Presented is the experimental edition of Unit IV: Transfer and Cycling of Materials in My Environment, which consists of 29 life science curriculum activities intended for the 13-to-15-year-old educable mentally retarded child. The curriculum guide is being used in the final field test prior to revision. Stressed throughout the program are ecological themes, inquiry skills, problem solving skills, environmental elements, and applicational behaviors and attitudes. Eight to 12 activities for each of the three core study areas within Unit IV are given of which the following are examples: plant and animal hunt, making a pill bug habitat, the hamburger lab, garbage, and planting in compost. Activities are organized into materials, teaching strategies, and anticipated student behaviors. The three cores consider energy and material transfer, decomposers in the environment, and garbage and the environment respectively. The ecological theme developed is the cyclic nature of processes, the inquiry skill seen to be developed is guessing and applying. Two problem solving skills emphasized are identifying controls and drawing conclusions. The environmental element considered is air. A desired behavior outcome is skill in personal body care. (For related curriculum guides see EC 050 871 through EC 050 874.) (DB)
Unit IV:
Transfer and Cycling
of Materials in My Environment
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<th>State/Province</th>
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The project to develop a life science curriculum for the educable mentally handicapped (EMH) was originally funded in the summer of 1969 by the Division of Research, Bureau of Education for the Handicapped, United States Office of Education. The project is charged with writing, field testing, evaluating, and disseminating materials dealing with topics in life sciences for the EMH population in our schools.

ME NOW, the BSCS model life science program for educable mentally handicapped youngsters in the 11- through 13-year age-group, has been released and is available from Hubbard Scientific Company of Northbrook, Illinois.

On the basis of the success of the ME NOW program, and in anticipation of meeting further student and instructor needs, the Bureau of Education for the Handicapped has provided the BSCS with a three-year continuation grant to develop model materials for 13- to 15-year-old EMH students. Recognition by the educational community of the need for special emphasis on matters of ecological concern led the BSCS staff to decide early in the project that a portion of the materials studies. The title of this portion of the materials is entitled ME A...

In May 1971, a planning conference for the development of ME A... by the five members of the writing team consisting of... and the needs of these studies. A multidimensional cognitive and affective... and needs of the child... of the literature of those needs might be...

Summer, 1971 - Initial writing conference
1971-72 academic year - Initial testing
Summer, 1972 - Revision
1972-73 academic year - Large-scale testing
Summer, 1973 - Revision
1973-74 academic year - Conclusion
### INTRODUCTION

The project is for the educable in the summer of 1971, a planning conference was held to prepare guidelines for the development of **ME AND MY ENVIRONMENT**. The conference was attended by the five members of the advisory committee, four of whom are in the field of special education and the fifth is in biology; the project writing team consisting of five special education teachers and five biology teachers; and the BSCS project staff. Conferences developed guidelines covering areas of environmental concern and utility for the target population of children, the characteristics of this population, and the needs of these children that might be met through environmental studies. A multidimensional model incorporating the science content, cognitive and affective behaviors, ecological themes, contextual focus, and needs of the children resulted from the planning conference. Following the conference, the BSCS project staff prepared a proposed content and objective outline for the curriculum. A thorough study was made of the existing literature covering the physical, social, and psychological needs of handicapped adults; the staff then attempted to identify which of those needs might be met by **ME AND MY ENVIRONMENT**.

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<td>1973-74 academic year</td>
<td>Conclusion of field test</td>
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</table>
THE ROLE OF THE TEACHER IN THIS EXPERIMENTAL EDITION

This curriculum has been written by teachers; it will be tested and modified by teachers. BSCS has a very enthusiastic teachers for this development, testing, and modification. Ten of these teachers served on the test team; more were selected as experimental teachers to provide the best possible initial field test of the curriculum. Feedback for the revision depends heavily upon the resourcefulness of these teachers. This means that teachers will be expected to:

1. Implementing the strategies and activities exactly as they have been written. Only when the complete curriculum as prescribed are analyzed can its strengths and weaknesses be revealed.

2. Developing a feel for the inquiry strategy, flow of activities, and ultimate student behaviors are an integral part of this understanding of the rationale of this program, the test teachers must suggest extensions of the activities; invent yet others as needed that would enable their students to achieve the objectives when the strategies are used.

3. Providing timely, accurate, and detailed feedback specifying strengths and weaknesses, modifications.

4. Contributing to the actual writing of the curriculum in a few of the open-ended situations. We put in italics at spots where we have given you the opportunity to develop a portion of an activity in depth. Notice that this request is not made everywhere, but it will enable us to identify potential writers among the group of test teachers.

The following outline will provide you with an overview of the major components of the program:

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<td>Landmarks In My Environment</td>
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Interrelationships Of Environmental Components | Observing | Experimenting | Knowing What The Problem Is And What To Do To Solve It |
Identifying                                      |          |             |                                                          |
will be tested and modified by teachers. BSCS has attempted to find highly skilled, flexible, and creative teachers to create the materials. Ten of these teachers served as writers to create the materials. Fourteen teachers provided the best possible initial field test of the curriculum. The success of this test in providing the resourcefulness of these teachers. This means that the test teachers have several responsibilities, exactly as they have been written. Only when the combined results of all teachers' use of this curriculum is organized. Through the program, the test teachers must suggest extensions of some activities, modifications of others, and feedback specifying strengths and weaknesses, modifications, alternatives, and student responses for each curriculum in a few of the open-ended situations. We purposely have provided blank pages in the manual to develop a portion of an activity in depth. Not only will this give ideas to the future writers, writers among the group of test teachers.

Overview of the major components of the program:

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<td>--skills in recognizing environmental landmarks and utilizing these for orientation and mobility.</td>
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### UNIT V. POPULATIONS AND SOCIETIES

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#### SOME GENERAL OBJECTIVES

1. To help the mentally handicapped child develop interests, skills, and positive attitudes through experiences with scientific -- especially biological -- concepts.

2. To provide the mentally handicapped child with challenging intellectual activity at a level commensurate with his ability to respond effectively.

3. To aid the child for his environment

4. To contribute to social maturity and
<table>
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<td>-- a feeling of competence in dealing with his environment.</td>
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<td>-- a basis for aesthetic appreciation.</td>
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<td>-- skill that may lead to a hobby or avocation over a lifetime.</td>
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<td>-- an attitude about and concern for overcrowding and its social and personal implications.</td>
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3. To aid the child in establishing functional modes of living through heightened observation, a well-developed curiosity, an increased measure of self-confidence, and a sense of responsibility to and for his environment.

4. To contribute to the development in the child of a higher level of social maturity and emotional stability that can lead to increased
vocational proficiency, realistic self-concept, creative self-expression, and more effective assimilation into the community.

5. To develop in the child a knowledge of himself in relation to his environment, along with a tendency to apply this knowledge to the tasks of everyday living.

6. To contribute to increased knowledge about the learning characteristics and limitations of the educable mentally handicapped pupil, and about effective strategies for instruction.

BASIC ASSUMPTIONS UNDERLYING THE DESIGN FOR THE CURRICULUM MATERIALS

In the initial discussions with the special education community, some basic assumptions for the development of the life science materials were identified. These were revised somewhat, based on the development and testing of ME NOW, to form the underlying assumptions for the development of ME AND MY ENVIRONMENT.

1. Ideas must be developed with a minimum of reading on the part of the student.

2. Vocabulary, where possible, should involve functional rather than technical language, although technical names are taught when these may be useful to the student.

3. Entry points should be concerned with concrete, tangible "things," rather than with abstract, intangible ideas or concepts.

4. The classroom environment and the materials should not be cluttered with distractors; however, a variety of perceptual modes and instructional media should be used (e.g., sight, touch, smell, etc.).

5. Activities should on or reinforce a

6. Learning, for the redundancy, and t student-watching.

7. An activity must desired behavior;

8. ENH children need oriented instruct

9. The curriculum sh experience in sci their environment

10. Most teachers of specific direction science concepts.

11. The teachers of the part, are not sci specific with reg

12. The materials and differences and to population.

13. To achieve the ob attempt to create is, the amount of is probably a fun be established to
Activities should be developed in small, discrete units that build on or reinforce a concept or skill.

5.

Learning, for the EMH student, requires slower pacing, greater redundancy, and time for participation by each student. The instructional materials should be student-doing rather than student-watching.

6.

An activity must involve the student in ways of applying the desired behavior; transfer cannot be assumed.

7.

EMH children need and can respond effectively to an activity-oriented instructional approach.

8.

The curriculum should be designed to provide students with an experience in science as inquiry, through the exploration of their environment.

9.

Most teachers of the Educable Mentally Handicapped will need specific directions in using inquiry strategies for teaching science concepts.

10.

The teachers of the Educable Mentally Handicapped, for the most part, are not science-oriented; therefore, the materials should be specific with regard to science techniques.

11.

The materials and methods must allow for attention to individual differences and to specific learning characteristics of the population.

12.

To achieve the objectives, designers of the materials should attempt to create a balance between detail and motivation; that is, the amount of minute and abstract detail that can be learned is probably a function of the interest and motivation that can be established to deal with it.

13.
The curriculum includes instruction related to the personal well-being, self-worth, confidence, and successful coping of each person to meet persistent daily life problems. The major aims are:

1. Development in each child of a sense of identity as a person who has some degree of control over and can act on his environment. This will lead to a degree of self-determination based on a rational coping with situations rather than a passive compliance or an impulsive response to problems.

2. Development in each child of a success syndrome. More than anything else, each activity is intended to be a success experience for each child. It is the teacher's responsibility - almost obligation - to see that each child succeeds at a level that is challenging to his abilities and that preserves his self-respect. It is a further responsibility of the teacher to point out his achievement. As a group, the students should help each individual fit what he has done into a pattern of accomplishment.

The curriculum is intended to be intellectually stimulating, and exploratory for each student, and to induce him to become actively involved. It should encourage the following outcome:

3. Development in each child of an interest that could become a hobby or avocation over a lifetime (through an exposure to an array of experiences in science). It is hoped that many children will find some area -- perhaps growing plants, caring for animals, identifying flowers, collecting things, or simply enjoying outings into the country -- that they feel strongly about and can develop some competence or knowledge in. This would provide a means of self-expression, and (perhaps) allow some degree of sharing or involvement with others.

The curriculum is or some specific content objectives are:

4. Development in each child of a sense of belonging to a group, because they want these kids to feel good about and care for other living things. A junior high student is not ready for this; he is ready to bring these kids a little help and (if there is a feeling of belonging to a group, because they want these kids to feel good about and care for other living things) it works...Another thing down -- try it again, just the tone of voice. 

5. Development in each child of an understanding of the environment and...

These are the five objectives for teachers and guides. A junior high student is not ready for this; he is ready to bring these kids a little help and (if there is a feeling of belonging to a group, because they want these kids to feel good about and care for other living things) it works...Another thing down -- try it again, just the tone of voice. 

Since the original plan for teachers and guides...
The personal well-being of each person for aims are:

- Development in each child of a sense of relationship and empathy with other living things. It is hoped this will lead to a positive regard and caring about what affects them as individuals and as a group, because what affects them affects the community of man.

- Development in each child of an understanding of environmental conditions that will lead to a sense of responsibility for the environment and actions that protect or improve it.

These are the five overriding aims that should serve as reference points for teachers and guide much of what they plan and do in the classroom. A junior high student in one of the first classes that tested these materials expressed what is needed this way: "I just feel that if we want these kids to improve, and that's the whole idea of it, you have to bring these kids a certain amount of happiness. You have got to make them feel that they are really wanted. If they are wanted, they will try a little harder. That sounds kind of childish, I suppose, but it works...Another thing...always inspire: 'Come on, put your best foot down -- try it again.' You know, things like that. I mean, to me, just the tone of voice makes a difference to me about going out or staying in this class. I just feel that they don't want me -- And they don't, (when their tone says) 'Oh, Eddie! Why did he have to come today?'

**ECOLOGICAL THEMES**

Since the original planning conference for the development of ME AND MY ENVIRONMENT, eight ecological themes have emerged which seem to encompass the major ideas and concepts (i.e., the science content) that the curriculum development team sees as appropriate for this student population. These themes are broad generalizations, some understanding of which appears to be a prerequisite for coping with
one's own environment as well as with society's environmental problems. The themes are probably best thought of as unifying threads which run throughout the curriculum.

1. INTERRELATIONSHIPS OF ENVIRONMENTAL COMPONENTS.

"When we try to pick out anything by itself, we find it hitched to everything else in the universe." -John Muir

Life is entirely dependent upon the things that the environment supplies: air, water, food, shelter, and subtle things such as a suitable temperature and humidity. Animals depend upon other animals or plants for food. Scavengers (carrion and detritus feeders) and decomposers (bacteria and fungi) obtain their nutrition from the remains of living organisms. Green plants depend upon sunlight, air, water, and minerals from their environment and form the base upon which all organisms are interconnected by food chains and complex food webs.

Organisms interact with each other, and with the environment, in a variety of ways in addition to the eater-eaten relationships of food chains or webs. Plants compete with each other for light, water, soil nutrients, and growing space. Animals compete for available food resources, space, and shelter. Other relationships include parasite-host and pathogen-host interactions.

The important consequence of this theme is that actions are not singular, nor do they have singular impact. Man's competitive interactions have far-reaching, often unknown consequences. For example, clearing land for raising agricultural crops destroys the habitat for plants and animals and disrupts certain food webs, while establishing suitable habitat for agricultural species. The resulting monocultures are often vulnerable to attack by pests because populations of natural predators competitive organism exacerbate the situation, predators, scavengers. Similarly, herbicide crops may destroy nontarget beneficial large-scale, indiscriminate applications of insecticides, herbicides may destroy harmful species, and application air and water pollution resources upon which of a myriad possibilities of consequences of consequences that life depends. Simple actions may have

2. DIVERSITY AND PATTERNS

There is great diversity and topography general communities of plants are adapted to perform there is diversity. Recognize the functioning and interrelationships within the biosphere.

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of natural predators have been removed. Attempts to control these

competitive organisms through applications of pesticides may simply

exacerbate the situation by killing nontarget organisms such as

predators, scavengers, and decomposers which are actually beneficial.

Similarly, herbicides used in control of weeds which are competing with
crops may destroy habitats for natural predators, making additional
applications of insecticides necessary; these in turn may kill more
nontarget beneficial organisms. Numerous studies have shown that

large-scale, indiscriminate use of pesticides may, in the long run,
actually decrease agricultural productivity. In addition, manufacture,
transport, and application of pesticides and fertilizers contribute to
air and water pollution, thereby adding to the degradation of vital
resources upon which all life depends. This is but one simple example
of a myriad possibilities. If we expect students to start thinking in
terms of consequences, it is imperative that they realize and ap-
preciate that life depends upon interrelationships and that apparently
simple actions may have far-reaching implications.

2. DIVERSITY AND PATTERN.

There is great diversity in the environment. Differences in climate
and topography generate different environments made up of different
communities of plants and animals. Plants and animals differ as they
are adapted to perform different functions. Even within a species
there is diversity. But, it is possible to find patterns within that
diversity. Recognizing patterns helps one conceptualize and understand
the functioning and interrelationships of all environmental elements
within the biosphere.

If one looks at the organisms in any habitat, he discovers a variety
of sizes, shapes, and colors. Further examination will reveal groups
of organisms that are related in various ways, e.g. some produce food
(producers) while others feed upon these producers (consumers). We
find that the organisms are all related in a pattern forming a food web.

Diversity is thought to enhance the stability of a system, for it provides alternate channels of energy or materials flow if part of the system is lost or overburdened. For example, consider a single food chain: plants, grasshoppers, frogs, snakes. If one link in the chain is lost, e.g. the grasshoppers are wiped out by insecticides, all links beyond that one will also be lost if they have no alternative sources of food. In a complex food web, however, a link may be lost without destroying the system; links beyond the missing one may turn to another channel for food (e.g., the frogs may exploit another type of insect food resource). Thus, preserving diversity may be necessary in preserving the stability of the life support system of the biosphere. Man cannot exist alone.

It is often said that variety is the spice of life. Diversity makes the environment less monotonous and more interesting. This aesthetic component should receive emphasis in the curriculum.

3. COMPLEMENTARITY OF ORGANISMS AND ENVIRONMENT.

A complement is something that completes or fills out something. Complementarity in this context refers to the completion brought about by interrelationships which are dependent upon one another. A few examples should clarify the meaning of this theme.

Organisms use material things from the environment and, in turn recycle things to the environment which may be used by other organisms. Thus, the presence of organisms modifies the environment in various ways, some of which make the environment more suitable for other organisms. Plants use carbon dioxide and release more oxygen than they use. Consumer organisms (animals, both the producers and the remains environment. Probes essential elements have come to a screeching halt.

Without scavengers, the rate of evaporation the atmosphere. Thus, plant succession is field, new roadside hardy pioneer plants die, and decay, thus by plants which are turn, cause further finally a relatively itself and that is a communities are usual.

4. FLOW OF ENERGY

"The biotic strata circuits, rapidly declining or as of stages in the
organisms (animals, decomposers) use oxygen and release carbon dioxide. Both the producers and consumers are dependent upon the environment for these resources, and the balance of these materials in the environment is likewise dependent upon both groups of organisms.

Without scavengers and decomposers there would be a prodigious accumulation of the remains of once living organisms cluttering up the environment. Probably all of the available carbon, oxygen, and other essential elements would be tied up in these dead remains. Life would have come to a screeching halt a long time ago!

The presence of plants improves the water-holding capacity of a watershed and helps prevent erosion of the soil by wind and water. plants reduce the rate of evaporation of soil water but at the same time release it to the atmosphere. Thus, plants play a vital role in the water cycle and influence local climates through the regulated flow. Plant succession is a classic example of complementarity. An abandoned field, new roadside, or similar disturbed area is quickly invaded by hardy pioneer plants which we usually think of as weeds. As these grow, die, and decay, they modify the immediate environment and are replaced by plants which are better adapted to the new conditions. These, in turn, cause further modifications and are replaced by other populations; finally a relatively stable community exists that is able to replace itself and that is in dynamic equilibrium with the environment. Such communities are usually referred to as climax communities.

4. FLOW OF ENERGY

"The biotic stream is capable of flowing in long or short circuits, rapidly or slowly, uniformly or in spurts, in declining or ascending volume. Ecology calls this sequence of stages in the transmission of energy a food chain, but it
Energy may be defined as the capacity to do work. To cause movement requires energy; indeed, to do anything requires energy. Life depends upon this continuous flow which is initiated by a constant input of energy from the sun, its photosynthetic transformation from light to chemical energy by the producer organisms (green plants), its passage from organism to organism along various food chains, and its eventual loss as radiant heat to outer space. Each time that energy is converted or transformed at each step along the way, some of it is lost from the system and is no longer available to do useful work. This, in simple terms, is the second law of thermodynamics. Green plants are able to fix photosynthetically only a portion of the sun's energy that they intercept. In turn, some of the energy which they trap and store is used by the plants for such things as growth, reproduction, and the movement of materials. Thus, only a portion of that original stored energy is available to the organisms which eat the plants. These organisms likewise use energy in their various life processes so that only a small portion of the energy which they received from eating plants is available to their predators. As a consequence, only about one-tenth of the energy at any step in a food chain is available to the next level. An acre of agricultural land will provide enough food energy for about 1.5 persons for a year if planted in wheat, but will feed only 0.1 person if used to raise beef cattle.

Society's use of fossil fuels is simply a utilization of energy captured and stored over millions of years by green plants. As such, this source of energy is in finite supply and is a nonrenewable resource. Electricity generated by fossil-fuel burning plants can similarly be traced to the sun. Hydroelectric plants offer a limited alternative source of energy. The energy stored in the limited number (which is simply a duplicate on the sun to replace others, is governed once released, flows to space as heat. This is technology of the sun is used to generate? Can the energy generated? What effect on organisms?

It should be emphasized present, of replacing... In the foreseeable future, the sun, through photosynthesis... 5. CYCLIC NATURE OF PRODUCTION

"All the rivers run..."

In contrast to energy, living to nonliving supply, and if they we of resources and cease to live. Essential minerals such as... Decomposer organisms... releasing materials which... that they are once environment.
To cause movement by a constant transformation anisms (green living various food outer space. Each step along is no longer possible to fix energy that they trap, growth, only a ble to the likewise use by a small planting plants e, only about in is available will provide air if planted o raise beef tion of energy en plants. As is a nonrenewable burning plants can ts offer a limited alternative source of electricity. This source is also finite because of the limited number of adequate sites. The use of nuclear reactors (which is simply a duplication on earth of the natural processes taking place on the sun to release energy) to generate electricity offers an alternative source of energy for society; this source, however, as are all others, is governed by the laws of thermodynamics. The energy, once released, flows through the system and is eventually lost to space as heat. This source is also finite, but refinements in the technology of the breeder reactor may make it a very large source. The exploitation of nuclear energy is fraught with unanswered questions and problems. How can we safely dispose of the radioactive wastes generated? Can the earth dissipate the huge amounts of waste heat generated? What effects will this heat have on climates, ecosystems, organisms?

It should be emphasized that nuclear energy offers little hope, at present, of replacing the sun as a life-supporting source of energy. In the forseeable future, man's only source of food energy will be the sun, through photosynthesis of green plants.

5. CYCLIC NATURE OF PROCESSES.

"All the rivers run into the sea, yet the sea is not full."
-King Solomon

In contrast to energy, materials (matter) are continuously cycled from living to nonliving systems. Materials necessary for life are in finite supply, and if they were not constantly cycled, life would simply run out of resources and cease. Some examples include the water cycle, the carbon dioxide-oxygen cycle, the nitrogen cycle, and the cycling of various essential minerals such as calcium, potassium, sulfur, and magnesium. Decomposer organisms play a most vital role in many of these cycles, releasing materials which have been incorporated into living organisms so that they are once again available to other organisms in the environment.
Man's present exploitation of consumable resources, in most cases, upsets these natural cycles. The manufacture and ultimate discarding of nonbiodegradable products removes important elements and compounds from the natural cyclic processes of the ecosphere and could ultimately lead to the exhaustion of such resources for the life support system. Burning of fossil fuels is changing the natural balance of oxygen and carbon dioxide in the atmosphere, with the consequences largely unknown. Degradation of air and water through pollution and the application of pesticides destroys organisms which are vital to cyclic processes.

6. FINITENESS OF RESOURCES.

To paraphrase Barry Commoner: Everything has to come from somewhere. The earth has been likened to a spaceship because of its finite supply of all material resources. Inasmuch as life depends upon a continued supply of resources, things have to be used over and over. Continued exploitation of any resource will lead to its exhaustion unless that resource is recycled. The demands of today's technological societies are placing tremendous burdens on the earth's resources and, at the same time, the wastes generated are making other resources unavailable or unfit for supporting life. Projections indicate that we will have depleted our supply of fossil fuels and several important metals resources early in the next century.

Through photosynthesis, food is a renewable resource so long as the natural cycles are able to resupply the raw materials necessary, and so long as environmental conditions necessary for plant life are maintained. But, the amount of food that can be produced on the earth at any one time is finite! There is only so much area available, only so much sunlight that can be intercepted, and only so much of the required raw materials available.

The consequence of this theme is that an indefinite continuation of growth and an increasing use of resources is impossible when the supply of all resources is finite, resource utilization, other parameter which projections indicate the growth. Most of us are doing

7. POPULATION DYNAMICS

A population refers to all individuals occupying a given space which is determined by factors such as immigration, and rate of growth (e.g., 2, 4, 8) and their environment as well as disease. They then come to equilibrium with other species. A common misconception is that the population will follow the first pattern curve up to the carrying capacity. There are, however, other patterns. The rapidly depleted, crash population is a good example of the population increasing to the carrying capacity or the environment beyond an appreciable length of time and then the population crashes when the population crashes are searching out a new environment.

The strategy is simple: while it is here and this process will survive. There is evidence that the similar to those described of the earth's resources.
of all resources is finite. This is true of population, food consumption, resource utilization, technology, gross national product, or any other parameter which one chooses to measure. And all noteworthy predictions indicate that we are very rapidly reaching the limits of growth. Most of us will probably experience the dire consequences!

7. POPULATION DYNAMICS.

A population refers to a collection of individuals of the same species occupying a given space at a given time. The size of living populations is determined by four factors: rate of birth, rate of death, rate of immigration, and rate of emigration. Populations tend to grow geometrically (e.g., 2, 4, 8, 16, 32,...) to the limit (carrying capacity) of their environment as determined by the available food, space, predation, and disease. They then either level off and exist in some fluctuating equilibrium with other populations, or they crash back to some low level. A common misconception is that all biological populations tend to follow the first pattern: growth which is described by an S-shaped curve up to the carrying capacity, followed by a fluctuating equilibrium. There are, however, many biological populations which dramatically overshoot the carrying capacity of their environment and, as resources are rapidly depleted, crash back to a low population level. A blowfly population is a good example of the latter. Upon arrival at a carcass, the population increases rapidly, completely overshooting the carrying capacity or the environment's capacity to sustain the population for any appreciable length of time. As the food resource is quickly depleted, the population crashes back to the low level of a few adult flies who are searching out a new carcass to feed upon.

The strategy is simple -- exploit the environment for all it's worth while it is here and hope that a few of the many adults produced in the process will survive long enough to make it to the next carcass. There is evidence that the characteristics of human population growth are similar to those described for the blowfly, and our present exploitation of the earth's resources is certainly analogous to the strategy employed...
by the blowfly. While such a strategy may be sound for organisms like the blowfly, it certainly would be disastrous for mankind. The earth is the only carcass that we have.

Since resources are finite, no population can continue to grow forever. The human population has grown geometrically over the past few centuries. Doubling time of the human population is currently less than 35 years, and the most optimistic estimates indicate that this population will exceed the carrying capacity of earth within a century (some suggest that we have already passed the carrying capacity and many demographers and ecologists have predicted a crash in the human population prior to the year 2020). Population control and zero population growth will be accomplished, either by self-imposed means or by natural means. If the latter, it will occur through starvation, disease, war, or lower fecundity. There are no other plausible alternatives!

Perhaps the greatest service that this curriculum could hope to perform is to help this population of youngsters understand the implications of population growth and the necessity for limiting family size. But, to achieve the desired end, the curriculum must provide the students with an understanding of the ways and means by which family size may be controlled. This is one area where individuals can make decisions, can have an influence, and can contribute to the solution of what may be mankind's most pressing problem!

8. ECOLOGICAL TRADE-OFFS.

"Every coin has two sides."

As we have seen, all environmental components are interrelated in intricate, complex ways. No action has singular impact, and thus any course of action must be carefully weighed and alternatives considered. Any course of action involves ecological trade-offs. For example, consider enjoying a life style which facilitates labor-saving devices and electricity is a major large, we have made the life style of those desirable devices. Project electrical power will be made using the arctic tundra, a valuable resource.

INQUIRY PHILOSOPHY

We do not view science as a system of facts and schemes. We have incorporated facts, not for their own sake, but for the way they can be used to further our understanding of the world we live in. For EMH students, as for all students, inquiry is a process of inquiry. Inquiry stems from curiosity about a question or problem and may involve behaviors such as observing, inferring, applying creative thinking (diplomacy, invention, or planning). Inquiry, simply defined, is a process of discovery, a means of learning. Inquiry, simply defined, is a process of discovery.
For example, consider society's use of electricity. Many of us enjoy a life style which is very closely tied to the conveniences and labor-saving devices powered by electricity. The generation of that electricity is a major factor in environmental degradation. By and large, we have made the decision to forego a certain amount of environmental quality to enjoy the leisure and convenience of electrical appliances. Projections indicate that increases in demand for electrical power will require strip mining vast areas of Wyoming and Montana, exploiting oil shale reserves of Colorado, depleting the petroleum reserves of the Alaskan north slope (with the inherent dangers to the arctic tundra), and constructing large numbers of nuclear power plants. In all of these activities, we will trade off various amounts of environmental quality.

INQUIRY PHILOSOPHY

We do not view science as a collection of facts, but as a process by which facts are gathered, interpreted, and organized into conceptual schemes. We have included facts, and activities structured to generate facts, not for their intrinsic value but to provide the means through which concepts and generalizations are developed through an inquiry strategy.

Inquiry, simply defined, is finding out why. Inquiry may be defined as a process of questioning, of seeking information, of discovering. For EMH students, as for others, the excitement of discovery adds meaning to learning. Inquiry allows the student a natural avenue for satisfying his curiosity about his world. An inquiry strategy is one which poses a question or problem and then guides students through inquiring kinds of behaviors such as observing, describing, identifying, comparing, associating, inferring, applying, predicting, translating, guessing, speculating, creative thinking (divergent production), and value judging.

There are degrees of inquiry. On one end of the scale, a question is posed and the student, after analyzing the question and applying his
experiences and background information, answers the question. At the other extreme, the student poses the question after being given a certain amount of background information, and then proceeds to answer the question after being given a certain amount of background information, and then proceeds to answer the question by designing an experiment, conducting the experiment, and interpreting the results.

All degrees of inquiry have a common ingredient: the answer is not given; it is arrived at by the individual after he has analyzed information relevant to the question. The distinction is obvious -- in inquiry strategies the questions are answered by the students and not the instructor.

If knowledge is acquired, at least in part, through an inquiry strategy, then the student should be able to use that strategy in acquiring further information and solving future problems as they arise.

It is assumed that after completion of the curriculum, the student will ask questions that emerge through the interaction of environmental inputs with the experiences we have provided. He will be more able to seek answers to these questions through his ability to acquire and interpret information.

**INQUIRY SKILLS**

1. **Observing** is a fundamental activity of scientists. The accumulation of information which may lead to knowledge comes primarily from what we see, hear, taste, smell, or touch. A major function of this curriculum should be to offer a rich and varied environment of concrete experiences for the students. As students gain experience, accuracy in observing and recording the details of their findings should be increased. Observing should frequently include an element to heed all of the senses.

2. **Identifying** involves identifying certain properties or characteristics of objects or events. This includes the identification of a property, the definition, the use of previous experience.

3. **Associating** involves identifying relationships or recognizing similarities between specific stimuli. Information for associating, may come from experience or observation.

4. **Describing** involves describing objects or events that were observed. Observations about how and why the student did not actually use the description, may enhance development.

5. **Comparing** involves identifying similarities or differences between objects or events. The use of reference points to generalize recognition may help students recognize that one has an understanding of a concept.

6. **Translating** involves expressing one idea in another way or a new context.
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including an element of divergent production by asking the students to heed all of the details, extraneous and otherwise, that they can. Opinion, interpretation, and speculation are not, of course, a part of observing.

2. IDENTIFYING involves the recognition of what something is or of certain properties that make it possible to categorize the thing. This includes the determination and/or matching of a name or definition, the use of a key or guide, or the recall of a label from previous experience.

3. ASSOCIATING involves seeing what things go together -- seeing relationships or recognizing common properties. Associating may be thought of as a prerequisite to classifying, or organizing data or information for some purpose. Grouping (classifying), through associating, may enhance conceptualizing.

4. DESCRIBING involves writing or verbalizing orally all of the relevant observations about a thing so that another individual would be able to use the description to identify the object or share in an event he did not actually experience. Emphasizing description should enhance development of observational skills.

5. COMPARING involves the inspection of two or more objects (events) to note similarities and differences. It is closely related to the student's ability to distinguish between critical differences and to generalize recognizable similarities. This skill could involve the use of referents other than the things compared. It is necessary that one have an understanding of such comparatives as hotter-colder and smaller-larger, as well as a comprehension of their related values, e.g., warmer-cooler and littler-bigger.

6. TRANSLATING is the skill in which recorded observations (data) are expressed in another symbolic form. The conversion of tabular
6. INFERRING involves drawing a conclusion based on evidence. It requires going beyond the information at hand to describe an effect or answer a question. It involves extrapolation and implication, and is closely related to two of the problem-solving skills: interpreting results and drawing conclusions.

7. APPLYING involves the utilization of a learned task or skill in some other situation than that in which the task or skill was originally learned. For example, if a child has learned to orient the top of one map with north, an application would be to orient another map in a similar manner.

8. GUESSING is the generation of ideas about outcomes in a data-poor situation. It involves using one's common sense and hunches to make the most informed judgment one can.

9. SPECULATING is the process of generating ideas about the nature or outcome of something one has not had the opportunity to observe, but about which one can think based on past experiences. It may be that a great deal is known about the subject, but without having observed it, one must describe the event from imagination.

10. PREDICTING is the skill of making informed estimates of what should happen in a given situation, based on knowledge of what enters into the situation and previous experience.

11. DIVERGENT PRODUCTION refers to the process of generating as many ideas about something as possible.

12. VALUE JUDGING involves more than simply expressing opinions or preferences. It is the comparison of things and the assignment of relative value to them, based upon some set of criteria. In this curriculum, the WHY of valuing should be sought.

13. EXPERIMENTING is the opportunity to set of materials, explore, and to find. Some examples of environmental can be burned, use thermometers, balances, etc.
PROBLEM SOLVING SKILLS

Inquiry is finding out WHY. The process of finding the answers to WHY is problem solving. The ME AND MY ENVIRONMENT science curriculum is a structured sequence of activities that enable the student, through success, to learn to seek the answers to WHY. It is hoped that the experiences provided in the curriculum will enable the student to face and solve the problems of everyday life, both now and later.

There are at least three levels of mastery of problem solving skills. The minimum level is an awareness of the skill. The second level is the functional ability to perform it. The highest level includes the capability of designing an original experiment and carrying it to completion. It should be borne in mind that problem solving behavior is a complex package involving past experience, motivation, cognitive development, etc. The development of problem solving skills should be closely related to the appropriate inquiry skills, concepts, and other organizers of the curriculum.

A brief description of the intended interpretation of the problem solving skills follows in what we consider to be a hierarchy of easiest to most difficult.

1. **EXPERIMENTING** is doing something to see what happens. It is having the opportunity to "mess around" with a given piece of apparatus or set of materials, to pursue individual curiosity or interest, to explore, and to find things out.

   Some examples of experimenting include: investigating the properties of environmental objects (e.g., which ones will float, which ones can be burned, which are man-made, etc.), having the opportunity to use thermometers or balances, raising a classroom pet or plants, burning things under a pinwheel, having time to experiment with the balances, etc.
It is important to distinguish between experimenting as we have defined it and the formal aspects of experiment and experimental design. Note that the formal aspects are dealt with as a separate category and that designing experiments is thought to be the most difficult of the problem solving skills.

To encourage development of this skill, instructions such as "ALLOW STUDENTS TO MANIPULATE AND EXPERIMENT WITH THE BALANCES," "CAPITALIZE ON STUDENT INTEREST BY ALLOWING STUDENTS TO OBSERVE AND HANDLE THE PETS," etc., are given to the teacher.

2. KNOWING what the problem is and what to do to solve it. Defining the problem and its parts clearly is an important first step in any problem solving situation. We assume that recognition and definition of a problem represents a difficult task for this student population, and has therefore been placed high in the problem solving skill hierarchy. The purpose of this skill is to assist students through many experiences in recognizing that a problem exists, in defining that problem, and understanding how answers to that problem might be obtained. This skill must be emphasized (that is, the problem made explicit) for the logical development of those skills which follow. Here we are concerned that the student know the question under investigation and clearly understand the methods to be used in attempting to answer that question. The materials should emphasize, for both teachers and students, that science is a process of finding answers to questions. There is a subtle difference between telling the student the answer to the question he is investigating (e.g., "To see if it is warmer in the sun or in the shade") as opposed to making it clear what the task focus is (e.g., "To see if there are differences in the temperature of different parts of the environment, and if so, see if we can discover what makes the temperature different in different places").

3. RECORDING DATA Quite often, observation and experiment fail to deliver information useable for interpretation. Recording of observations by the investigator to record and interpret them in the context of the question. This recording sounds, etc., etc., is given to the teacher.

4. DISCUSSION AND TR Rubric at the outside of the investigation and from another standpoint and thread rather than the identification of variability of the identification of variability of the collection of discussion of variability. The ability to express involvement here, with observing, identifying differences. Discussion provides the teacher understanding of the possibilities for further activities to re-evaluate and review.

5. ORGANIZING DATA This skill makes it easier to organize the information. Included in this category are choices such as line or bar representations. The ability to express differences related to data for the student. Organizing data of translating information.
3. **RECORDING DATA** questions of science are answerable through observation and collection of data pertinent to the question. Recording of observations is a necessary skill to enable the investigator to recall the observations and discuss and interpret them in view of the question. Included here is the collection and transcription of information called for by the question. Making sketches, notes, taking pictures, recording sounds, recording measurements, etc., are included.

4. **DISCUSSION AND TREATMENT OF GROUP DATA -- COMPARING RESULTS**
A look at the outcomes of each student's or student group's investigation and a discussion of why one result may differ from another should emphasize the dynamics of group discussion and dialog rather than recitation and monolog. Discussion of variability of results should assist students in the identification of variables which may influence outcomes. The ability to express or talk about what was done is involved here, with students operating primarily at the observing, identifying, describing, and comparing levels of cognition. Discussion of individual or group results provides the teacher with an opportunity to assess student understanding of the investigation and to recognize possibilities for further investigation, alternative activities to re-emphasize particular concepts, or review.

5. **ORGANIZING DATA** The ordering and grouping of recorded information makes it easier to interpret and see relationships. Included in this category are tabulation of data, averaging or deciding on best estimates, any visual representation such as line or bar graphs, and pictures or schematic representations. This is the most difficult skill directly related to data for students to become proficient in. Organizing data often involves the inquiry skill of translating information into a different symbolic form.
6. EXPLAINING, DEFENDING, ANSWERING WHY QUESTIONS This involves discussion of a more sophisticated level than that previously considered. Explaining should assist in the development of the idea of cause and effect. It implies the students' understanding of the question, the procedures, and some ability to interpret results. Defending encourages confidence in one's procedures and interpretation of outcomes. Answering why questions requires an understanding of the questions and task as well as forcing students to analyze data and make interpretations. In the activity Food For Sleep, such questions as "WHERE DID THE HEAT ENERGY COME FROM?" "HOW DO YOU KNOW?" and "WHY ARE YOU TAKING THE TEMPERATURE OF ALL THREE CONTAINERS?" fall into this category. To answer such questions, the students are often operating at the inference level of cognition.

Specific examples of such questions are included in the guide. It seems particularly appropriate for the teacher to be asking individuals or groups these kinds of questions as they proceed with an investigation. We need to emphasize, by providing questioning strategies, that discussion of this sort with individuals and small groups is an effective method of instruction which provides immediate feedback to the teacher.

7. ASKING QUESTIONS This category refers to student questions which are raised as a result of their observations, experiences, and experimenting. Teachers are given examples of the kinds of questions that students may raise and suggestions of how such questions should be dealt with.

8. IDENTIFYING VARIABLES Identification of those variables which may influence the outcome of an investigation is necessary if one is to understand the concept of a controlled experiment, if one is to make any sort of an appraisal of the design of an experiment. The that many factors recognize and id learn much by as skill is highly

9. IDENTIFYING CONT variables except constant can be

10. INTERPRETING RES problem solving Explicit models deal with the data question asked. tions of data and question; not go for further inve tempt of ign

11. DRAWING CONCLUS conclusions. The sions that are su conclusions are experimental ev forced conclusion gathered.

12. RECOGNIZING PROB necessary prereq problem solving s
This level than assist in ct. It implies the procedures, and encourages understanding of out-students to e activity Food For ENERGY COME FROM?" E TEMPERATURE OF . To answer such the inference ded in the guide. cher to be asking s as they proceed by providing is sort with method of instruc-teacher.

9. IDENTIFYING CONTROLS Once the students are able to identify variables that may influence an outcome, the idea that all variables except the one under investigation must be held constant can be developed.

10. INTERPRETING RESULTS This is perhaps the most important of the problem solving skills, and may be the most difficult to develop. Explicit models for teachers and students are provided. They deal with the data collected and interpret it in terms of the question asked. Emphasis is placed on recognizing the limitations of data and that the data may or may not have answered the question; not going beyond the data; and recognizing the need for further investigation. Teachers are cautioned to avoid the temptation of ignoring the data and simply providing "the answer."

11. DRAWING CONCLUSIONS Interpretation of results may warrant drawing conclusions. The emphasis here is on drawing only those conclusions that are supported by the data collected. Some forced conclusions are inevitable because of the difficulty of providing experimental evidence; however, great care is exercised to avoid forced conclusions when an experiment is conducted and data gathered.

12. RECOGNIZING PROBLEMS AND FORMULATING QUESTIONS This skill is a necessary prerequisite for the general application of the other problem solving skills outside the classroom situation. In other
words, if we expect students to apply the problem solving skills above to their daily problems, it seems necessary that they be able to recognize that a problem exists and be able to state an appropriate question. To develop this skill, the students are presented with events or phenomenon that present an identifiable problem, and then given the opportunity to define that problem.

13. DESIGNING EXPERIMENTS Once the students are able to recognize a problem and formulate a question, an experiment to answer that question may be designed. The design should include identification of variables and controls, methods for observation, gathering data, organizing and presenting data, etc. It is assumed that this student population will be able to perform this skill only after a great deal of experience with the preceding skills.

SPECIFYING STRATEGIES FOR INSTRUCTION

The model for inquiry used in these materials demands that the focus of classroom activity be on student involvement with materials and activities. The teacher functions as a catalyst in generating pupil response in the learning situation. The response desired may be attitudinal, cognitive, or psychomotor: verbal or nonverbal. The teacher's behavior also falls in these same categories, but with an important difference: the teacher must be totally conscious of his role as a stimulus, while the student is generally unaware that he is being manipulated by strategy.

To communicate maximally with the teacher, we feel we must carefully describe as much as possible of the pattern of interaction upon which the anticipated results depend. The whole intent of this curriculum would be defeated if this pattern is not understood and implemented. We know, for example, that teachers often fail to allow children the opportunity or the time to think for themselves when a problem is posed. They also frustrate of things on express their own views to provide for teachers that will -- if initial benefits we describe.

We do not anticipate individual students will provide enough remining unexpected or unpredictable materials are written.

UNIT GOALS

Unit goals are broad and of a major portion of will, is understood elements that capture the function also serve the function are directed.

CORE OBJECTIVES

The core objectives are outcomes for sequence to summarize what the each of the activity map for the teacher they may also serve as evaluation attainment of students
Problem solving skills are necessary that they be able to state an identifiable problem. They are able to recognize a concept to answer that problem. I include identification, gathering data, assumed that this skill only after the development of pupil classroom skills.

We do not anticipate that we can predict all that will occur with individual students in the classroom. We hope that we can, however, provide enough reminders to the teacher so that he will deal with unexpected or unpredicted events in the same mode in which the materials are written.

**LEVELS OF OBJECTIVE STATEMENTS**

**UNIT GOALS**

Unit goals are broad general statements that define long-term goals of a major portion of the unit. An initial statement, "The student will," is understood in each of the goals. They are defined as statements that capture the intent and emphasis of the curriculum. They also serve the function of organizers toward which the core objectives are directed.

**CORE OBJECTIVES**

The core objectives (stated in student behaviors) refer to the desired outcomes for sequences of activities. The role of these objectives is to summarize what the student will be able to do as a consequence of each of the activity sequences. The core objectives provide a cognitive map for the teacher to extend or elaborate on. These core objectives may also serve as evaluative guides to assess short-term progress and attainment of students.
ACTIVITY OBJECTIVES

Activity objectives are enabling or performance objectives that relate to the specific activity. They identify the actions or behaviors students must perform or acquire to insure their success in achieving the broader objectives of the curriculum. The role of the activity objective is to provide the teacher with specific instructional landmarks both to plot the course and to chart student progress. The objectives include information which the student has repeated or restated, experiences he has had, actions he has performed, and products he has made.

ANTICIPATED STUDENT RESPONSE BEHAVIORS

These focus on specific actions or interactions occurring during instruction. They describe what we predict students will do or say in response to some specific strategy.

TEACHING THE MATERIALS

It is often said that man is a curious animal and that science is a content vehicle to capitalize on this phenomenon.

Science, then, for the EMH student, capitalizes on the student's natural curiosity about himself. Science is exciting, and ME AND MY ENVIRONMENT relies on this excitement. This science program has been designed to fit into the already existing curriculum framework and within individual teaching philosophies.

The amount of time spent on each activity can be tailored to fit the mood of the class and the teacher. An average of 45 minutes may be required for all activities. Some activities will require extensive time, perhaps several days. The main point in teaching ME AND MY ENVIRONMENT is not to hurry -- to allow sufficient time for inquiry to occur.

The ME AND MY ENVIRONMENT take less time. The Particular attention curriculum with the o sight vocabulary is i suggestions given for lary lessons. Math s the lessons provide a

PLANNING GUIDE

Teaching the material time. Less preparative planning guide will he example, if a film is remind you when. The when initiating an ac

OVERVIEWS

Each UNIT and CORE is teacher an insight int

RATIONALE

Each UNIT and CORE is the why of the particu read, thought about, a to focus on and subsequen students.
objectives that relate to behaviors students in achieving the broader activity objective is to landmarks both to plot. Objectives include experiences he has made.

Sight vocabulary is included in many of the activities, and suggestions given for using these words in spelling and vocabulary lessons. Math skills are an integral part of science, and the lessons provide application of the student's math skills.

**PLANNING GUIDE**

Teaching the materials for the first time will require preparation time. Less preparation time is required after that. The teacher's planning guide will help you prepare materials in advance. For example, if a film is to be ordered, the planning guide will remind you when. The guide should be followed rather rigidly when initiating an activity.

**OVERVIEWS**

Each UNIT and CORE is provided with a summary "roadmap" to give the teacher an insight into the direction or groupings of activities.

**RATIONALE**

Each UNIT and CORE is provided with a section to provide background into the why of the particular material used. These rationales should be read, thought about, and continually referred back to in order for you to focus on and subsequently provide why intentionality to your students.
BACKGROUND INFORMATION

Some pertinent points which are not necessarily developed in the curriculum itself but which will provide you with useful information have been incorporated in this section at the beginning of each CORE.

REVIEWS TO SUCCESS AND CLUES TO SUCCESS

A portion of the evaluation program during the first field testing of ME AND MY ENVIRONMENT entailed the use of what was basically an objective pretest, administered on the days before beginning instruction on each unit, and an identical posttest administered the days following completion of each unit. The items included in each test were specifically designed to secure information on the students' background knowledge as well as to secure data about the success of the materials. They were not used to evaluate the youngsters.

Because the item designs for use with this student population proved highly effective, many of these questions, along with some situational tasks, have been incorporated into two instructional assessment sections. The first of these, "Clues to Success," appears periodically within various activities so that you can have immediate feedback on the effectiveness of the materials and instruction. At this point you have the unique opportunity to determine whether or not your students are ready for the next activity or whether a modification, repetition, extension, or review of certain activities is necessary before proceeding.

The "Reviews to Success" are generally concluding activities in a CORE. They enable you to assess the effectiveness of instruction for the entire CORE and to decide if the students are prepared for the next set of objectives.

WORKSHEETS

The worksheets in the program are used in a variety of ways: a) as reinforcement to general or specific objectives; b) to introduce new information and an activity; c) as covered in previous on daylight slides. chalboard before th

35mm SLIDES

This medium broadens inquiry activities. the teacher and by me strategies give spec

You need not complet Your students should move from their desk. It will be desirable those windows where the chalkboard.

The largest possible clearly. Therefore, from the chalkboard, above or below the edge.

It is expected that a dir
directly on the proj

Be sure that you are Carousel Projector and proj

GAMES

Perhaps the most am
objectives through th
first field testing of the COREs was basically an objective of the COREs. Immediate instruction on each field was specifically designed to develop background knowledge of the materials. They were presented periodically within the assessment sections.

The concept population proved best in some situational teaching activities, especially during inquiry activities. The projected image should be used both by the teacher and by most students during instruction. The teaching strategies give specific instructions for using them.

You need not completely darken your classroom when using the slides. Your students should be able to write or read at their desks or move from their desks to the board while the slides are being shown. It will be desirable, however, to turn off those lights or darken those windows where the light is reflected directly from the chalkboard.

The largest possible image is usually best for the students to see clearly. Therefore, place the slide projector as far as possible from the chalkboard, but so that the image projected does not extend above or below the edges of the board.

It is expected that students and teachers will often use chalk to mark directly on the projected image.

Be sure that you are familiar with the operating instructions for the Carousel Projector and that you observe the manufacturer's cautions for insertion and projection of slides, trays, bulbs, and lenses.

Perhaps the most ambitious of the endeavors has been to promote certain objectives through the use of games and game theory. Besides providing...
variation to the instructional mode, the games are used to dramatize some of the major concepts in the curriculum, as well as to give experience in cooperation and taking turns.

BOOKLETS

This medium is used as a variation to the worksheets and 35mm slides. It combines a minimum of reading with cartooned illustrations to present somewhat detailed factual information.

POLAROID CAMERA

To increase the opportunities for involving all students in the activities, a Polaroid camera has been included as part of the instructional materials. The camera is provided through the courtesy of the Polaroid Corporation.

A camera in the classroom can serve as a valuable motivation device for students, as well as a help in prolonging their ever-so-short interest span. The instant feedback from the pictures is a replay of the actual class activity, a photographic record that can be used to compare before and after conditions, a progress report of growth and development, or an assessment of the learning that took place in an activity. Actually operating the camera, manipulating parts, focusing, developing, and viewing the finished product affords an ego-building experience. Such experiences will help the student develop self-esteem and self-confidence, thus contributing to the development of a success syndrome.
BSCS are used to dramatize as well as to give illustrations to students in the as part of the developed through the le motivation, enhancing their back from the ty, a photore and after development, or n an activity. ts, focusing, fords an ego- p the student ontributing
UNIT IV OVERVIEW

The focus of Unit IV is on man -- the interdependency that exists between man and his environment, and the degree to which man is capable of affecting the quality of his environment. Related activities treat sequentially the flow of energy through living things, the cyclical nature of materials, and man's place in the recycling of resources, and how he can facilitate the natural cyclic system maintained by the environment.

The first core of activities attempts to develop the concept of transferring energy and matter through environmental systems (food chains, food webs). Its intent is to create a foundation or frame of reference for the student so he can relate later concepts to the finite quantity of his environmental resources.

The second core of activities concentrates on those concepts required for the student to understand the processes of decomposition as they occur in nature and as they can be affected by man's contribution to the environmental system. How can man act to facilitate or inhibit the decomposition processes?

The third core of activities is directed toward illuminating the effects that man can have on his environment through the materials that are made by him, used by him, and eventually disposed of by him. Concepts are developed to depict the importance of managing man's waste; emphasis is placed on understanding the decomposition of non-biodegradable and biodegradable materials and how these are related to the need to recycle certain components of the environment.

The earth is finite, we run out of most of the try to pick out anything in the universe. Unit the statement of interaction food energy along food of these chains into more is subsequently lost from through the ecosystem materials are continually (bio = life, geo = earth) all these cycling relaxation under the heading cycling through the biotic decomposer organisms in primary emphasis is placed student can act on his activities. The unit co on his environment through continued practi attempts to open up for around him.
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UNIT IV RATIONALE

The earth is finite in size and material resources. Why then don't we run out of most of these resources? John Muir once said, "When we try to pick out anything by itself, we find it hitched to everything else in the universe." Unit IV attempts to answer the question and to amplify the statement of interactions and interdependencies. The transfer of food energy along food chains is reconsidered, and the interlocking of these chains into more complex food webs. From these webs, also, energy is subsequently lost from the ecosystem. Matter and materials flow through the ecosystem like energy. In contrast to energy, however, materials are continually reused through so-called biogeochemical cycles (bio = life, geo = earth, chemical = matter cycle). A significant agent in all these cycling relationships is the large group of organisms classified under the heading of decomposers. Without the decomposers, cycling through the biotic community would soon cease to exist. Thus, a primary emphasis is placed on the role (both helpful and harmful) of decomposer organisms in the environment. Ways are suggested whereby the student can act on his environment through composting and other such activities. The unit contributes to the development of a success syndrome through continued practice in inquiry and problem solving skills. It attempts to open up for the student new avenues of interest in the world around him.
## Me and My Environment

### Unit IV. Transfer and Cycling of Materials in My Environment

#### Core A. Energy and Material Transfer

### Aims for Me and My Environment

1. **Development in Each Child of a Sense of Identity as a Person Who Has Some Degree of Control Over and Can Act on His Environment.** This will lead to a degree of self-determination based on a rational coping with situations rather than on a passive compliance or an impulsive response to problems.

2. **Development in Each Child of a Success Syndrome.** More than anything else, each activity is intended to be a success experience for each child. It is the teacher’s responsibility -- almost obligation -- to see that each child succeeds at a level that is challenging to his abilities and that preserves his self-respect. It is a further responsibility of the teacher to point out his achievement. The students as a group should help each individual fit what he has done into a pattern of accomplishment.

3. **Development in Each Child of an Interest That Could Become a Hobby or Avocation Over a Lifetime (through an exposure to an array of experiences in science).** It is hoped that many children will find some area -- perhaps growing plants, caring for animals, identifying flowers, collecting things, or simply enjoying outings into the country -- that they feel strongly about and can develop some competence or knowledge in. This would provide a means of self-expression, and (perhaps) allow some degree of sharing or involvement with others.

4. **Development in Each Child of a Sense of Relationship and Empathy With Other Living Things.** It is hoped that this will lead to a positive regard and caring about what affects them as individuals and as a group, because what affects them affects the community of man.

5. **Development in Each Child of an Understanding of Environmental Conditions that will lead to a sense of responsibility for the environment and actions that protect or improve it.**

### Objectives

1. Appreciate the cycling relationships through:
   
   a. Understanding of what a cycle is
   
   b. Understanding of the role of man as an environmental agent
   
   c. Realization that certain materials can be recycled
   
   d. Recognition of examples of man's impact on the environment

2. Comprehend the role of man as an environmental agent

3. Recognize that plant and animal life extend beyond food chain relationships.
UNIT IV GOALS

1. Appreciate the cycling relationships of the materials and organisms in the environment through:
   a. Understanding of what a cycle is.
   b. Understanding of the role of decomposers.
   c. Realization that certain materials are in finite supply.
   d. Recognition of examples of man's impact upon the environment.

2. Comprehend the role of man as an integral part of nature, not apart from nature.

OBJECTIVES OF CORE A

1. Reconstruct the transfer of energy through an environmental system.
2. Conclude that all materials are transferred through environmental systems.
3. Recognize that plant and animal (including man and microbes) interdependence extends beyond food chain relationships.
Organisms interact with each other, and with the environment, in a variety of ways. Life is entirely dependent upon these interactions. The influences of one life form upon another are often very subtle, but man and his ability to succeed as a life form are controlled by these interactions. Because of man's ability to alter the environment, and because of his tendency to make a more dramatic impact on it, what may appear to be a simple, straightforward action can have a major, long-range impact on the very interactions man is dependent upon. It is important for students to understand this idea. This core lays a foundation for a more thorough treatment of it later on in Unit V by reviewing energy flow and materials cycling in man's environment.
IT IV. TRANSFER AND CYCLING OF MATERIALS IN MY ENVIRONMENT

RE A. ENERGY AND MATERIAL TRANSFER

A food chain is a series of organisms that interact by eating each other. One species is eaten by another species, which in turn is utilized by still another species for food, and so forth. Each species get its life-sustaining energy from the one previous to it in the chain. All chains start (or end, depending upon your viewpoint) with the green leaf. This most fundamental cog of life converts various material and chemical components of the environment into food for all other organisms by locking the sun's energy into usable sugar and starch compounds. It is the plant that originally has drawn waterborne elements and substances from the soil and started them on their odyssey through the living world. Thus, as a growing corn plant stores and uses the sun's energy to combine carbon, oxygen, and hydrogen into the stored starch of a kernel of corn, so is it also storing other elements such as nitrogen and potassium. The energy and matter is then passed on to the chicken that eats the corn, and then on to the person who eats the chicken. But few organisms depend solely upon one other organism for food. Man acquires minerals and energy directly from plants, as well as from other animals. These plants and animals supply food to other organisms as well. One food chain is connected to many others; hence the interdependency and transfer cannot be viewed as linear, but must be seen as a highly complex and intertwined mechanism. Thus it is that the flow of materials and energy is presented in the context of the food web.
### PLANNING GUIDE

**NOTE:** Some activities (indicated in italics and an ✈️ in the margin) need to be prepared several days or weeks in advance. Use this guide to create a teaching and preparation schedule. All supplies needed are included in the core kit.

<table>
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<tr>
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<tr>
<td><strong>Materials You Furnish</strong></td>
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<td>4-1. Food Chain Game Revisited</td>
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<td>✈️ Four decks per set - 1 set</td>
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<tr>
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<td>✈️ Worksheet 4-2, one per set</td>
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<tr>
<td>4-3. The Long Journey</td>
<td>Booklet - The Long Journey</td>
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<td>Page ____</td>
<td>✈️ One per student</td>
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<th>Notes and Suggestions to Teacher (Italics and Arrow Indicate Advance Preparation Directions)</th>
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<tbody>
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<td>Flash cards (&quot;Food Chain Game&quot;)</td>
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<td>Camera (Polaroid Square Shooter)</td>
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<td>One deck per class</td>
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<tr>
<td>Flash cards: Hawk, Cow, Mosquito, Snake, Man, Grass, Frog</td>
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<td>Water symbol, Energy symbol, Sugar symbol</td>
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<td>Clue to Success - Food chain</td>
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<td>Worksheet 4-2, Clue to Success - Food chain</td>
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<td><strong>CORE A</strong></td>
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<td>Date planned _____</td>
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<tr>
<td><strong>4-5. Plant And Animal Hunt</strong></td>
<td>File cards 6&quot; X 8&quot;</td>
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<td>Crayons or colored pencils</td>
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<td>Magazines with pictures of</td>
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<td>Scissors</td>
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<td><strong>4-6. Tying Up The Hunt</strong></td>
<td>Cards prepared in Activity</td>
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<td>4-5</td>
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<td>Scissors</td>
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<td>One deck per class</td>
<td>One pair per class - include at least some left-handed ones.</td>
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<td>Two per student</td>
<td>Collect many magazines well in advance.</td>
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</tbody>
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<td><strong>Materials in Supply Kit</strong></td>
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<td>Fish in pond</td>
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<td>Slide 4-4</td>
<td>Squirrel in cage</td>
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<td>Slide 4-5</td>
<td>Alligator in tank</td>
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<td>Elk in mountain</td>
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<td>Slide 4-7</td>
<td>Buffalo on the plains</td>
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<td>Slide 4-8</td>
<td>Constrictor in field</td>
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<td>Slide 4-9</td>
<td>Lion on vehicle</td>
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<tr>
<td>4-8. Review Of Success</td>
<td>Many magazines</td>
<td>Slide 4-10</td>
<td>Several for each child</td>
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<td>Scissors</td>
<td>Slide 4-11</td>
<td>One pair for each child</td>
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<td>Butcher paper</td>
<td>Slide 4-12</td>
<td>One piece for each child</td>
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<td>Large felt pens</td>
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<td>Alligator in Everglades</td>
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<td>Slide 4-6</td>
<td>Elk in mountain meadow</td>
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<td>Buffalo on grassland</td>
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<td>Constrictor in desert</td>
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<td>Slide 4-11</td>
<td>One piece for each student</td>
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<tr>
<td>Slide 4-12</td>
<td>One for each student</td>
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<td>Review of Success</td>
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<td>Question 3 Review Of Success</td>
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</table>
OBJECTIVE FOCUS FOR THIS ACTIVITY

UNIT GOALS:

1. Appreciate the cycling relationships of the materials and organisms in the environment through:
   a. Understanding of what a cycle is.
   d. Recognition of examples of man's impact upon the environment.

2. Comprehend the role of man as an integral part of nature, not apart from nature.

CORE A OBJECTIVES:

1. Reconstruct the transfer of energy through an environmental system.

TEACHING STRATEGIES

Activity 4-1. The Food Chain Game Revisited

Through this activity the students will be given an opportunity to review the concepts associated with building food chains, covered earlier in Unit III. Students will build food chains and trace energy flow along the chain. At the same time the teacher will be able to assess whether the students understand the concept that all the food for animals (man included) comes from plants.
OBJECTIVES:

- Appreciate the cycling relationships of the materials and organisms in the environment through:
  a. Understanding of what a cycle is.
  d. Recognition of examples of man's impact upon the environment.
- Comprehend the role of man as an integral part of nature, not apart from nature.

TEACHING STRATEGIES

ACTIVITY 4-1. THE FOOD CHAIN GAME REVISITED

At the end of this activity, each student should:
--have played the food chain game.
--have felt successful and enjoyed the game.
--be able to defend a food chain sequence.
--be able to complete the worksheet, "Missing links."
ACTIVITY 4-1

MATERIALS

1. Deck of flash cards (from Activity 3-2 of Unit III)
4 Decks of Food Chain Cards
Worksheet 4-1
Slide 4-1
*35mm Slide projector
Camera (Polaroid Square Shooter)

*Not furnished in materials kit

TEACHING STRATEGIES

Teacher Preparation:

1. Have available ample table space for four groups to play the card game.

2. This activity, because of its length, is divided into Part I and Part II. The first part introduces the concept of food chains and the fact that they end in a plant. The second part of the activity consists of a game which gives the students an opportunity to build food chains.

Some students will remember this game from their exposure to it in Unit I.I. Capitalize on their awareness by placing one of them in each group of students taking part in this activity so that they may act as catalysts in initiating discussion.

Part I.

Hold up the deck of flash cards and say:

HOW MANY OF YOU REMEMBER PLAYING THIS SCIENCE GAME?

WHAT IS IT THAT WE LEARNED FROM THE GAME?

If sufficient recall does not occur, or if you feel that further review is necessary, say:

ONE THING WE TRIED TO DO IN THIS GAME WAS TO DECIDE WHAT IT IS THAT ANIMALS EAT.
**TEACHING STRATEGIES**

**Preparation:**

Ensure ample table space for four groups to play the card game.

**Activity:** Because of its length, the activity is divided into two parts. The first part introduces the concept of food chains and the fact that they start with a plant. The second part of the activity is a game which gives the students an opportunity to build food chains.

Students will remember this game from their exposure in Part III. Capitalize on their awareness by having them in each group of students taking part in the activity so that they may act as catalysts in the discussion.

Draw a deck of flash cards and say:

**OF YOU REMEMBER PLAYING THIS GAME?**

**IT THAT WE LEARNED FROM THE GAME?**

If sufficient recall does not occur, or if you feel further review is necessary, say:

**THING WE TRIED TO DO IN THIS GAME WAS TO IDE WHAT IT IS THAT ANIMALS EAT.**

**ANTICIPATED STUDENT BEHAVIORS**

**Students:**

- -indicate whether or not they recall the game.

--who recall the game could respond with:
  - "We learned what a food chain is."
  - "A food chain is a series of animals that eat other animals and/or plants."
  - "All food in a food chain starts with plants."
  - "We learned who has whom for dinner."

- -Who do not recall the game could respond with:
  - "I don't remember playing the game."
  - "I don't remember what we learned from the game."
  - "I don't know what it is that animals eat."
Display the card depicting a hawk. Ask the students to identify the bird, and then fasten the picture to the chalkboard by means of tape, or set the card on the left side of the chalk tray.

Spread out the rest of the cards in the deck and ask a student to select a card depicting something a hawk eats.

Again display the "hawk food" card, asking the students to identify it.

Say:

**HAWKS DO EAT _____ AND OTHER THINGS.**

Fasten or set up the picture to the right of the hawk.

(Student's name) DRAW AN ARROW FROM THE HAWK TO THE _____ TO SHOW THAT A HAWK EATS A _____.

Continue to build a food chain by saying:

NOW WHAT DO YOU THINK (prey) EAT?

Continue until you have completed a logical food chain down to the plant source. Some possible examples follow:

- HAWK → SNAKE → MOUSE → GRASSHOPPER → GRASS
- HAWK → MOUSE → GRAIN
TEACHING STRATEGIES

display the card depicting a hawk. Ask the students to identify the bird, and then fasten the picture to the chalkboard by means of tape, or set the card on the left side of the chalk tray.

Spread out the rest of the cards in the deck and ask a student to select a card depicting something a hawk eats.

Again display the "hawk food" card, asking the students to identify it.

Say:

AWKS DO EAT _____ AND OTHER THINGS.

Fasten or set up the picture to the right of the hawk.

Student's name) DRAW AN ARROW FROM THE HAWK TO THE _____ TO SHOW THAT A HAWK EATS A ______.

Continue to build a food chain by saying:

OW WHAT DO YOU THINK (prey) EAT?

Continue until you have completed a logical food chain down to the plant source. Some possible examples follow:

AWK → SNAKE → MOUSE → GRASSHOPPER → GRASS

AWK → MOUSE → GRAIN

ANTICIPATED STUDENT BEHAVIORS

Students:

--should identify the bird as a hawk.

--will select a card depicting a frog, snake, chicken, mouse, rabbit, or song bird.

--will draw an arrow pointing to the prey between the hawk and prey.

--should select appropriate food of the prey, place it to the right of the first two cards, and draw an arrow between the two.
ACTIVITY 4-1

MATERIALS

TEACHING STRATEGIES

HAWK — FROG — MOSQUITO — MAN — COW — GRASS

HAWK — SONG BIRD — WORM — LEAF

Then point to the board and say:

NOTICE THAT WE HAVE SEVERAL ANIMALS THAT DEPEND ON ONE ANOTHER FOR THEIR FOOD. SINCE EACH IS LINKED TO THE NEXT BECAUSE OF EATING HABITS WE CALL THIS A FOOD CHAIN.

Write "food chain" on the board.

WHAT DO ANIMALS USE FOOD FOR? (WHAT DO ANIMALS GET FROM FOOD?)

INSTEAD OF THINKING OF FOOD LET'S THINK OF ENERGY. STARTING WITH THE PLANT LET'S TRACE ENERGY ALONG THE FOOD CHAIN.

As the student does the tracing make a statement similar to:

ENERGY FROM THE GRASS IS TRANSFERRED TO THE COW AS THE COW EATS AND DIGESTS THE GRASS. THE COW USES SOME OF IT TO LIVE AND GROW. IT STORES SOME OF IT IN ITS FAT AND MUSCLES. ENERGY IS TRANSFERRED FROM THE COW TO THE MAN AS HE EATS THE HAMBURGER. THEN ENERGY IS TRANSFERRED FROM THE MAN TO THE MOSQUITO AS THE MOSQUITO SUCKS BLOOD FROM THE MAN...ETC.

THUS, WHERE DID THE HAWK'S ENERGY ORIGINALLY COME FROM?

If students have difficulty in answering this question, trace the chain in reverse order by saying:
TEACHING STRATEGIES

AWK → FROG → MOSQUITO → MAN → COW → GRASS

when point to the board and say:

NOTICE THAT WE HAVE SEVERAL ANIMALS THAT DEPEND ON ONE ANOTHER FOR THEIR FOOD. SINCE EACH IS INKED TO THE NEXT BECAUSE OF EATING HABITS WE CALL THIS A FOOD CHAIN.

chain" on the board.

0 ANIMALS USE FOOD FOR? (WHAT DO ANIMALS USE FOOD?)

OF THINKING OF FOOD LET'S THINK OF . STARTING WITH THE PLANT LET'S TRACE ALONG THE FOOD CHAIN.

ent does the tracing make a statement similar

F FROM THE GRASS IS TRANSFERRED TO THE COW. THE COW EATS AND DIGESTS THE GRASS. THE COW USES SOME OF IT TO LIVE AND GROW. IT STORES IT IN ITS FAT AND MUSCLES. ENERGY IS RELEASED FROM THE COW TO THE MAN AS HE EATS BURGER. THEN ENERGY IS TRANSFERRED FROM THE COW/TO THE MOSQUITO AS THE MOSQUITO SUCKS FROM THE MAN...ETC.

WHERE DID THE HAWK'S ENERGY ORIGINALLY COME FROM?

If students have difficulty in answering this question, trace the chain in reverse order by saying:

ANTICIPATED STUDENT BEHAVIORS

Students:

--recall that food contains stored energy which is released during respiration and reply, "Energy."

--point to the plant and then to each succeeding animal in the chain.

--reply, "The grass that the cow ate."
The Hawk got its energy from the Frog, who got its energy from the Mosquito, who got its energy from the Man...etc.

Continue building other chains and by tracing the energy flow through them until you feel that the students have fully grasped the idea of the chaining of foods.

As a point of departure ask several students to begin with man and build chains of things he eats.

As an added feature have students, working in groups of three or four, take appropriate pictures with which to build a photographic food chain. To some groups you may give the hint to start the chain with man. Permit the more capable students to start with any animal and proceed to the plant source. If the supply of film permits, encourage pupils to try for a chain as long as possible.

Only one group of students will be able to work at a time, because of limited equipment. In order to expedite the task, permit students to work between classes, at lunch break, etc.

Have the students display (from left to right) their chains; draw arrows and label each link; then follow with discussion, questions-answers period.

Then say:
TEACHING STRATEGIES

THE HAWK GOT ITS ENERGY FROM THE FROG, WHO
GOT ITS ENERGY FROM THE MOSQUITO, WHO GOT
ITS ENERGY FROM THE MAN...ETC.

building other chains and by tracing the energy
ough them until you feel that the students have
asped the idea of the chaining of foods.
ent of departure ask several students to begin with
build chains of things he eats.

Students:

--will build such examples as:

MAN → CHICKEN → GRASSHOPPER → GRASS
MAN → COW → CORN

CAMERA TIME

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four, take appropriate pictures with which to
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of limited equipment. In order to expedite the
mit students to work between classes, at lunch
cc.

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raw arrows and label each link; then follow
ussion, questions-answers period.

ANTICIPATED STUDENT BEHAVIORS
There are many examples of chains we could discuss. You can see that while all animals depend on other living things for food, not all of the chains are the same length. These chains all have one thing in common, however. Can anybody see what that is?

If students fail to perceive that each chain ends with a plant, ask:

Look at the end of each chain on this side of the board (point to the right side). What is the same about each of these living things?

Say:

If we were to build other chains like these, we would expect to end with what kind of living things?

Have students recall Activity 3-11 where they traced ingredients of a hamburger to their sources.

Say:

Do you remember what we ended with when we traced the hamburger and its bun to its source?

Now look at our food chains. What do we end up with in every food chain?

What do we end up with in food sources and food chains?

Make sure this concept is clear before proceeding.
TEACHING STRATEGIES

ARE MANY EXAMPLES OF CHAINS WE COULD S. YOU CAN SEE THAT WHILE ALL ANIMALS ON OTHER LIVING THINGS FOR FOOD, NOT THE CHAINS ARE THE SAME LENGTH. THESE ALL HAVE ONE THING IN COMMON, HOWEVER. YBODY SEE WHAT THAT IS?

f students fail to perceive that each chain ends with a plant, ask:

LOOK AT THE END OF EACH CHAIN ON THIS SIDE OF THE BOARD (point to the right side). WHAT S THE SAME ABOUT EACH OF THESE LIVING THINGS?

say:

IF WE WERE TO BUILD OTHER CHAINS LIKE THESE, WE WOULD EXPECT TO END WITH WHAT KIND OF LIVING THINGS?

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DO WE END UP WITH IN FOOD SOURCES AND CHAINS?

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ANTICIPATED STUDENT BEHAVIORS

Students:

--respond, "All begin with an animal," "Linked together," "I don't know," "All end in a plant."

--respond, "All are plants."

--recall, "Plants."

--recall hamburger transparency and say, "Plants."

--conclude, "Plants."

--respond, "Plants."
At this point use Worksheet 4-1 to assess if the concept is clear. Place randomly on the chalk tray the following cards which represent correct responses to the blanks in the worksheet: snake grass grain chicken insect worms.

Distribute Worksheet 4-1 and say:

HERE ARE THE MISSING LINKS ASKED FOR ON YOUR WORKSHEETS. I'VE MIXED THEM UP, SO YOU MUST CHOOSE THE RIGHT ONE FOR YOUR ANSWER. WRITE THE NAME OF THE LINK IN THE PROPER SPACE.

Ask students to put their names on the worksheets and collect them to look at later. Now write the first chain on the chalkboard and ask different students to tell (and defend) what could go in the blanks. Do this for the second and third chains. Remember there are several answers possible for each. Encourage discussion. Praise all good ideas.

Later, use Tallysheet 4-1 to note any student who had difficulties (or the whole class if necessary). Give these particular students encouragement and support when they play the "Food Chain Game."
TEACHING STRATEGIES

ANTICIPATED STUDENT BEHAVIORS

ACTIVITY 4-1

Students:

---should study the choices in the chalk tray and write in an appropriate link in the blanks on the worksheet. Correct answers for each chain are:

1. Hawk → snake → mouse → grass or grain.
2. Man → cow → grass or grain.
3. Lion → chicken → insects or worms → grass.

---use Worksheet 4-1 to assess if the concept place randomly on the chalk tray the following represent correct responses to the blanks sheet: snake grass grain chicken insect

Worksheet 4-1 and say:

---THE MISSING LINKS ASKED FOR ON YOUR TS. I'VE MIXED THEM UP, SO YOU MUST THE RIGHT ONE FOR YOUR ANSWER. WRITE OF THE LINK IN THE PROPER SPACE.

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Worksheet 4-1 to note any student who had (or the whole class if necessary). Give lar students encouragement and support when "Food Chain Game."
Part II.

**MATERIALS**

- 1 Deck flash cards
- 4 Decks of Food Chain Cards

**TEACHING STRATEGIES**

**Part II.**

WE'VE ONLY BUILT A FEW FOOD CHAINS. WE SHOULD BUILD SOME MORE. WE'LL DO THIS BY PLAYING THE "FOOD CHAIN GAME."

Prepare the students to play by dividing the class into groups of three or four. Distribute a deck of food chain cards to each group. Allow time for them to examine the cards. Point out that this deck differs from the flash cards in that it also includes cards with plants pictured.

Say:

THE OBJECT OF THIS GAME IS TO BUILD FOOD CHAINS. YOU WILL DO THIS BY USING THE LIVING THINGS PICTURED ON THE CARDS. THIS GAME IS SIMILAR TO THE RUMMY GAME YOU PLAYED BEFORE. I'LL EXPLAIN THE RULES AND THEN PLAY THE GAME WITH TWO OF YOU SO WE CAN SEE HOW IT IS PLAYED.

1. AFTER THE CARDS ARE SHUFFLED EACH PLAYER WILL BE DEALT FOUR CARDS TO START WITH.

2. THE REST OF THE CARDS ARE PLACED FACE DOWN IN THE MIDDLE OF THE TABLE AND THE TOP CARD ON THAT PILE IS TURNED FACE UP BESIDE THE OTHERS.

3. EACH PLAYER LOOKS AT THE CARDS IN HIS HAND TO SEE IF ANY OF HIS CARDS FORM A FOOD CHAIN. ONE RULE TO REMEMBER IS THAT CHAINS MUST BE COMPLETE -- THEY MUST BEGIN WITH AN ANIMAL AND END WITH A PLANT.
TEACHING STRATEGIES

ONLY BUILT A FEW FOOD CHAINS. WE BUILD SOME MORE. WE'LL DO THIS USING THE "FOOD CHAIN GAME."

students to play by dividing the class into three or four. Distribute a deck of food chain cards to each group. Allow time for them to examine the cards. It turns out that this deck differs from the flash cards in that it also includes cards with plants pictured.

EFFECT OF THIS GAME IS TO BUILD FOOD CHAINS. I DO THIS BY USING THE LIVING THINGS ON THE CARDS. THIS GAME IS SIMILAR TO THE RUMMY GAME YOU PLAYED BEFORE. I'LLテLL THE RULES AND THEN PLAY THE GAME WITH YOU SO WE CAN SEE HOW IT IS PLAYED.

ER THE CARDS ARE SHUFFLED EACH PLAYER WILL BE DEALT FOUR CARDS TO START WITH.

REST OF THE CARDS ARE PLACED FACE DOWN THE MIDDLE OF THE TABLE AND THE TOP CARD THAT PILE IS TURNED FACE UP BESIDE THE PLAYERS.

H - LAYER LOOKS AT THE CARDS IN HIS HAND AND SEE IF ANY OF HIS CARDS FORM A FOOD CHAIN.

STUDENT TO REMEMBER IS THAT CHAINS MUST BE PIETE - THEY MUST BEGIN WITH AN ANIMAL AND END WITH A PLANT.

ANTICIPATED STUDENT BEHAVIORS

Students:

--should reexamine the deck so as to become further acquainted with individual cards.
4. Determine which player goes first by "picking a number from one to ten." Before he lays any cards down, he draws either the top card from the face down pile or the top card from the face up pile.

5. If he has one or more food chains in his hand, he may now lay down the cards face up on the table in the correct order, determining who eats whom as he does so. Lay the cards down so that they form a chain from left to right.

6. He then picks from the face down pile the number of cards he just put down. After restoring his hand to the five cards he began with, he discards one and is back to his original hand of four. Each player will have four cards at the beginning of his turn, draw one so that during this turn he has five cards, and discard at the end of his turn (back to four cards).

7. Each player takes his turn. Cards drawn are used to form new chains or to add to others. (For example: A student may lay down a mouse, insect, and grain as a chain. During a later turn, a snake could be added to the beginning of the chain.)

8. Each card is worth one point. The first person to lay down enough chains so that they have at least ten points is the winner. All food chains must be complete and end with a plant.

Note: If any questions arise about what eats what, make it clear that for purposes of the game the eating habits as described on the card will be the only ones accepted.
### TEACHING STRATEGIES

To determine which player goes first, "pick a number from one to ten." Before he lays cards down, he draws either the top card from the face down pile or the top card from the face up pile.

If he has one or more food chains in his hand, he may now lay down the cards face up on the table in the correct order, showing who eats whom as he does so. The cards down so that they form a line from left to right.

Then picks from the face down pile the number of cards he just put down. After adding his hand to the five cards he has with, he discards one and is back to his original hand of four. Each player has four cards at the beginning of the turn, draw one so that during this turn as five cards, and discard at the end of turn (back to four cards).

Player takes his turn. Cards drawn are to form new chains or to add to others. (example: A student may lay down an ant, insect, and grain as a chain. During the next turn, a snake could be added to the ant at the end of the chain.)

Each card is worth one point. The first one to lay down enough chains so that he or she has at least ten points is the winner. All food chains must be complete, and end with a plant.

Questions arise about what eats what. Make sure that for purposes of the game the eating as described on the cards will be the only accepted.
Now select two or three students and go over the rules again demonstrating how the game is played. Continue the demonstration only until the game is understood. Then allow the students to play the game as long as it seems appropriate.

Conclude by saying:

FROM PLAYING THIS GAME WHAT HAVE WE LEARNED?

WHY ARE ANIMALS IMPORTANT TO EACH OTHER?
TEACHING STRATEGIES

two or three students and go over the rules strating how the game is played. Continue ration only until the game is understood. Then students to play the game as long as it seems .

saying:
SLAYING THIS GAME WHAT HAVE WE LEARNED?

ANTICIPATED STUDENT BEHAVIORS

Students:

--should observe two or three classmates and the teacher playing the game.

--should demonstrate ability to play the game following the rules described.

--respond, "Animals are important to each other and depend on each other," "All animals depend on plants."

--conclude, "Because they eat each other," "They get energy from each other," "They wouldn't have any food without each other," "They'd die." Statements should indicate interdependency of living things in terms of food.

ANIMALS IMPORTANT TO EACH OTHER?
### Activity 4-1: "The Food Chain Game Revisited"

#### Activity name suggested by class:

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<th>Date taught (month and date, e.g. 11/2)</th>
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<th>Minutes of class time on science each day</th>
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<table>
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<th>Students absent on each date (Use <em>0</em> Number)</th>
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#### Teacher Evaluation

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<th>Tally</th>
<th>Rev</th>
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<td>Day 6</td>
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5. Interest of class as expressed by apparent attention to what is happening.

- Number of students responding with:
- Name students you noted especially:

<table>
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<th>HIGH INTEREST</th>
<th>MODERATE INTEREST</th>
<th>INDIFFERENCE</th>
<th>MODERATE RESISTANCE</th>
<th>STRONG DISLIKE</th>
<th>HARD TO RATE</th>
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6. Equipment in kit:
- None
- Satisfactory
- Too fragile
- Too needed
- Difficult to use

7. Equipment I got:
- None
- Easy
- Hard to get, but okay
- Hard to get
- Unobtainable, add to kit
- Add to kit

8. Materials used:
- Worksheet # # #
- Game #
- Slides (show slide nos.) # # # #
- Transparency #
- Card(s) #
- Tape(s) #
- Other -

#### Evaluation Criteria

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<th>Game</th>
<th>Slides (show slide nos.)</th>
<th>Transparency</th>
<th>Card(s)</th>
<th>Tape(s)</th>
<th>Other</th>
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9. Maturity level is
- just right
- too childish
- too mature
- Explain: 

10. Vocabulary level is
- just right
- too easy
- too difficult
- Explain:

11. Were teacher instructions clear enough to follow? 
- Yes
- No - Pages and Problem:

12. Were clues to success and reviews of success helpful? 
- Yes
- No - Why not?

13. Did the activity fulfill the purpose stated by the Guide? 
- Yes
- No - Comment:

14. Were any parts of this activity omitted? 
- No
- Yes - Explain:

15. Your rating of this activity:
- Worthwhile
- Of value--needs the
- Worth salvaging--make
- Worthless
- Keep as is
- Revision suggested
- Major changes described
- Drop it
8. Materials used:

<table>
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<tr>
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<th>Worksheet</th>
<th>Game</th>
<th>Slide(s) (show slide nos.)</th>
<th>Transparency</th>
<th>Card(s)</th>
<th>Tape(s)</th>
<th>Other</th>
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<td>Worthwhile as is</td>
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<td>Worthless: omit</td>
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9. Maturity level is  □ just right □ too childish □ too mature  Explain:
10. Vocabulary level is □ just right □ too easy □ too difficult  Explain:
11. Were teacher instructions clear enough to follow?  □ Yes  □ No - Pages and Problem:
12. Were clues to success and reviews of success helpful?  □ Yes  □ No - Why not?
13. Did the activity fulfill the purpose stated by the Guide?  □ Yes  □ No - Comment:
14. Were any parts of this activity omitted?  □ No  □ Yes - Explain:
15. Your rating of this activity:
   □ Worthwhile  □ Of value--needs the □ Worth salvaging--make  □ Worthless
   ——keep as is   ——revision suggested   ——major changes described   ——drop it

SPECIFIC CONCERNS ABOUT THIS ACTIVITY:

16. There are always parts of activities that are good and need not be changed.
    What parts of this activity should be retained when the curriculum is revised?
    Page(s) ____________________:
17. Did students have difficulty stating that all energy originally comes from plants?
    □ No  □ Yes: Comment.
18. Were any students unsuccessful in playing the food chain game?
    □ No  □ Yes: Comment.
19. Concern (or questions) about content:
20. Messages for staff (read immediately):

Have you answered each question, attached annotated Guide, your revisions, student work, etc.?
UNIT IV, CORE A
Activity 4-1: "The Food Chain Game Revisited"

Teacher ____________________________

REPORT OF WHAT HAPPENED AND SUGGESTIONS FOR REVISION

1. Whenever practical write all over your second copy of the Guide. Tear out the activity and send the annotated Guide in with this form.


3. Tell us what you did. Think of what you needed, what you had to work out for yourself, how you presented something to make it go over.

4. Describe the revisions you said were needed in answering the questions on the other side of this form.

5. As a reminder of things that help in revision, read through the following list and check off things you want to be sure to note this time. (We know you can't tell about everything every time!)

THE LESSON

☐ how you organized materials or class.
☐ things added (a question, a picture, etc.).
☐ equipment, supplies, visual aids.
☐ things that went wrong, misunderstandings.
☐ what you would do differently or avoid next time.
☐ turmoil in the class caused by the activity, or disruptive students, or interruptions, and how you dealt with them.

THE STUDENTS

☐ who had problems and what they were.
☐ how someone "caught on" (or who never did).
☐ who was really "turned off" (or on).
☐ reactions of parents, teachers, students.
☐ special evidence of learning or applying ideas.
OBJECTIVE FOCUS FOR THIS ACTIVITY

UNIT GOALS:

1. Appreciate the cycling relationships of the materials and organisms in the environment through:
   a. Understanding of what a cycle is.
   b. Understanding of the role of decomposers.

2. Comprehend the role of man as an integral part of nature, not apart from nature.

CORE A OBJECTIVES:

1. Reconstruct the transfer of energy through an environmental system.

2. Conclude that all materials are transferred through environmental systems.

TEACHING STRATEGIES

Activity 4-2. The Trip Of A Drop Of Water

In the same way that energy transfer is implicit in the "Food Chain Game", so is the transfer of material. This activity will make that transfer explicit.

Teacher Preparation:

Set up in random order on the chalkboard tray the flash cards indicated. Ask for a student volunteer to arrange the cards into one food chain that utilizes every card.

MATERIALS

Flash cards:
- Hawk
- Cow
- Mosquito
- Snake
- Man
- Grass
- Frog
OBJECTIVES:

Reconstruct the transfer of energy through an environmental system.

Conclude that all materials are transferred through environmental systems.

ACHING STRATEGIES

The Trip Of A Drop Of Water

way that energy transfer is implicit in the Game", so is the transfer of material. This l make that transfer explicit.

Anticipation:

Random order on the chalkboard tray the flash ted. Ask for a student volunteer to arrange to one food chain that utlizes every card.

ANTICIPATED STUDENT BEHAVIORS

At the end of this activity, each student should:

--be able to move energy and matter symbols from one component to another in a food chain.

--have demonstrated an understanding of energy and matter transfer by correctly completing Worksheet 4-2.

--arrange the seven cards into the following food chain: Hawk→Snake→Frog→Mosquito→Man Cow→Grass.
ACTIVITY 4-2

MATERIALS

Energy symbol
Sugar symbol
Water symbol
Slide 4-2
Worksheet 4-2
*35mm Slide projector

*Not furnished in materials kit

TEACHING STRATEGIES

Point to the food chain and say:

WE TALKED OF HOW ENERGY MOVES FROM ONE THING TO ANOTHER IN A FOOD CHAIN.

Hold up the energy symbol and say:

I'M PLACING THIS SYMBOL FOR ENERGY IN THE GRASS. (Student's name), MOVE THE ENERGY SYMBOL TO WHERE THAT ENERGY IS TRANSFERRED NEXT IN THIS FOOD CHAIN.

After the student has correctly placed the symbol on the cow ask:

(Student's name), HOW DOES THE COW GET THE ENERGY?

Continue in the same manner, giving other students the opportunity to move the energy symbol and to answer what the direct energy source is. At this time redirect the discussion to focus on the cycling of materials through the food chains.

WE'VE JUST SEEN THAT ENERGY IS PASSED ALONG FROM ONE THING TO ANOTHER IN THE ENVIRONMENT. ARE THERE ANY OTHER THINGS BESIDES ENERGY THAT ARE PASSED ALONG IN A FOOD CHAIN?

If food is given as an answer, ask:

WHAT IS THE FOOD THAT PLANTS MAKE?

Place the sugar symbol on the grass.
<table>
<thead>
<tr>
<th>TEACHING STRATEGIES</th>
</tr>
</thead>
<tbody>
<tr>
<td>The food chain and say:</td>
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<tr>
<td>Talked of how energy moves from one thing to another in a food chain.</td>
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<tr>
<td>The energy symbol and say:</td>
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<tr>
<td>Placing this symbol for energy in the grass.</td>
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<tr>
<td>(Student's name), move the energy symbol to where energy is transferred next in this food chain.</td>
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<tr>
<td>If the student has correctly placed the symbol on the</td>
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<tr>
<td>(Student's name), how does the cow get the energy?</td>
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<tr>
<td>In the same manner, giving other students the opportunity to move the energy symbol and to answer</td>
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<tr>
<td>Direct energy source is. At this time redirect discussion to focus on the cycling of materials in food chains.</td>
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<tr>
<td>I just seen that energy is passed along from thing to another in the environment. Are there any other things besides energy that are passed along in a food chain?</td>
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<tr>
<td>If food is given as an answer, ask:</td>
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<tr>
<td>What is the food that plants make?</td>
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<tr>
<td>Place the sugar symbol on the grass.</td>
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</table>

<table>
<thead>
<tr>
<th>ANTICIPATED STUDENT BEHAVIORS</th>
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<tbody>
<tr>
<td>Students:</td>
</tr>
<tr>
<td>--move the energy symbol to the cow.</td>
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<tr>
<td>--reply, &quot;It eats the grass.&quot;</td>
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<tr>
<td>--will, drawing upon past experience, most likely answer, &quot;food,&quot; and possibly, &quot;water.&quot;</td>
</tr>
<tr>
<td>--recall what the food manufactured as an end product of photosynthesis is, and answer, &quot;Sugar.&quot;</td>
</tr>
</tbody>
</table>
TEACHING STRATEGIES

(Student's name), MOVE THE SUGAR SYMBOL TO WHERE IT IS TRANSFERRED AFTER IT LEAVES THE PLANT.

SUGAR IS PASSED ALONG. HOW COULD A COW GET THE SUGAR A PLANT MAKES?

NOW (student's name), MOVE THE SUGAR SYMBOL TO WHERE THE SUGAR COULD BE TRANSFERRED NEXT IN THE FOOD CHAIN.

HOW CAN THE MAN GET THE SUGAR THAT WAS ONCE A PART OF THE PLANT?

Continue the strategy in a similar manner and again give a variety of students the opportunity to participate. Then set up another chain and say:

SUGAR IS NOT THE ONLY MATERIAL THAT WE MENTIONED THAT IS PASSED FROM ONE LINK TO ANOTHER ALONG A CHAIN.

Say:

TAKE THIS WATER SYMBOL AND SHOW AND TELL US HOW IT WOULD GET FROM ONE END OF THE CHAIN TO THE OTHER.

Conclude by saying:
TEACHING STRATEGIES

ANTICIPATED STUDENT BEHAVIORS

Activity 4-2

Students:

--move the sugar symbol to the cow.

--reply, "Eat the plant."

--inspect the chain and move the sugar symbol to the man.

--reply, "Eat the cow [hamburger, steak]."

--place the water symbol on the plant (at the plant end of the chain) and move it from link to link. While doing so they should indicate their understanding by making statements similar to: "The water from the corn is transferred to the mouse when it eats the corn, and then on to the snake when the snake eats the mouse, and finally to the hawk when the hawk eats the snake."
**ACTIVITY 4-2**

**MATERIALS**

Worksheet 4-2

Slide 4-2

---

**TEACHING STRATEGIES**

There are many other materials transferred from one part of the food chain to the other. This is true of many chemicals and minerals. You have probably heard of some of them: carbon, oxygen, iron, nitrogen, iodine, and calcium.

Distribute Worksheet 4-2 and project Slide 4-2. Continue by drawing attention to the components and saying:

Look at the picture on your worksheet.

What is shown in A?

What is shown in B?

What is shown in C?

What is shown in D?

What is shown in E?

What is shown in F?

As students describe each picture write on the chalkboard:

A. Caterpillar
B. Chicken
TEACHING STRATEGIES

ARE MANY OTHER MATERIALS TRANSFERRED
ONE PART OF THE FOOD CHAIN TO THE OTHER.
IS TRUE OF MANY CHEMICALS AND MINERALS.
WE PROBABLY HEARD OF SOME OF THEM:
N, OXYGEN, IRON, NITROGEN, IODINE, AND
M.

Worksheet 4-2 and project Slide 4-2. Continue
attention to the components and saying:

AT THE PICTURE ON YOUR WORKSHEET.

S SHOWN IN A?
S SHOWN IN B?
S SHOWN IN C?
S SHOWN IN D?
S SHOWN IN E?
S SHOWN IN F?

describe each picture write on the chalkboard:

caterpillar

chicken

CLUES TO SUCCESS

ANTICIPATED STUDENT BEHAVIORS

Students:

--respond, "A caterpillar eating grass."
--respond, "A chicken eating the caterpillar."
--respond, "A girl eating a chicken leg."
--respond, "A fly biting the girl."
--respond, "A fish eating the fly."
--respond, "A cat (bobcat) eating the fish."
TEACHING STRATEGIES

C. Girl  
D. Fly  
E. Fish  
F. Cat

Say:

NOW I'LL READ THE SENTENCES AND YOU WRITE IN THE WORD IN THIS LIST THAT FITS. DON'T TELL ANYONE ELSE WHAT YOU WROTE UNTIL EVERYONE HAS DECIDED FOR HIMSELF AND WRITTEN IN ALL THE WORDS. THEN WE WILL TALK ABOUT YOUR ANSWERS.

Read each sentence pausing long enough for each student to write in his answer.

When all have answered, again read each statement and have students tell and explain their answers.

Then have them write their names on the worksheets and hand them in for you to tally and review later. (Don't forget to return their papers!)

NOTE: If a student's paper illustrates a problem on a worksheet, annotate it and send it in.
READ THE SENTENCES AND YOU WRITE IN THIS LIST THAT FITS. DON'T TELL ELSE WHAT YOU WROTE UNTIL EVERYONE IDED FOR HIMSELF AND WRITTEN IN ALL DS. THEN WE WILL TALK ABOUT YOUR.

Sentence pausing long enough for each student his answer.

If answered, again read each statement and have I and explain their answers.

write their names on the worksheets and for you to tally and review later. (Don't turn their papers!)

student's paper illustrates a problem on sheet, annotate it and send it in.
UNIT IV, CORE A
TALLY SHEET 4-1
ACTIVITY 4-1: WORKSHEET 4-1 AND ACTIVITY 4-2: WORKSHEET 4-2

<table>
<thead>
<tr>
<th>Teacher Attach class list here</th>
<th>1 (Hawk chain)</th>
<th>2 (Man chain)</th>
<th>3 (Lion chain)</th>
<th>1 (Caterpillar)</th>
<th>2 (Both fly and fish)</th>
<th>3 (All arrows)</th>
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### UNIT IV, CORE A

**Activity 4-2: "The Trip Of A Drop Of Water"**

**Activity name suggested by class:**

**Teacher**

<table>
<thead>
<tr>
<th>BSCS USE:</th>
<th>Post:</th>
<th>Tally</th>
<th>Rev:</th>
</tr>
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</table>

<table>
<thead>
<tr>
<th>1. Date taught (month and date, e.g. 11/2)</th>
<th>Day 1</th>
<th>Day 2</th>
<th>Day 3</th>
<th>Day 4</th>
<th>Day 5</th>
<th>Day 6</th>
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<tr>
<td>2. Minutes of class time on science each day</td>
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<td>3. Minutes of preparation each day</td>
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<td>4. Students absent on each date (Use ID Number)</td>
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<tr>
<th>5. Interest of class as expressed by apparent attention to what is happening.</th>
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</thead>
<tbody>
<tr>
<td>Number of students responding with: Name students you noted especially:</td>
</tr>
<tr>
<td>HIGH INTEREST</td>
</tr>
</tbody>
</table>

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<thead>
<tr>
<th>6. Equipment in kit: □ None □ Satisfactory □ Too □ Too □ Difficult</th>
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<tr>
<td>needed</td>
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<th>7. Equipment I got: □ None □ Easy □ Hard to get, □ Hard to get, □ Unobtainable,</th>
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<tr>
<td>needed</td>
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</table>

<table>
<thead>
<tr>
<th>8. Materials used: Worksheet Game Slides (show slide nos.) Transparency Card(s) Tape(s) Other</th>
</tr>
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| Worthwhile as is | Revise slightly | Revise much | Worthless: omit |
|---------------------------------|
| just right | too childish | too mature | Explain: |

<table>
<thead>
<tr>
<th>9. Maturity level is □ just right □ too childish □ too mature</th>
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<tbody>
<tr>
<td>□ too mature Explain:</td>
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<tr>
<th>10. Vocabulary level is □ just right □ too easy □ too difficult</th>
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<tr>
<td>□ too difficult Explain:</td>
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<tr>
<th>11. Were teacher instructions clear enough to follow? □ Yes □ No - Pages and Problem:</th>
</tr>
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<tr>
<th>12. Were clues to success and reviews of success helpful? □ Yes □ No - Why not?</th>
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<tr>
<th>13. Did the activity fulfill the purpose stated by the Guide? □ Yes □ No - Comment:</th>
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<tr>
<th>14. Were any parts of this activity omitted? □ No □ Yes - Explain:</th>
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<tr>
<th>15. Your rating of this activity: □ Worthwhile □ Of value--needs the □ Worth salvaging--make □ Worthless</th>
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<tbody>
<tr>
<td>□ Worthless -- keep as is □ revision suggested □ major changes described □ drop it</td>
</tr>
</tbody>
</table>

**SPECIFIC CONCERNS ABOUT THIS ACTIVITY:**
6. Equipment in kit: □ None □ Satisfactory □ Too needed □ Too fragile □ Difficult complicated to use
   Equipment I got: □ None □ Easy □ Hard to get, □ Too hard to get, □ Fragile □ Too needed □ Too hard to get, □ Unobtainable, □ Needed but okay □ Add to kit □ Add to kit

8. Materials used:

<table>
<thead>
<tr>
<th>Worksheet</th>
<th>Game</th>
<th>Slides (show slide nos.)</th>
<th>Transparency</th>
<th>Card(s)</th>
<th>Tape(s)</th>
<th>Other</th>
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<tr>
<td>Worthwhile as is</td>
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<td>Revise slightly</td>
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9. Maturity level is □ just right □ too childish □ too mature □ Explain:
10. Vocabulary level is □ just right □ too easy □ too difficult □ Explain:
11. Were teacher instructions clear enough to follow? □ Yes □ No - Pages and Problem:
12. Were clues to success and reviews of success helpful? □ Yes □ No - Why not?
13. Did the activity fulfill the purpose stated by the Guide? □ Yes □ No - Comment:
14. Were any parts of this activity omitted? □ No □ Yes - Explain:
15. Your rating of this activity:
   □ Worthwhile □ Of value--needs the □ Worth salvaging--make □ Worthless--keep as is □ Revision suggested □ Major changes described □ Drop it

SPECIFIC CONCERNS ABOUT THIS ACTIVITY:

16. There are always parts of activities that are good and need not be changed. What parts of this activity should be retained when the curriculum is revised? Pages(s) ________________:
17. Did students remember (and not seem surprised) that plants make sugar? □ No □ Yes: Comment.
18. Did students have difficulty answering Worksheet 4-1? (6 pictures on energy/material flow) □ No □ Yes: Comment.
19. Concern (or questions) about content:
20. Messages for staff (read immediately):

Have you answered each question, attached annotated Guide, your revisions, student work, etc.?
SIDE A
UNIT IV, CORE A
Activity 4-2: "The Trip Of A Drop Of Water"

REPORT OF WHAT HAPPENED AND SUGGESTIONS FOR REVISION

1. Whenever practical write all over your second copy of the Guide. Tear out the activity and send the annotated Guide in with this form.
3. Tell us what you did. Think of what you needed, what you had to work out for yourself, how you presented something to make it go over.
4. Describe the revisions you said were needed in answering the questions on the other side of this form.
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☐ how you organized materials or class.
☐ things added (a question, a picture, etc.).
☐ equipment, supplies, visual aids.
☐ things that went wrong, misunderstandings.
☐ what you would do differently or avoid next time.
☐ turmoil in the class caused by the activity, or disruptive students, or interruptions, and how you dealt with them.

THE STUDENTS
☐ who had problems and what they were.
☐ how someone "caught on" (or who never did).
☐ who was really "turned off" (or on).
☐ reactions of parents, teachers, students.
☐ special evidence of learning or applying ideas.
OBJECTIVE FOCUS FOR THIS ACTIVITY

UNIT GOALS:

1. Appreciate the cycling relationships of the materials and organisms in the environment through:
   a. Understanding of what a cycle is.
   b. Understanding of the role of decomposers.
   c. Realization that certain materials are in finite supply.
   d. Recognition of examples of man’s impact upon the environment.

2. Comprehend the role of man as an integral part of nature, not apart from nature.

CORE A OBJECTIVES:

2. Conclude that all materials are transferred through environmental systems.

TEACHING STRATEGIES

Activity 4-3. The Long Journey: A Review

As a built-in redundancy and review, this activity in story form traces the flow of an atom of nitrogen backwards from its incorporation in an individual.

Initiate the activity by passing out the booklet, The Long Journey, and saying:

WE’VE TALKED OF MATERIALS TRANSFER FROM ONE PART OF THE FOOD CHAIN TO ANOTHER. FOLLOW WITH ME AS I READ THIS STORY TO YOU.
FOCUS FOR THIS ACTIVITY

GOALS:

1. Appreciate the cycling relationships of the materials and organisms in the environment through:
   a. Understanding of what a cycle is.
   b. Understanding of the role of decomposers.
   c. Realization that certain materials are in finite supply.
   d. Recognition of examples of man's impact upon the environment.

2. Comprehend the role of man as an integral part of nature, not apart from nature.

OBJECTIVES:

1. Conclude that all materials are transferred through environmental systems.

TEACHING STRATEGIES

3. The Long Journey: A Review

In redundancy and review, this activity traces the flow of an atom of nitrogen back to its incorporation in an individual.

The activity by passing out the booklet, The Long Journey saying:

ATTENDED OF MATERIALS TRANSFER FROM ONE OF THE FOOD CHAIN TO ANOTHER. FOLLOW WITH ME READ THIS STORY TO YOU.

UNIT IV. TRANSFER AND CYCLING OF MATERIALS IN MY ENVIRONMENT

CORE A. ENERGY AND MATERIAL TRANSFER

ACTIVITY 4-3. THE LONG JOURNEY: A REVIEW

ANTICIPATED STUDENT BEHAVIORS

At the end of this activity, each student should:

--have read the booklet, The Long Journey.
--have demonstrated his understanding of matter movement in the environment by tracing a particle of nitrogen from the air to the hair.
ACTIVITY 4-3

THE LONG JOURNEY

MATERIALS

THE BIOLOGICAL SCIENCES CURRICULUM STUDY

TEACHING STRATEGIES

Read the booklet ahead of time so that you can practice use of necessary conversational inflections. The significance of the cartoons should be apparent.

Did you ever wonder what you're made of and where you came from? Oh, I don't mean babies and that kind of stuff... I mean the real you, right now. Did you ever wonder where hair, skin, fingers, nails and all that kind of stuff came from?

Well, let me tell you. I was wondering, too. So I saw the doctor, and he said, 'You are made of very tiny atoms. These atoms are all joined together to build all of your parts. As a matter of fact, he said that most of me is made of carbon atoms. Four out of every five parts of me is carbon.'

We traveled back in time two weeks. He said my blood carries one nitrogen particle to the root of my hair just before it becomes a part of my hair.

Back another six hours and we saw us falling down the esophagus (food tube) to my stomach. We were a part of a chewed-up piece of food. Next, just a minute before we had been sitting with the nitrogen in a hamburger.

Back another six hours and we saw us falling down the esophagus to my stomach. We were a part of a chewed-up piece of food. Next, just a minute before we had been sitting with the nitrogen in a hamburger.
booklet ahead of time so that you can practice necessary conversational inflections. The significance of the cartoons should be apparent.

Well, let me tell you. I was wondering, so I told the person he was a scientist. He told me I was made of few pieces of matter called molecules. The molecules are all joined together to build all of my parts. As a matter of fact, he said that most of me is made of water molecules. Four out of every five parts of me is water.

It's pretty easy to see where all the water comes from. I drink a lot and then there's water in just about everything I eat. But, what about some of the other things I'm built of? Take nitrogen, for instance. Where'd that come from?

Let's pretend to catch on to a piece of nitrogen. For instance, my hair is made of molecules that have lots of nitrogen in them. Let's follow one of those nitrogen to see where it came from. The scientist said that we'd have to imagine we were very, very small in order to do this.

Back another six hours and we saw us falling down my esophagus (food tube) to my stomach. We were a part of a chewed-up piece of food then.

Just the day before I had been ground up into a hamburger at the meat packing plant. The meat cutter and I were from pieces of muscle in the leg of a steer.

The steer didn't know it, but it picked up nitrogen when it ate grass just before its trip to the slaughter house.

Just a minute before we had been sitting with the nitrogen in a hamburger.

The nitrogen from the grass in the steer's leg in muscle as it had gotten into my hair.

I'm built of molecules.
At this point ask the students to draw a chain representation of The Long Journey from the time nitrogen was washed from the air until it ended up in their hair. Ask them to use the pictures of the story to give them clues. The final chain should be representations (word or picture) of the following:

- Air → Soil → Clover → Grasshopper
- Frog → Snake → Hawk (dropping) → Hay
- Steer (hamburger) → Me.
point ask the students to draw a chain:

Soil → Clover → Grasshopper → Snake → Hawk (dropping) → Hay (hamburger) → Me.
UNIT IV, CORE A  
Activity 4-3: "The Long Journey: A Review"  
Teacher

Activity name suggested by class:  

<table>
<thead>
<tr>
<th>Date taught (month and date, e.g. 11/2)</th>
<th>Day 1</th>
<th>Day 2</th>
<th>Day 3</th>
<th>Day 4</th>
<th>Day 5</th>
<th>Day 6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minutes of class time on science each day</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Minutes of preparation each day</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Students absent on each date (Use ID Number)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

5. Interest of class as expressed by apparent attention to what is happening.  
   Number of students responding with:  
   Name students you noted especially:

<table>
<thead>
<tr>
<th>HIGH INTEREST</th>
<th>MODERATE INTEREST</th>
<th>INDIFFERENCE</th>
<th>MODERATE RESISTANCE</th>
<th>STRONG DISLIKE</th>
<th>HARD TO RATE</th>
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<tbody>
<tr>
<td>(Number)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

6. Equipment in kit:  
   None  Satisfactory  Too fragile  Too complicated  Difficult to use

7. Equipment I got:  
   None  Easy  Hard to get  Hard to get, but okay  Unobtainable, needed to get  add to kit  add to kit

8. Materials used:  
   Worksheet  Game  Slides (show slide nos.)  Transparency  Card(s)  Tape(s)  Other

<table>
<thead>
<tr>
<th>Worthwhile as is</th>
<th>Revise slightly</th>
<th>Revise much</th>
<th>Worthless: omit</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</table>

9. Maturity level is  
   just right  too childish  too mature  Explain:

10. Vocabulary level is  
    just right  too easy  too difficult  Explain:

11. Were teacher instructions clear enough to follow?  
    Yes  No - Pages and Problem.

12. Were clues to success and reviews of success helpful?  
    Yes  No - Why not?

13. Did the activity fulfill the purpose stated by the Guide?  
    Yes  No - Comment:

14. Were any parts of this activity omitted?  
    No  Yes - Explain:

15. Your rating of this activity:  
    Worthwhile  Of value - needs the  Worth salvaging - make  Worthless
6. Equipment in kit:  □ None □ Satisfactory □ Too needed □ Too fragile □ Too complicated □ Difficult to use

Equipment I got:  □ None □ Easy □ Hard to get, but okay □ Hard to get, Unobtainable, add to kit

8. Materials used:

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10. Vocabulary level is  □ just right □ too easy □ too difficult  Explain:

11. Were teacher instructions clear enough to follow?  □ Yes □ No - Pages and Problem:

12. Were clues to success and reviews of success helpful?  □ Yes □ No - Why not?

13. Did the activity fulfill the purpose stated by the Guide?  □ Yes □ No - Comment:

14. Were any parts of this activity omitted?  □ No □ Yes - Explain:

15. Your rating of this activity:
   □ Worthwhile  □ Of value--needs the □ Worth salvaging--make □ Worthless -- keep as is  revision suggested major changes described -- drop it

SPECIFIC CONCERNS ABOUT THIS ACTIVITY:

16. There are always parts of activities that are good and need not be changed. What parts of this activity should be retained when the curriculum is revised? Page(s) ____________:

17. Did the students have difficulty understanding "The Long Journey" booklet?  (Any misinterpretations, ambiguities, etc.)  □ No  □ Yes: Comment.

18. Did students have trouble listing the ten links in the nitrogen chain?  □ No  □ Yes: Comment.

19. Concerns (or questions) about content:

20. Messages for staff (read immediately):
UNIT IV, CORE A
Activity 4-3: "The Long Journey: A Review"

REPORT OF WHAT HAPPENED AND SUGGESTIONS FOR REVISION

1. Whenever practical write all over your second copy of the Guide. Tear out the activity and send the annotated Guide in with this form.
3. Tell us what you did. Think of what you needed, what you had to work out for yourself, how you presented something to make it go over.
4. Describe the revisions you said were needed in answering the questions on the other side of this form.
5. As a reminder of things that help in revision, read through the following list and check off things you want to be sure to note this time. (We know you can't tell about everything every time!)

THE LESSON
☐ how you organized materials or class.
☐ things added (a question, a picture, etc.).
☐ equipment, supplies, visual aids.
☐ things that went wrong, misunderstandings.
☐ what you would do differently or avoid next time.
☐ turmoil in the class caused by the activity, or disruptive students, or interruptions, and how you dealt with them.

THE STUDENTS
☐ who had problems and what they were.
☐ how someone "caught on" (or who never did).
☐ who was really "turned off" (or on).
☐ reactions of parents, teachers, students.
☐ special evidence of learning or applying ideas.
OBJECTIVE FOCUS FOR THIS ACTIVITY

UNIT GOALS:

1. Appreciate the cycling relationships of the materials and organisms in the environment through:
   a. Understanding of what a cycle is.
   b. Understanding of the role of decomposers.
   c. Realization that certain materials are in finite supply.
   d. Recognition of examples of man's impact upon the environment.

2. Comprehend the role of man as an integral part of nature, not apart from nature.

CORE A OBJECTIVES:

1. Reconstruct the transfer of energy through an environmental system.

2. Conclude that all materials are transferred through environmental systems.

TEACHING STRATEGIES

Activity 4-4. Food Webs

The food chain transfer of energy and cycling of materials is now expanded into the context of the food web. Students will be given the opportunity to review the concepts associated with analyzing food webs that were just presented in Unit III. Students will later apply these concepts to the environment near your school in Activity 4-6. It is hoped that this will help them to become much more aware of the intricate relationships that exist around them every day.
CUES FOR THIS ACTIVITY

Appreciate the cycling relationships of the materials and organisms in the environment through:

a. Understanding of what a cycle is.
b. Understanding of the role of decomposers.
c. Realization that certain materials are in finite supply.
d. Recognition of examples of man’s impact upon the environment.

Comprehend the role of man as an integral part of nature, not apart from nature.

OBJECTIVES:

Reconstruct the transfer of energy through an environmental system.

Conclude that all materials are transferred through environmental systems.

TEACHING STRATEGIES

Food Webs

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UNIV IV. TRANSFER AND CYCLING OF MATERIALS IN MY ENVIRONMENT

CORE A. ENERGY AND MATERIAL TRANSFER

ACTIVITY 4-4. FOOD WEBS

ANTICIPATED STUDENT BEHAVIORS

At the end of this activity, each student should:

--have participated in the food web string activity and played the role of an organism appropriately.
--have identified appropriate food chains and food web interactions.
--have realized that a disturbance in any part of the food web will ultimately be felt in the whole food web.
ACTIVITY 4-4

MATERIALS

1 Deck of food web flash cards
*Large ball of string
*Scissors

*Not furnished in materials kit

TEACHING STRATEGIES

Teacher Preparation:

1. Arrange the chairs or desks in a large circle facing toward the center of the classroom before students arrive.

2. Prior to the organizing of the class have the materials outlined in the materials list available.

Begin the activity by having each student draw a flash card from the flash card deck. Explain that each student will pretend he is the organism he draws from the deck.

Have each student hold the card so that all students sitting in the circle can see all of the cards.

Start by saying:

EACH OF YOU IS PRETENDING TO BE ONE KIND OF LIVING THING -- THE ORGANISM PICTURED ON THE CARD YOU ARE HOLDING. (Student's name), YOU ARE ALL OF THE SNAKES IN THE AREA. (Student's name), YOU ARE THE WHOLE POPULATION OF MOSQUITOES.

Ask:

DO ANY OF YOU SEE AN ORGANISM THAT YOU, AS THE ORGANISM YOU'RE PRETENDING TO BE, WOULD NORMALLY EAT?

Pick a volunteer and have him identify the organism he is pretending to be and then identify one he eats. Have him hold on to the end of the ball of string until told to let go. Stretch the string from this organism (student) to the organism (student) that it eats. Have the second organism (student) hold on to the string. Then ask that organism (student) to identify an organism that it might eat. If the student can not identify a food source, have the class
TEACHING STRATEGIES

Preparation:
- Arrange the chairs or desks in a large circle facing the center of the classroom before students arrive.
- To the organizing of the class have the materials outlined in the materials list available.
- Activity by having each student draw a flash card deck. Explain that each student is the organism he draws from the deck. Student hold the card so that all students in the circle can see all of the cards.

Demo:
- **If you is pretending to be one kind of thing -- the organism pictured on the card you are holding.** (Student's name), you are the whole population of mosquitoes. (Student's name), you are all of the snakes in the area. (Student's name), you are the whole population of mosquitoes.

- **If you see an organism that you, as the organism you're pretending to be, would normally eat?**
- Volunteer and have him identify the organism he is to be and then identify one he eats. Have him tie the end of the ball of string until told to let him off the string from this organism (student) to the organism that it eats. Have the second organism tied on to the string. Then ask that organism to identify an organism that it might eat. If they can not identify a food source, have the class

ANTICIPATED STUDENT BEHAVIORS

Students:

- Should recall the food chain game and identify organisms they would normally eat.
- Should hold string appropriately.
Diagram 4-1

Teaching Strategies

Help him. When a food source is identified, stretch the string to the new food source played by a third student. Continue identifying food sources until you reach a dead end in your food chain. (See Diagram 4-1.) Ask at this point:

WHAT HAVE WE MADE?

Then cut the string and start a new food chain starting with a student who is not yet in the food chain. Continue with this procedure until a maze of string is created between the students, i.e., until a complex food web is created. Remember that only one student can play the role of any specific organism, so most students will be joined to the others by more than one string.

Then ask:

WHAT HAVE WE MADE NOW?

HOW DOES THIS DIFFER FROM A FOOD CHAIN?

If students cannot answer the previous question, ask:

DOES A SPIDER WEB LOOK ANYTHING LIKE WHAT WE HAVE MADE?

WHAT WOULD BE A GOOD NAME FOR WHAT WE HAVE MADE?
When a food source is identified, stretch the new food source played by a third student. Stifling food sources until you reach a dead food chain. (See Diagram 4-2.) Ask at

WE MADE?

string and start a new food chain starting at who is not yet in the food chain. Continue procedure until a maze of string is created students, i.e., until a complex food web is emer that only one student can play the specific organism, so most students will be others by more than one string.

WE MADE NOW?

THIS DIFFER FROM A FOOD CHAIN?

Students cannot answer the previous question, ask:

WHAT WOULD BE A GOOD NAME FOR WHAT WE HAVE MADE?

Students:

--respond, "Food chain."

--recall and respond, "Food web."

--inspect the model and realize that the web is more complex than a chain and that it is in fact made up of many chains.

--should notice the similarity and respond, "Yes."

--should associate spider web with class activity and respond, "Food Web."
Now continue and say:

A GROUP OF FOOD CHAINS CONNECTED TOGETHER LIKE THESE WE HAVE MADE HERE IS CALLED A FOOD WEB. WHY DO YOU SUPPOSE IT'S CALLED THAT?

HOW DOES A FOOD WEB DIFFER FROM A FOOD CHAIN?

WHAT DOES A FOOD WEB SHOW US THAT A FOOD CHAIN DOES NOT?

When students have a basic appreciation of the complex nature of the food interactions of the organisms in the food web, proceed with the following: Pick the student who has the most strings in his hand and make up a disastrous situation relating to the organism that student is pretending to be; the situation should be as lifelike as possible. Examples might be: a drought hits an area and wipes out the grain population for a year; hunters shoot all of the hawks in an area; an insecticide kills all of the mosquitoes, etc.

After describing the disaster, have that student and that student only drop the strings in his hand. Then have all of the organisms that are directly affected (holding the other end of those strings) drop their strings. Then have all those that are affected by the second release drop theirs, etc. All the strings should be so interconnected that all or nearly all of the students will have dropped their strings. After this has occurred say:
Teaching Strategies

And say:

？of food chains connected together
These we have made here is called a food web.
You suppose it's called that?

Is a food web differ from a food chain?

Is a food web show us that a food chain can't?

Yes, have a basic appreciation of the complex food interactions of the organisms in the ecosystem with the following: Pick the student with most strings in his hand and make up a situation relating to the organism that pretending to be; the situation should be as possible. Examples might be; a drought and wipes out the grain population for a's shoot all of the hawks in an area; an kills all of the mosquitoes, etc.

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Anticipated Student Behaviors

Students:

--should propose various reasons and should include the tangled aspect of interconnecting pathways.

--compare the two and indicate that a food web is a network of many interconnecting chains, while a food chain is merely a single pathway of energy flow.

--should compare the two and emphasize the complexity of the food web. This might be expressed as, "More strings," "Harder," etc.
TEACHING STRATEGIES

Remember, each of you is pretending to be all of one kind of thing. (Student's name), is the entire (grain) population.

What did a change in the (grain) population do to our food web?

How are all the organisms in a food web related?

Does it matter if something happens to one population in a food web?

Why does it matter?

How does it affect other populations?

You may have to ask what effect it will have on one prey population if a second prey population has been wiped out. The answer is that the predator will of necessity concentrate on the remaining prey species because it becomes the predator's only source of food.

Are people in food webs?

Are we affected if other populations in our food web are affected?
TEACHING STRATEGIES

BER, EACH OF YOU IS PRETENDING TO BE OF ONE KIND OF THING. (Student’s name), ENTIRE (grain) POPULATION.

DID A CHANGE IN THE (grain) POPULATION DO FOR FOOD WEB?

WE ALL THE ORGANISMS IN A FOOD WEB RELATED?

IT MATTER IF SOMETHING HAPPENS TO ONE POPULATION FOOD WEB?

ES IT MATTER?

ES IT AFFECT OTHER POPULATIONS?

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OPLE IN FOOD WEB?

AFFECTED IF OTHER POPULATIONS IN OUR FOOD E AFFECTED?

ANTICIPATED STUDENT BEHAVIORS

Students:

--should conclude from the string experience that it “Goofed up the whole works.”

--should realize that all the organisms are inter-connected in a food web.

--respond, "Yes."

--infer that a change in one population in a food web affects all the other populations.

--infer that as one population is reduced (or increased), shifts in the numbers of other populations compensate for the loss or increase.

--respond, "Yes."

--infer that man is affected by changes in his food web.
### UNIT IV, CORE A
Activity 4-4: "Food Webs"

**Activity name suggested by class:**

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<thead>
<tr>
<th>Teacher</th>
<th>BSCS USE:</th>
<th>Post</th>
<th>Tally</th>
<th>Rev</th>
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</thead>
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<table>
<thead>
<tr>
<th>Day 1</th>
<th>Day 2</th>
<th>Day 3</th>
<th>Day 4</th>
<th>Day 5</th>
<th>Day 6</th>
</tr>
</thead>
</table>

1. **Teacher**
   - Date taught (month and date, e.g. 11/2)

2. Minutes of class time on science each day

3. Minutes of preparation each day

4. Students absent on each date (Use ID Number)

5. Interest of class as expressed by *apparent attention* to what is happening.
   - Number of students responding with: Name students you noted especially:
     - **HIGH INTEREST**
     - **MODERATE INTEREST**
     - **INDIFFERENCE**
     - **MODERATE RESISTANCE**
     - **STRONG DISLIKE**
     - **HARD TO RATE**

6. Equipment in kit:
   - None
   - Satisfactory
   - Too needed
   - Difficult to use

7. Equipment I got:
   - None
   - Easy
   - Hard to get, but okay
   - Unobtainable, needed to get

8. Materials used:
   - Worksheet
   - Game
   - Slides (show slide nos.)
   - Transparency
   - Card(s)
   - Tape(s)
   - Other

9. Maturity level is
   - **just right**
   - **too childish**
   - **too mature**
   - Explain:

10. Vocabulary level is
    - **just right**
    - **too easy**
    - **too difficult**
    - Explain:

11. Were teacher instructions clear enough to follow?  
    - Yes
    - No - Pages and Problem:

12. Were clues to success and reviews of success helpful?  
    - Yes
    - No - Why not?

13. Did the activity fulfill the purpose stated by the Guide?  
    - Yes
    - No - Comment:

14. Were any parts of this activity omitted?  
    - No
    - Yes - Explain:

15. Your rating of this activity:
    - **Worthwhile**
    - Of value--needs the
    - Worth salvaging--make
    - Worthless
    - --keep as is
    - revision suggested
    - major changes described
    - --drop it
Equipment I got:  

<table>
<thead>
<tr>
<th>Needed</th>
<th>Fragile</th>
<th>Complicated to Use</th>
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</thead>
<tbody>
<tr>
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<td></td>
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8. Materials used:

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| Just right | Too childish | Too mature | Explain: |

10. Vocabulary level is  

| Just right | Too easy | Too difficult | Explain: |

11. Were teacher instructions clear enough to follow?  

| Yes | No - Pages and Problem: |

12. Were clues to success and reviews of success helpful?  

| Yes | No - Why not? |

13. Did the activity fulfill the purpose stated by the Guide?  

| Yes | No - Comment: |

14. Were any parts of this activity omitted?  

| No | Yes - Explain: |

15. Your rating of this activity:  

| Worthwhile | Of value--needs the | Worth salvaging--make | Worthless--keep as is | Revision suggested | Major changes described | Drop it |

16. There are always parts of activities that are good and need not be changed. What parts of this activity should be retained when the curriculum is revised?  

Page(s): ____________

17. Did students have difficulty understanding what was meant by the terms 'organism' and 'population'?  

| No | Yes - Comment: |

18. Did you use the terms 'prey' and 'predator' (and did students understand them)?  

| Yes | No - Comment: |

19. Were there any students who could not explain the effect of a change in one population on the other populations in the ecosystem?  

| No | Yes - Comment: |

20. Concern (or questions) about content:  

21. Messages for staff (read immediately):  

Have you answered each question, attached annotated Guide, your revisions, student work, etc.?  

SIDE A
UNIT IV, CORE A
Activity 4-4: "Food Webs"

Teacher ____________________________

REPORT OF WHAT HAPPENED AND SUGGESTIONS FOR REVISION

1. Whenever practical write all over your second copy of the Guide. Tear out the activity and send the annotated Guide in with this form.


3. Tell us what you did. Think of what you needed, what you had to work out for yourself, how you presented something to make it go over.

4. Describe the revisions you said were needed in answering the questions on the other side of this form.

5. As a reminder of things that help in revision, read through the following list and check off things you want to be sure to note this time. (We know you can't tell about everything every time!)

THE LESSON

☑ how you organized materials or class.
☑ things added (a question, a picture, etc.).
☑ equipment, supplies, visual aids.
☑ things that went wrong, misunderstandings.
☑ what you would do differently or avoid next time.
☑ turmoil in the class caused by the activity, or disruptive students, or interruptions, and how you dealt with them.

THE STUDENTS

☑ who had problems and what they were.
☑ how someone "caught on" (or who never did).
☑ who was really "turned off" (or on).
☑ reactions of parents, teachers, students.
☑ special evidence of learning or applying ideas.

(We know you can't tell about everything every time!)
UNIT GOALS:

1. Appreciate the cycling relationships of the materials and organisms in the environment through:
   a. Understanding of what a cycle is.
   b. Understanding of the role of decomposers.
   c. Realization that certain materials are in finite supply.
   d. Recognition of examples of man's impact upon the environment.

2. Comprehend the role of man as an integral part of nature, not apart from nature.

CORE A OBJECTIVES:

1. Reconstruct the transfer of energy through an environmental system.

2. Conclude that all materials are transferred through environmental systems.

TEACHING STRATEGIES

Activity 4-5. Plant And Animal Hunt

This activity will introduce/reacquaint students with some plants and animals in their area. The plants and animals identified will be used to construct another food web of string in Activity 4-6. Because the plants and animals will be familiar to the students, this food web will provide a more concrete model than the previous one.
FOCUS FOR THIS ACTIVITY

GOALS:
1. Appreciate the cycling relationships of the materials and organisms in the environment through:
   a. Understanding of what a cycle is.
   b. Understanding of the role of decomposers.
   c. Realization that certain materials are in finite supply.
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TEACHING STRATEGIES

5. Plant And Animal Hunt
   This activity will introduce/reacquaint students with some animals in their area. The plants and animals will be used to construct another food web of Activity 4-6. Because the plants and animals familiar to the students, this food web will be more concrete model than the previous one.

UNIT IV. TRANSFER AND CYCLING OF MATERIALS IN MY ENVIRONMENT

CORE A. ENERGY AND MATERIAL TRANSFER

ACTIVITY 4-5. PLANT AND ANIMAL HUNT

ANTICIPATED STUDENT BEHAVIORS

At the end of this activity, each student should:
--have identified several plants and animals found in his area.
--have seen and identified plants and animals from other parts of the country.
ACTIVITY 4-5

MATERIALS

*File cards, (6" X 8"), 2 per student
*Crayons, colored pencils
*Magazines with pictures of local organisms
*Scissors, 1 per pair of students

*Not furnished in materials kit

TEACHING STRATEGIES

Prior to this activity you will want to locate a convenient outdoor place where you can take your class for this field trip. It should be as rich in plant and animal life as possible. Places that may be good for the purpose include parks, zoos, fields, or woods.

Begin this activity by asking:

**IF WE WANTED TO TAKE A SHORT TRIP TO FIND A LOT OF PLANTS AND ANIMALS, WHERE COULD WE GO?**

As each place is suggested ask the following questions:

**WILL THERE BE A LOT OF PEOPLE THERE?**

**WHO OWNS IT?**

**DO WE NEED PERMISSION TO GO ON THAT PROPERTY? WHY OR WHY NOT?**

**CAN WE GET A GUIDE OR EXPERT TO HELP US?**

Discuss all the various areas that could be visited and eventually arrive at as much of a universal agreement as is possible. Try not to dictate the spot -- let students discuss the problem and weigh all the considerations.

A place within easy walking distance is obviously preferable unless you can easily get a bus or other transportation. If no obvious place is available, the school grounds can be used as a last resort. The main reason for not using the school grounds is that students will miss a chance to explore an area that is not as familiar as the school yard. When the place has been established, continue by asking:
<table>
<thead>
<tr>
<th>TEACHING STRATEGIES</th>
<th>ANTICIPATED STUDENT BEHAVIORS</th>
</tr>
</thead>
</table>

This activity you will want to locate a convenient place where you can take your class for this field should be as rich in plant and animal life as possible. Places that may be good for the purpose include parks, fields, or woods.

Activity by asking:

**WANTED TO TAKE A SHORT TRIP TO FIND A PLACE WHERE PLANTS AND ANIMALS LIVE, WHERE COULD WE GO?**

Once a place is suggested, ask the following questions:

- **HERE BE A LOT OF PEOPLE THERE?**
- **IS IT?**
- **NEED PERMISSION TO GO ON THAT PROPERTY? WHY NOT?**
- **GET A GUIDE OR EXPERT TO HELP US?**

Consider the various areas that could be visited and arrive at as much of a universal agreement as possible. Try not to dictate the spot—let students help in the decision-making process and weigh all the considerations.

If an easy walking distance is obvious, you can easily get a bus or other transportation. If no obvious place is available, the school can be used as a last resort. The main reason for exploring the school grounds is that students will be more inclined to explore an area that is not as familiar to them. When the place has been established, students:

- **should call on their experience and suggest a place.**
- **should guess appropriately.**
- **should relay their knowledge or guesses.**
- **should discuss private or public places and decide appropriately for each.**
- **should discuss the possibility.**
MATERIALS

TEACHING STRATEGIES

WHEN WE VISIT THE (place) WHAT KINDS OF PLANTS AND ANIMALS DO YOU THINK WE WILL FIND?

As students make suggestions, write them on the board under two columns, "Plant" and "Animal". If there is any confusion about what is plant or animal, it should be clarified at this time. Students may not think of a fish, a bird, or an insect as an animal, for example. If this problem arises, it would be a good time to review the grouping work done earlier. Explain that animals can be grouped into categories based on common characteristics. For example, birds fly and have feathers, and thus we classify them as birds. Besides being animals, they are classified as birds. Continue this kind of exploration until the students understand that all such organisms are animals.

The students should be allowed to comment on other students' suggestions. Let them agree or disagree with a suggestion and explain why they agree or disagree. The tendency should be to include all suggestions unless they are obviously incorrect.

If the space on the chalkboard is not needed for several days, the list can be left on the board. If the space is needed, some student in the class should be appointed recorder and should copy the list for a permanent record.

The day of the field trip:

If the weather is bad, postpone the field trip and see Activity 4-7 for an alternate lesson.

Briefly review with the students the conduct you expect from them on the field trips.
TEACHING STRATEGIES

VISIT THE (place) WHAT KINDS OF PLANTS DO YOU THINK WE WILL FIND?

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ANTICIPATED STUDENT BEHAVIORS

Students:

--should use their experiences in the area to make logical predictions.
NOTE TO TEACHERS:

The students should be paired by the teacher for the trip, and should then be told that each group (pair) should report at least five plants and five animals from the area to the teacher. They must tell the teacher the name of each organism and whether or not it is a plant or animal. If the teacher questions the presence of that organism, she can ask to see it or for the indirect evidence of the organism named. Encourage students to spread out and find as many organisms as possible. Encourage the collection of indirect evidence also! Such evidence might be a feather, a bone, hair, acorn, leaf, etc.

Record the names of the two students in each team on Tallysheet 4-2 and take it along on the field trip to check off plants and animals each team finds. If you supply the name of the organism, make an asterisk in the appropriate column for that team. (See Diagram 4-2.)

While duplication should be allowed in organisms listed, strive to obtain variety by asking students to bring in more names if they all select the same organisms.

Some teams may have difficulty supplying the specific names of animals such as robin or hawk, in which case you can use a group name as a category, such as birds or bugs. The same will be true of plants. (Of course students should be free to ask each other what something is or to ask you. You may wish to take along a key to flowers, trees, birds, or insects. You may also wish to extend this lesson to show students how to use such guides. If the students find something that stumps everyone, they may wish to take a picture of it and ask a local expert to identify it.
TEACHING STRATEGIES

HERS:

- Should be paired by the teacher for the trip, then be told that each group (pair) should
  select five plants and five animals from the teacher. They must tell the teacher the name
  and whether or not it is a plant or the teacher questions the presence of that
  one can ask to see it or for the indirect
  the organism named. Encourage students to
  find as many organisms as possible.

- Collection of indirect evidence also! Such
  might be a feather, a bone, hair, acorn, leaf,
  names of the two students in each team on
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- Variation should be allowed in organisms listed,
  obtain variety by asking students to bring in
  if they all select the same organisms.

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  or insects. You may also wish to extend
  to show students how to use such guides. If
  find something that stumps everyone, they
  take a picture of it and ask a local expert to

ANTICIPATED STUDENT BEHAVIORS
Day after the field trip:

In this part of the activity, students will compare their predictions with their actual findings. Either their predictions will be verified, in which case you should congratulate them, or their findings will be more or less than they predicted.

Back in the classroom the day after the field trip, write the list of plants and animals seen on the trip on the chalkboard next to the list of those listed before the field trip. Circle the names of any organisms which occur on one list but not on the other. If someone suggested before the field trip that a robin might be seen, but no robin was reported, circle robin. Both lists could be placed on the chalkboard before the class comes in and when the class is assembled the teacher could ask:

WHY ARE SOME NAMES CIRCLED?

Or the lists could be written on the chalkboard and the words circled while the students are present and the same question asked.

Ask whichever of the following questions is appropriate or both:

WHY DID WE SEE SOME ORGANISMS WHICH DIDN'T APPEAR ON THE FIRST LIST?

or
Students:

**ANTICIPATED STUDENT BEHAVIORS**

**ACTIVITY 4-5**

1. **MUCH TRIP TIME**

After the field trip:

- of the activity, students will compare their
  with their actual findings. Either their
  will be verified, in which case you should
  them, or their findings will be more or less
  predicted.

- classroom the day after the field trip,
  list of plants and animals seen on the trip
  board next to the list of those listed
  field trip. Circle the names of any
  which occur on one list but not on the
  someone suggested before the field trip
  might be seen, but no robin was reported.
  Both lists could be placed on the chalkboard
  class comes in and when the class is assembled
  could ask:

- **SOME NAMES CIRCLED?**

- could be written on the chalkboard and the
  read while the students are present and the same
  asked.

- of the following questions is appropriate or

- WE SEE SOME ORGANISMS WHICH DIDN'T APPEAR
  FIRST LIST?

- respond, "I don't know," "Because they are
  important," "Because they are missing from the
  other list."
ACTIVITY 4-5

MATERIALS

TEACHING STRATEGIES

WHY DIDN'T WE SEE ALL OF THE ORGANISMS WE THOUGHT WE WOULD SEE?

Ask:

WHY WERE SOME ORGANISMS SEEN BY MORE STUDENTS THAN OTHERS?

Now discuss each organism seen on the trip. Ask questions such as:

WHAT IS THE (organism) LIKE?
WHAT DOES IT EAT?
WHY CAN IT LIVE AT THE (place)?
WHAT DOES IT DO IN THE AREA?

If possible the list of organisms seen on the trip should be left on the chalkboard for the next day of class.

Discuss all responses that may arise. Summarize with a comment that now the class is going to prepare for a game that will use the names and a drawing of the organisms the students reported from the trip.

Give each student two 6 X 8 inch cards and assign him to draw a simple, colored picture of an assigned plant on one card and to label the drawing with the name of the plant in black at the bottom of the card; then to draw an assigned animal and label it on the other card. Have the students print the labels in large letters. Be sure that
**TEACHING STRATEGIES**

- Don't we see all of the organisms we would see?

- Are some organisms seen by more students than others?

  - Each organism seen on the trip. Ask questions:
    - The (organism) like?
    - Does it eat?
    - Does it live at the (place)?
    - Does it do in the area?

  - The list of organisms seen on the trip should be chalkboard for the next day of class.

  - Responses that may arise. Summarize with a new list of organisms reported from the trip.

  - Students will prepare for a game.

  - Student two 6 x 8 inch cards and assign him to:
    - One colored picture of an assigned plant on one label the drawing with the name of the plant on the bottom of the card; then to draw an animal and label it on the other card. Have the bottom the labels in large letters. Be sure that.

  - Anticipated Student Behaviors:
    - Respond, "I don't know," "Some were asleep," "Some were dead," "Some only spend part of their time there," "They were there but we just missed them," "We made a mistake."

    - Respond, "Some students see better than others," "Students were in different places at the same time," "Some of the organisms moved out of the area, thus were seen by some students and not by others," "Some students thought some organisms were more important than others, so reported them first," "Some organisms were more numerous, and so were seen and reported by more students."

    - Provide information as their background allows.
<table>
<thead>
<tr>
<th>MATERIALS</th>
<th>TEACHING STRATEGIES</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>a card is made for each plant and animal. If there are not enough organisms for each student to make two cards, have duplicate cards made.</td>
</tr>
<tr>
<td></td>
<td>If students are reluctant to draw or cannot draw, the provide magazines from which pictures of the organisms can be found. Have them cut them out on the cards and label them. In a few cases you may want some student to photograph an organism.</td>
</tr>
<tr>
<td></td>
<td>Collect the cards when they are completed and have them available for distribution to the students for the string game in the next activity.</td>
</tr>
</tbody>
</table>
TEACHING STRATEGIES

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ANTICIPATED STUDENT BEHAVIORS

ACTIVITY 4-5

WERK TIME

WERK TIME

Cards when they are completed and have them or distribution to the students for the string next activity.
# Activity 4-5: "Plant And Animal Hunt"

## Activity name suggested by class:

**Teacher**

<table>
<thead>
<tr>
<th>Date taught (month and date, e.g. 11/2)</th>
<th>Day 1</th>
<th>Day 2</th>
<th>Day 3</th>
<th>Day 4</th>
<th>Day 5</th>
<th>Day 6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minutes of class time on science each day</td>
<td></td>
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<tr>
<td>Minutes of preparation each day</td>
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<tr>
<td>Students absent on each date (Use ID Number)</td>
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</tr>
</tbody>
</table>

## BSCS USE: Post ___ Tally ___ Rev ___

5. Interest of class as expressed by apparent attention to what is happening.

- Number of students responding with:
  - High Interest
  - Moderate Interest
  - Indifference
  - Moderate Resistance
  - Strong Dislike
  - Hard To Rate

6. Equipment in kit:
   - None
   - Satisfactory
   - Too fragile
   - Too complicated
   - Difficult

7. Equipment I got:
   - None
   - Easy
   - Hard to get
   - Unobtainable

8. Materials used:
   - Worksheet
   - Game
   - Slides (show slide nos.)
   - Transparency
   - Card(s)
   - Tape(s)
   - Other

<table>
<thead>
<tr>
<th>Worthwhile as is</th>
<th>Worksheet</th>
<th>Game</th>
<th>Slides (show slide nos.)</th>
<th>Transparency</th>
<th>Card(s)</th>
<th>Tape(s)</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>Revise slightly</td>
<td></td>
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<tr>
<td>Revise much</td>
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<tr>
<td>Worthless: omit</td>
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</tbody>
</table>

9. Maturity level is:
   - Just right
   - Too childish
   - Too mature

10. Vocabulary level is:
    - Just right
    - Too easy
    - Too difficult

11. Were teacher instructions clear enough to follow? 0 Yes 0 No - Pages and Problem:

12. Were clues to success and reviews of success helpful? 0 Yes 0 No - Why not?

13. Did the activity fulfill the purpose stated by the Guide? 0 Yes 0 No - Comment:

14. Were any parts of this activity omitted? 0 No 0 Yes - Explain:

15. Your rating of this activity:
    - Worthwhile
    - Of value -- needs the
    - Worth salvaging -- make
    - Worthless
    - Keep as is
    - Revision suggested
    - Major changes described
    - Drop it

### SPECIFIC CONCERNS ABOUT THIS ACTIVITY:
Equipment I got: □ None □ Easy □ Hard to get, □ Hard to get, □ Unobtainable, needed to get but okay □ add to kit □ add to kit

|M  |
|------------------|------------------|------------------|------------------|
| Worksheet # | Game # | Slides (show slide nos.) | Transparency # | Card(s) # | Tape(s) # | Other # |
|------------------|------------------|------------------|------------------|------------------|
| Worthwhile as is |       |       |       |       |       |       |
| Revise slightly |       |       |       |       |       |       |
| Revise much |       |       |       |       |       |       |
| Worthless: omit |       |       |       |       |       |       |

9. Maturity level is □ just right □ too childish □ too mature Explain: ____________________________________________________________________________
10. Vocabulary level is □ just right □ too easy □ too difficult Explain: ____________________________________________________________________________

11. Were teacher instructions clear enough to follow? □ Yes □ No - Pages and Problem: ____________________________________________________________________________
12. Were clues to success and reviews of success helpful? □ Yes □ No - Why not? ____________________________________________________________________________
13. Did the activity fulfill the purpose stated by the Guide? □ Yes □ No - Comment: ____________________________________________________________________________
14. Were any parts of this activity omitted? □ No □ Yes - Explain: ____________________________________________________________________________
15. Your rating of this activity: □ Worthwhile □ Of value--needs the □ Worth salvaging--make □ Worthless--keep as is □ Revision suggested □ Major changes described □ Drop it ____________________________________________________________________________

SPECIFIC CONCERNS ABOUT THIS ACTIVITY:

16. There are always parts of activities that are good and need not be changed. What parts of this activity should be retained when the curriculum is revised? Page(s) ____________________________________________________________________________

17. Did students have difficulty identifying the names of plants or animals found in the area? □ No □ Yes: Comment. [NOTE: Be sure to send in Tallysheet 4-2 showing organisms they observe.] ____________________________________________________________________________

18. Did the field trip go smoothly with no problems? □ Yes □ No: Comment.

19. Did any students have difficulty picturing their plant and animal? □ No □ Yes: Comment.

20. Concern (or questions) about content:

21. Messages for staff (read immediately): ____________________________________________________________________________
REPORT OF WHAT HAPPENED AND SUGGESTIONS FOR REVISION

1. Whenever practical write all over your second copy of the Guide. Tear out the activity and send the annotated Guide in with this form.
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☐ how you organized materials or class.
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☐ things that went wrong, misunderstandings.
☐ what you would do differently or avoid next time.
☐ turmoil in the class caused by the activity, or disruptive students, or interruptions, and how you dealt with them.

THE STUDENTS
☐ who had problems and what they were.
☐ how someone "caught on" (or who never did).
☐ who was really "turned off" (or on).
☐ reactions of parents, teachers, students.
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<table>
<thead>
<tr>
<th>STUDENT PAIRS</th>
<th>No. of animals found</th>
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<tbody>
<tr>
<td>Team 1</td>
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# of teams reporting each plant and animal
<table>
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<table>
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<th>ANIMALS</th>
<th>PLANTS</th>
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<tr>
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<td>No. of plants found</td>
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</tbody>
</table>

Send this sheet in with the Activity 5 Feedback Form.
OBJECTIVE FOCUS FOR THIS ACTIVITY

UNIT GOALS:

1. Appreciate the cycling relationships of the materials and organisms in the environment through:
   a. Understanding of what a cycle is.
   b. Understanding of the role of decomposers.
   c. Realization that certain materials are in finite supply.
   d. Recognition of examples of man's impact upon the environment.

2. Comprehend the role of man as an integral part of nature, not apart from nature.

CORE A OBJECTIVES:

1. Reconstruct the transfer of energy through an environmental system.

2. Conclude that all materials are transferred through environmental systems.

TEACHING STRATEGIES

Activity 4-6. Tying Up The Hunt

This activity is designed to show various relationships between the plants and animals found in the student's environment. It will also reinforce the concept that a disruption in a community of organisms will ultimately affect all organisms in that community.
Focus for this Activity

Objectives:

Appreciate the cycling relationships of the materials and organisms in the environment through:

a. Understanding of what a cycle is.

b. Understanding of the role of decomposers.

c. Realization that certain materials are in finite supply.

d. Recognition of examples of man's impact upon the environment.

Comprehend the role of man as an integral part of nature, not apart from nature.

OBJECTIVES:

Reconstruct the transfer of energy through an environmental system.

Conclude that all materials are transferred through environmental systems.

Teaching Strategies

ACTIVITY 4-6. TYING UP THE HUNT

At the end of this activity, each student should:

--have identified appropriate food chain and food web interactions for the local flora (plants) and fauna (animals).

--have played the role of a local plant population or animal population in the food web game.

--conclude that food web relationships are complex and that changes in one aspect of the web will ultimately affect the whole web.

1. Tying Up The Hunt

It is designed to show various relationships between plants and animals found in the students' community. It will also reinforce the concept that in a community of organisms will ultimately affect the whole community.
ACTIVITY 4-6

MATERIALS

*Cards prepared in Activity 4-5
*Ball of string
*Scissors

*Not furnished in materials kit

TEACHING STRATEGIES

The strategy of this activity should follow exactly that in Activity 4-4, Food Webs. Give each student a card that corresponds to a plant or animal identified on the field trip. Have students arrange themselves in a circle as they did in Activity 4-4 and hold the cards so the other students can see them. Now continue with the exact strategy you followed in Activity 4-4, the only difference being that you will use local plants and animals.

Make sure you bring out these important points again:

1. What eats what, i.e., all the possible food chains.

2. How the food chains overlap to form a very complex maze, a food web.

3. How a disaster in one population of a food web will ultimately affect the entire food web.

Try to give this activity as much local flavor and reality as you can!
**TEACHING STRATEGIES**

- The activity should follow exactly that described in Activity 4-4, *Food Webs*. Give each student a card that corresponds to a plant or animal identified on the activity. Have students arrange themselves in a circle as described in Activity 4-4 and hold the cards so the rest of the class can see them. Now continue with the exact procedure followed in Activity 4-4, the only difference being that you will use local plants and animals.

- You bring out these important points again:
  - What eats what, i.e., all the possible food chains.
  - How the food chains overlap to form a very complex maze, a food web.
  - How a disaster in one population of a food chain will ultimately affect the entire food web.

- Use this activity as much local flavor and reality!
UNIT IV, CORE A
Activity 4-6: "Tying Up The Hunt"

Activity name suggested by class:

Day 1 Day 2 Day 3 Day 4 Day 5 Day 6

1. Date taught (month and date, e.g. 11/2)

2. Minutes of class time on science each day

3. Minutes of preparation each day

4. Students absent on each date (Use ID Number)

5. Interest of class as expressed by **apparent attention** to what is happening.
   - Number of students responding with: Name students you noted especially:

   - **HIGH INTEREST**
   - **MODERATE INTEREST**
   - **INDIFFERENCE**
   - **MODERATE RESISTANCE**
   - **STRONG DISLIKE**
   - **HARD TO RATE**

6. Equipment in kit:
   - □ None □ Satisfactory □ Too needed □ Too fragile □ Complicated to use

7. Equipment I got:
   - □ None □ Easy □ Hard to get, □ Hard to get, □ Unobtainable, needed to get □ But okay □ Add to kit □ Add to kit

8. Materials used:
   - Worksheet # #: #: #
   - Game #
   - Slides (show slide nos.)
   - Transparency # #: # #: #
   - Card(s) #
   - Tape(s) #
   - Other #

   - **Worthwhile as is**
   - **Revise slightly**
   - **Revise much**
   - **Worthless: omit**

9. Maturity level is
   - □ just right □ too childish □ too mature
   - **Explain:**

10. Vocabulary level is
    - □ just right □ too easy □ too difficult
    - **Explain:**

11. Were teacher instructions clear enough to follow? □ Yes □ No - Pages and Problem:

12. Were clues to success and reviews of success helpful? □ Yes □ No - Why not?

13. Did the activity fulfill the purpose stated by the Guide? □ Yes □ No - Comment:

14. Were any parts of this activity omitted? □ No □ Yes - Explain:

15. Your rating of this activity:
   - □ Worthwhile □ Of value--needs the □ Worth salvaging--make
   - □ Worthless --keep as is □ revision suggested □ major changes described □ spare it
6. Equipment in kit: □ None □ Satisfactory □ Too needed □ Too fragile □ Too complicated to use
   Equipment I got: □ None □ Easy □ Hard to get, □ Hard to get, □ Unobtainable, needed to get but okay add to kit □ Unobtainable, add to kit

8. Materials used:

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9. Maturity level is □ just right □ too childish □ too mature Explain:
10. Vocabulary level is □ just right □ too easy □ too difficult Explain:
11. Were teacher instructions clear enough to follow? □ Yes □ No - Pages and Problem:
12. Were clues to success and reviews of success helpful? □ Yes □ No - Why not?
13. Did the activity fulfill the purpose stated by the Guide? □ Yes □ No - Comment:
14. Were any parts of this activity omitted? □ No □ Yes - Explain:
15. Your rating of this activity:
   □ Worthwhile □ Of value--needs the □ Worth salvaging--make □ Worthless--keep as is revision suggested major changes described --drop it

SPECIFIC CONCERNS ABOUT THIS ACTIVITY:

16. There are always parts of activities that are good and need not be changed. What parts of this activity should be retained when the curriculum is revised? Page(s) ____________________:

17. Did the students remember the other food web they made and understand what would happen? □ Yes □ No: Comment.

18. Did students have trouble deciding what local organisms ate? □ No □ Yes: Comment.

19. Concern (or questions) about content:

20. Messages for staff (read immediately):

Have you answered each question, attached annotated Guide, your revisions, student work, etc.?
REPORT OF WHAT HAPPENED AND SUGGESTIONS FOR REVISION

1. Whenever practical write all over your second copy of the Guide. Tear out the activity and send the annotated Guide in with this form.


3. Tell us what you did. Think of what you needed, what you had to work out for yourself, how you presented something to make it go over.

4. Describe the revisions you said were needed in answering the questions on the other side of this form.

5. As a reminder of things that help in revision, read through the following list and check off things you want to be sure to note this time. (We know you can't tell about everything every time!)

   THE LESSON
   [ ] how you organized materials or class.
   [ ] things added (a question, a picture, etc.).
   [ ] equipment, supplies, visual aids.
   [ ] things that went wrong, misunderstandings.
   [ ] what you would do differently
       or avoid next time.
   [ ] turmoil in the class caused by the activity, or disruptive students, or interruptions, and how you dealt with them.

   THE STUDENTS
   [ ] who had problems and what they were.
   [ ] how someone "caught on" (or who never did).
   [ ] who was really "turned off" (or on).
   [ ] reactions of parents, teachers, students.
   [ ] special evidence of learning or applying ideas.
OBJECTIVE FOCUS FOR THIS ACTIVITY

UNIT GOALS:

1. Appreciate the cycling relationships of the materials and organisms in the environment through:
   a. Understanding of what a cycle is.
   b. Understanding of the role of decomposers.
   c. Realization that certain materials are in finite supply.
   d. Recognition of examples of man's impact upon the environment.

2. Comprehend the role of man as an integral part of nature, not apart from nature.

CORE A OBJECTIVES:

1. Reconstruct the transfer of energy through an environmental system.

2. Conclude that all materials are transferred through environmental systems.

TEACHING STRATEGIES

Activity 4-7. Hunting In Other Areas

This activity is designed to show students some environments in this country other than the one they visit. It will allow them to predict what it is like in environments they may have never been in. Students will also relate obvious environmental conditions to the plants and animals of an area.
US FOR THIS ACTIVITY

Appreciate the cycling relationships of the materials and organisms in the environment through:

a. Understanding of what a cycle is.

b. Understanding of the role of decomposers.

c. Realization that certain materials are in finite supply.

d. Recognition of examples of man's impact upon the environment.

Comprehend the role of man as an integral part of nature, not apart from nature.

OBJECTIVES:

Reconstruct the transfer of energy through an environmental system.

Conclude that all materials are transferred through environmental systems.

TEACHING STRATEGIES

Hunting In Other Areas

is designed to show students some in this country other than the one they'll allow them to predict what it is environments they may have never been in.
also relate obvious environmental condi-
plants and animals of an area.

ANTICIPATED STUDENT BEHAVIORS

At the end of this activity, each student should:

--observe a series of slides on various environments.
--participate in a discussion of the various environments.
--make predictions about the environmental components of the unknown environments.
Note to teacher:

This activity is really designed to give you some flexibility in your field trip in Activity 4-5, should inclement weather occur. If the weather is bad on the day of the planned trip, the set of slides can be shown, and the strategy outlined followed. Then if the weather clears the trip can be taken the next day. It will not solve the problem of prolonged inclement weather, but it will give you one day's flexibility for the trip. If this activity is not substituted for the field trip, you should use it after the field trip unless you are behind schedule.

Discussion should accompany these slides. The students should be asked to think of other organisms they might expect to find in each area besides those organisms actually seen in the slide. This ties in with the idea that there may be other organisms in the area the class visits which may not be seen at the time the class is there. There may also be indirect evidence of some organisms, and the teacher may wish to include these animals -- for example, a feather from a cardinal. The students should decide at this time whether or not they want to include indirect evidence for listing an organism in the area actually visited.

As each slide is shown, ask this series of questions:

WHERE DO YOU THINK THIS PICTURE WAS TAKEN?
WHY DO YOU THINK SO?

WHAT PLANTS DO YOU SEE?
WHAT ANIMALS DO YOU SEE?
### Teaching Strategies

- If the weather is bad on the planned trip, the set of slides can be used instead, and the strategy outlined followed. Then if clear, the trip can be taken. The weather may not solve the problem of prolonged inclement weather, but it will give you a day's flexibility in your field trip in Activity 4-5, should weather occur.

- Students should accompany these slides. The students are asked to think of other organisms they might find in each area besides those organisms shown in the slide. This ties in with the idea that there may be other organisms in the area the class may not be seen at the time the class is there. There may also be indirect evidence of some organisms and the teacher may wish to include these for example, a feather from a cardinal. The teacher should decide at this time whether or not to include indirect evidence for listing in the area actually visited.

- If this activity is not substituted for the trip, the teacher should use it after the field trip and behind schedule.

- Ask the students the following questions:
  - **DO YOU THINK THIS PICTURE WAS TAKEN?**
  - **YOU THINK SO?**
  - **PLANTS DO YOU SEE?**
  - **ANIMALS DO YOU SEE?**

### Anticipated Student Behaviors

**Students:**

- Use their knowledge to guess the locations of the pictures and tell what they used as clues.
- Name plants.
- Name animals.
### Teaching Strategies

<table>
<thead>
<tr>
<th>Slide 4-6</th>
<th>Slide 4-7</th>
<th>Slide 4-8</th>
</tr>
</thead>
</table>

**IS THIS PLACE LIKE THE PLACE WE WILL VISIT (VISITED)?**

**WHAT OTHER PLANTS (ANIMALS) DO YOU SUPPOSE LIVE AT THIS PLACE? WHY? HOW DO YOU KNOW?**

**WHAT IS THE WEATHER LIKE AT THIS PLACE?**

**WHAT DO THE ANIMALS IN THE PICTURE EAT? WHAT EATS THEM?**

**COULDL YOU LIVE AT THIS PLACE? WHY? WHY NOT?**

After all slides are shown and students have discussed the various environments, ask:

**WHICH ANIMALS (PLANTS) THAT WE SAW DO YOU THINK WE COULD FIND WHERE WE LIVE?**

**WHICH ONES COULD WE NOT FIND IN OUR AREA? WHY?**

**NOTE:** For your information, just a few examples of plants and animals are listed that might be found in the areas shown in the slides. If students do not give any responses to the questioning, they might react to these examples.
TEACHING STRATEGIES

PLACE LIKE THE PLACE WE WILL VISITED)?
HER PLANTS' (ANIMALS) DO YOU SUPPOSE THIS PLACE? WHY? HOW DO YOU KNOW?

THE WEATHER LIKE AT THIS PLACE?
THE ANIMALS IN THE PICTURE EAT? WHAT EM?
YOU LIVE AT THIS PLACE? WHY? WHY NOT?

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ANTICIPATED STUDENT BEHAVIORS

Students:

--respond, "No," "Yes."

--relate experience and knowledge to predict what other plants and animals live there.

--speculate about the climate of the place.

--describe possible food sources of animals described.

--speculate on their life needs and decide if the pictured environment could satisfy those needs.

--identify local plants and animals as much as possible.

--identify those plants and animals not found in the local area and give reasons why not, such as "No food," "Too large," "Too cold," "Too wet," "Too dry," "Too many people," etc.

ACTIVITY 4-7

43
### Materials

- **Slide 4-9**

### Teaching Strategies

<table>
<thead>
<tr>
<th>Plants</th>
<th>Animals</th>
</tr>
</thead>
<tbody>
<tr>
<td>4-3 Water Plants</td>
<td>Crayfish, Frogs, Snails, Hellgrammite (Dobsonfly Larva)</td>
</tr>
<tr>
<td>4-4 Oak Tree, Maple Tree, Sycamore, Bushes, Shrubs, Flowers</td>
<td>Pigeon, Man, Robin, Sparrow, Dog</td>
</tr>
<tr>
<td>4-5 Cypress, Spanish Moss, Mangroves, Lilies</td>
<td>Snake, Deer, Turtle</td>
</tr>
<tr>
<td>4-6 Pines, Grass, Aspen, Fir, Mosses, Farn Berries</td>
<td>Deer, Bear, Cougar, Bobcat, Wolf</td>
</tr>
<tr>
<td>4-7 Grass, Sage Brush, Bushes</td>
<td>Jackrabbit, Prairie Dog, Fox, Coyote, Deer</td>
</tr>
<tr>
<td>4-8 Cactus, Yucca, Chaparral, Sage Brush</td>
<td>Fox, Rattle Snake, Gerbil, Owl</td>
</tr>
<tr>
<td>4-9 Grass, Trees, Shrubs, Flowers</td>
<td>Lion, Zebra, Giraffe, Hyena, Vulture</td>
</tr>
<tr>
<td>TEACHING STRATEGIES</td>
<td>ANTIPIATED STUDENT BEHAVIORS</td>
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<td>Plants</td>
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<td>Larva)</td>
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<td></td>
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<td>Sage Brush, Yucca, Pral, Sage Brush</td>
<td>Jackrabbit, Prairie Dog,</td>
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<td>Trees, Shrubs, Rocks</td>
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<td>Owl</td>
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<td></td>
<td>Lion, Zebra, Giraffe, Hyena,</td>
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<td></td>
<td>Vulture</td>
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UNIT IV, CORE A
Activity 4-7: "Hunting In Other Areas"

Activity name suggested by class: [Teacher]

<table>
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<tr>
<th>Date taught (month and date, e.g. 11/2)</th>
<th>Day 1</th>
<th>Day 2</th>
<th>Day 3</th>
<th>Day 4</th>
<th>Day 5</th>
<th>Day 6</th>
</tr>
</thead>
</table>
1. Date taught (month and date, e.g. 11/2) |       |       |       |       |       |       |
2. Minutes of class time on science each day |       |       |       |       |       |       |
3. Minutes of preparation each day |       |       |       |       |       |       |
4. Students absent on each date |       |       |       |       |       |       |
5. Students absent on each date (Use ID Number) |       |       |       |       |       |       |

5. Interest of class as expressed by apparent attention to what is happening.

Number of students responding with: Name students you noted especially:

(Number)

HIGH INTEREST
MODERATE INTEREST
INDIFFERENCE
MODERATE RESISTANCE
STRONG DISLIKE
HARD TO RATE

6. Equipment in kit: None Satisfactory Too Too Difficult needed fragile complicated to use

None Easy Hard to get, Hard to get, Unobtainable, needed to get but okay add to kit add to kit

7. Equipment I got: None Easy Hard to get, Hard to get, Unobtainable, needed to get but okay add to kit add to kit

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<td>Revise slightly</td>
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9. Maturity level is
just right
too childish
too mature
Explain:

10. Vocabulary level is
just right
too easy
too difficult
Explain:

11. Were teacher instructions clear enough to follow? Yes No - Pages and Problem:

12. Were clues to success and reviews of success helpful? Yes No - Why not?

13. Did the activity fulfill the purpose stated by the Guide? Yes No - Comment:

14. Were any parts of this activity omitted? No Yes - Explain:

15. Your rating of this activity:
Worthwhile
Of value--needs the
Worth salvaging--make
Worthless
---keep as is
---revision suggested
---major changes described
---drop it.
1. Equipment in kit: □ None □ Satisfactory □ Too □ Too hard to get, □ Too fragile □ Too complicated □ Difficult
   needed to get but okay □ Hard to get, □ Unobtainable, add to kit □ Okay, add to kit

Equipment I got: □ None □ Easy □ Hard to get, □ Hard to get, □ Unobtainable, needed to get
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    □ Worthwhile □ Of value -- needs the revision suggested □ Worthless
    -- keep as is □ Worth salvaging -- make major changes described □ Worthless
    -- drop it

SPECIFIC CONCERNS ABOUT THIS ACTIVITY:

16. There are always parts of activities that are good and need not be changed.
    What parts of this activity should be retained when the curriculum is revised?
    Pages(s) ______________________

17. Were students able to accurately describe each environment and its inhabitants?
    □ Yes □ No: Comment.

18. What plants and animals did students suggest for each of the habitats listed?
    Slide 4-5 Slide 4-6 Slide 4-7 Slide 4-8 Slide 4-9
    everglades mountain meadow prairie desert African grassland

19. Concern (or questions) about content:

20. Messages for staff (read immediately):

Have you answered each question, attached annotated Guide, your revisions, student work, etc.?
UNIT IV, CORE A
Activity 4-7: "Hunting In Other Areas"

Teacher ____________________________

REPORT OF WHAT HAPPENED AND SUGGESTIONS FOR REVISION

1. Whenever practical write all over your second copy of the Guide. Tear out the activity and send the annotated Guide in with this form.
3. Tell us what you did. Think of what you needed, what you had to work out for yourself, how you presented something to make it go over.
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☐ things added (a question, a picture, etc.).
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☐ things that went wrong, misunderstandings.
☐ what you would do differently or avoid next time.
☐ turmoil in the class caused by the activity, or disruptive students, or interruptions, and how you dealt with them.

THE STUDENTS

☐ who had problems and what they were.
☐ how someone "caught on" (or who never did).
☐ who was really "turned off" (or on).
☐ reactions of parents, teachers, students.
☐ special evidence of learning or applying ideas.
OBJECTIVE FOCUS FOR THIS ACTIVITY

UNIT GOALS:

1. Appreciate the cycling relationships of the materials and organisms in the environment through:
   a. Understanding of what a cycle is.
   b. Understanding of the role of decomposers.
   c. Realization that certain materials are in finite supply.
   d. Recognition of examples of man's impact upon the environment.

2. Comprehend the role of man as an integral part of nature, not apart from nature.

CORE A OBJECTIVES:

1. Reconstruct the transfer of energy through an environmental system.

2. Conclude that all materials are transferred through environmental systems.

TEACHING STRATEGIES

Activity 4-8. Review Of Success

This review of success is divided into two parts. The first is structured, its completion should aid in the success of the second, which is relatively unstructured to allow latitude for the student's imagination. Use this activity only as an encouragement, not a discouragement, device!
OBJECTIVES:

Reconstruct the transfer of energy through an environmental system.

Conclude that all materials are transferred through environmental systems.

TEACHING STRATEGIES

Review Of Success

At the end of this activity, each student should:

- answer each of the three instructional assessment questions.
- cut out of magazines pictures of plants and animals that are related.
- indicate with lines on his food web some inter-relationships between the plants and animals.
- explain to the class how materials and energy move through his food web.
- explain to the class how one disaster in his food web might affect other organisms in the web.
ACTIVITY 4-8

MATERIALS

Worksheet 4-3
*Many magazines
*Scissors
*Butcher paper
*Large felt pens
*Paste or tape
*35mm Slide projector

Slides 4-10 through 4-12
*Not furnished in materials kit

TEACHING STRATEGIES

Part I.

Distribute Worksheet 4-3 and have each student put his name on it.

Project each question separately. Read the question and possible answers aloud to the students. Allow ample time for them to mark their worksheets.

After all students have had the opportunity to answer all of the questions, collect the worksheets. Then project each slide and discuss the answers with them. Have them defend their choices. After class, tally the students' answers on Tallysheet 4-3. Consider whether the whole class needs further review or if a few individuals need special attention.

Then proceed to the next part.

Part II.

Instruct students to cut pictures of plants and animals that they believe are part of a food web out of the magazines you provide. Have the students tape the
<table>
<thead>
<tr>
<th>TEACHING STRATEGIES</th>
<th>ANTAGICATED STUDENT BEHAVIORS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Students:</td>
</tr>
<tr>
<td></td>
<td><strong>CLUES TO SUCCESS</strong></td>
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<td></td>
<td>Worksheet 4-3 and have each student put his question separately. Read the question and answers aloud to the students. Allow ample time to mark their worksheets.</td>
</tr>
<tr>
<td></td>
<td>Students have had the opportunity to answer all questions, collect the worksheets. Then project and discuss the answers with them. Have them mark their choices. After class, tally the students' worksheets 4-3. Consider whether the whole class needs further review or if a few individuals need additional help to the next part.</td>
</tr>
<tr>
<td></td>
<td>Students to cut pictures of plants and animals believe are part of a food web out of the book to provide. Have the students tape the pictures together.</td>
</tr>
<tr>
<td></td>
<td><strong>--mark an X on the plant in answer to the question in Slide 4-10.</strong></td>
</tr>
<tr>
<td></td>
<td><strong>--place an X on &quot;a food web&quot; in answer to the question in Slide 4-11.</strong></td>
</tr>
<tr>
<td></td>
<td><strong>--should mark the appropriate choice after deciding that the number of fish in the pond will decrease and infer, therefore, that the birds depending upon them would no longer frequent the pond. (Slide 4-12.)</strong></td>
</tr>
<tr>
<td>MATERIALS</td>
<td>TEACHING STRATEGIES</td>
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<tr>
<td>Slide 4-10 pictures onto a large piece of butcher paper. After they have placed the pictures on the paper, have them connect the plants and animals with lines to show the relationships that exist.</td>
<td></td>
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<tr>
<td>Slide 4-11 When the food webs are complete, ask each student to display his food web and explain the relationships he has drawn. Ask each student if he can explain how energy and materials are passed through the food web, and also if he can show how a disaster might affect his food web.</td>
<td></td>
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<tr>
<td>Slide 4-12 As each student explains his food web, capitalize on the good things that are in the food web and do not dwell on any errors made. You can use this activity as a gauge of your teaching success in Activities 4-1 through 4-7. If all of your students made a reasonable food web and have shown basically accurate interrelationships, you can consider it a job well done. Evaluate in your own mind the posters that do not meet this minimal standard. Perhaps you will need to backtrack to make certain concepts clearer. If students can explain material and energy flow and disastrous consequences in their food webs, you have put the frosting on the cake! You (and your students) deserve a cheer! Display all the food webs somewhere in your room, if possible, and keep telling your students how great they are.</td>
<td></td>
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</table>
TEACHING STRATEGIES

Put to a large piece of butcher paper. After placed the pictures on the paper, have them e plants and animals with lines to show the ps that exist.

ACTIVITY 4-8

ood webs are complete, ask each student to food web and explain the relationships he Ask each student if he can explain how materials are passed through the food web he can show how a disaster might affect web.

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the food webs somewhere in your room, if and keep telling your students how great they
UNIT IV, CORE A
TALLYSHEET 4-3
ACTIVITY 4-8: "REVIEW OF SUCCESS"

<table>
<thead>
<tr>
<th>Teacher</th>
<th>Date</th>
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</table>

**KEY**

1 (Plants) | 2 (Food Web) | 3 (Effect on Web)

<table>
<thead>
<tr>
<th>plants</th>
<th>man</th>
<th>other</th>
<th>a</th>
<th>b</th>
<th>c</th>
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Does this review give an accurate indication of student understanding?  □ Yes  □ No
If not, what other evidence do you have of student learning?
UNIT IV, CORP A
Activity 4-8: "Review Of Success"

Teacher

Activity name suggested by class: [ ]

<table>
<thead>
<tr>
<th>Date taught (month and date, e.g. 11/2)</th>
<th>Day 1</th>
<th>Day 2</th>
<th>Day 3</th>
<th>Day 4</th>
<th>Day 5</th>
<th>Day 6</th>
</tr>
</thead>
</table>

2. Minutes of class time on science each day:

3. Minutes of preparation each day:

4. Students absent on each date (Use ID Number):

5. Interest of class as expressed by apparent attention to what is happening:
   - HIGH INTEREST
   - MODERATE INTEREST
   - INDIFFERENCE
   - MODERATE RESISTANCE
   - STRONG DISLIKE
   - HARD TO RATE

   Number of students responding with: Name students you noted especially:

   (Number)

6. Equipment in kit:
   - None
   - Satisfactory
   - Too necessary
   - Too difficult to use

7. Equipment I got:
   - None
   - Easy
   - Hard to get, needed to get
   - Hard to get, but can add to kit
   - Unobtainable, needed to get
   - Hard to get, add to kit
   - Unobtainable, add to kit

8. Materials used:

<table>
<thead>
<tr>
<th>Worksheet</th>
<th>Game</th>
<th>Slides (show slide nos.)</th>
<th>Transparency</th>
<th>Card(s)</th>
<th>Tape(s)</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
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</tbody>
</table>

   Worthwhile as is:
   - Revise slightly
   - Revise much
   - Worthless: omit

9. Maturity level is:
   - Just right
   - Too childish
   - Too mature

10. Vocabulary level is:
    - Just right
    - Too easy
    - Too difficult

11. Were teacher instructions clear enough to follow? [ ] Yes [ ] No - Pages and Problem:

12. Were clues to success and reviews of success helpful? [ ] Yes [ ] No - Why not?

13. Did the activity fulfill the purpose stated by the Guide? [ ] Yes [ ] No - Comment:

14. Were any parts of this activity omitted? [ ] No [ ] Yes - Explain:

15. Your rating of this activity:
   - Worthwhile
   - Of value--needs the
   - Worth salvaging--make
   - Worthless--keep as is
   - Revision suggested
   - Major changes described
   - Drop it

7. Equipment I got:  
- None  
- Hard to get,  
- Unobtainable,  
- Needed to get, but okay  
- Satisfactorily to use

8. Materials used:  
<table>
<thead>
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<th>Transparency</th>
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</tr>
</thead>
<tbody>
<tr>
<td>Worthwhile as is</td>
<td>Revise slightly</td>
<td>Revise much</td>
<td>Worthless: omit</td>
<td></td>
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</tr>
</tbody>
</table>

9. Maturity level is  
- Just right  
- Too childish  
- Too mature  
- Explain:

10. Vocabulary level is  
- Just right  
- Too easy  
- Too difficult  
- Explain:

11. Were teacher instructions clear enough to follow?  
- Yes  
- No - Pages and Problem:

12. Were clues to success and reviews of success helpful?  
- Yes  
- No - Why not?

13. Did the activity fulfill the purpose stated by the Guide?  
- Yes  
- No - Comment:

14. Were any parts of this activity omitted?  
- No  
- Yes - Explain:

15. Your rating of this activity:  
- Worthwhile  
- Of value—needs the  
- Worth salvaging—make  
- Worthless—keep as is  
- Revision suggested—major changes described—drop it

SPECIFIC CONCERNS ABOUT THIS ACTIVITY:

16. There are always parts of activities that are good and need not be changed.  
What parts of this activity should be retained when the curriculum is revised?  
Page(s) ________:

17. Did any student give away the answer to any question on this worksheet?  
- No  
- Yes: Comment.

18. Did any students have difficulty making their own food web?  
- No  
- Yes: Comment.

19. Did any students have difficulty explaining their web and what would happen in a disaster?  
- No  
- Yes: Comment.

20. Concern (or questions) about content:

21. Messages for staff (read immediately).

Have you answered each question, attached annotated Guide, your revisions, student work, etc.?
UNIT IV, CORE A
Activity 4-8: "Review Of Success"

REPORT OF WHAT HAPPENED AND SUGGESTIONS FOR REVISION

1. Whenever practical write all over your second copy of the Guide. Tear out the activity and send the annotated Guide in with this form.


3. Tell us what you did. Think of what you needed, what you had to work out for yourself, how you presented something to make it go over.

4. Describe the revisions you said were needed in answering the questions on the other side of this form.

5. As a reminder of things that help in revision, read through the following list and check off things you want to be sure to note this time. (We know you can't tell about everything every time!)

   THE LESSON
   □ how you organized materials or class.
   □ things added (a question, a picture, etc.).
   □ equipment, supplies, visual aids.
   □ things that went wrong, misunderstandings.
   □ what you would do differently or avoid next time.

   THE STUDENTS
   □ who had problems and what they were.
   □ how someone "caught on" (or who never did).
   □ who was really "turned off" (or on).
   □ reactions of parents, teachers, students.

   □ special evidence of learning or applying ideas.
   □ turmoil in the class caused by the activity, or disruptive students, or interruptions, and how you dealt with them.
1. Was the background information for this core adequate? ☐ Yes ☐ No
Comment:

2. Was it clear to you why these particular activities were chosen and the direction they were leading? ☐ Yes ☐ No
Comment:

3. Did the activities fulfill the purposes stated in the Guide for this core? ☐ Yes ☐ No
Comment:

4. How would you increase the clarity of this core for students? (Help them understand why they are doing these activities.)

5. Is there a practical (take-home) value for your students in these activities? ☐ Yes ☐ No
6. If yes, what do you see as the "take-home" lesson? If no, what is needed?

7. In these materials, what things did your students find difficult to do?

8. Should there be more clues to success or reviews of success in this core? ☐ Yes ☐ No
Comment:

9. Was there too much reading and too many teacher directions? ☐ Yes ☐ No
Comment:

10. Did you make use of the Planning Guide? ☐ Yes ☐ No
Comment:
5. Is there a practical (take-home) value for your students in these activities? □ Yes □ No

6. If yes, what do you see as the "take-home" lesson? If no, what is needed?

7. In these materials, what things did your students find difficult to do?

8. Should there be more clues to success or reviews of success in this core? □ Yes □ No

9. Was there too much reading and too many teacher directions? □ Yes □ No

10. Did you make use of the Planning Guide? □ Yes □ No

11. If you could teach your way, rather than following the Guide, how would you do it?

12. Which of your students do you believe were unsuccessful in achieving the objectives of this core of activities? Explain.
NEW STUDENTS ENTERING DURING THIS CORE

<table>
<thead>
<tr>
<th>Date Entered</th>
<th>Last Name</th>
<th>Name Used</th>
<th>Ethnic Group</th>
<th>Sex</th>
<th>Birthdate</th>
<th>Test date</th>
<th>Test</th>
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STUDENTS DROPPED IN THIS PERIOD

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W = White
B = Black
S = Spanish-American
O = Other

W = WISC
B = Binet
O = Other

ADDITIONAL INFORMATION ON NEW STUDENTS:
NEW STUDENTS ENTERING DURING THIS CORE

<table>
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<th>Test date</th>
<th>Test</th>
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W = WISC  
B = Binet  
O = other  
(name)
## Me and my Environment

### UNIT IV. TRANSFER AND CYCLING OF MATERIALS IN MY ENVIRONMENT

### CORE B. DECOMPOSERS IN MY ENVIRONMENT

#### AIMS FOR ME AND MY ENVIRONMENT

1. **Development in Each Child of a Sense of Identity as a Person Who Has Some Degree of Control Over and Can Act on His Environment.** This will lead to a degree of self-determination based on a rational coping with situations rather than on a passive compliance or an impulsive response to problems.

2. **Development in Each Child of a Success Syndrome.** More than anything else, each activity is intended to be a success experience for each child. It is the teacher's responsibility -- almost obligation -- to see that each child succeeds at a level that is challenging to his abilities and that preserves his self-respect. It is a further responsibility of the teacher to point out his achievement. The students as a group should help each individual fit what he has done into a pattern of accomplishment.

3. **Development in Each Child of an Interest That Could Become a Hobby or Avocation Over a Lifetime (through an exposure to an array of experiences in science).** It is hoped that many children will find some area -- perhaps growing plants, caring for animals, identifying flowers, collecting things, or simply enjoying outings into the country -- that they feel strongly about and can develop some competence or knowledge in. This would provide a means of self-expression, and (perhaps) allow some degree of sharing or involvement with others.

4. **Development in Each Child of a Sense of Relationship and Empathy with Other Living Things.** It is hoped that this will lead to a positive regard and caring about what affects them as individuals and as a group, because what affects them affects the community of man.

5. **Development in Each Child of an Understanding of Environmental Conditions that will lead to a sense of responsibility for the environment and actions that protect or improve it.**

#### OBJECTIVES

1. Appreciate the cycling relationship through:
   
   a. Understanding of what a cycle is
   
   b. Understanding of the role of decomposers in maintaining the cycle
   
   c. Realization that certain materials are recycled
   
   d. Recognition of examples of man's influence on the cycle

2. Comprehend the role of man as an influence on the environment

   **OBJECTIVES**

   1. Know the habitat requirements of microbes
   
   2. Indicate how knowledge of decomposers contributes to man
   
   3. Conclude that microbes contribute to man.
UNIT IV GOALS

1. Appreciate the cycling relationships of the materials and organisms in the environment through:
   
a. Understanding of what a cycle is.
   
b. Understanding of the role of decomposers.
   
c. Realization that certain materials are in finite supply.
   
d. Recognition of examples of man's impact upon the environment.

2. Comprehend the role of man as an integral part of nature, not apart from nature.

OBJECTIVES OF CORE B

1. Know the habitat requirements of microbes and other decomposers.

2. Indicate how knowledge of decomposers can improve man's environment.

3. Conclude that microbes contribute to man's well-being as well as pose problems for man.
UNIT IV. TRANSFER AND CYCLING OF MATERIALS IN MY ENVIRONMENT

CORE B. DECOMPOSERS IN MY ENVIRONMENT

CORE B RATIONALE

After developing the concept of a food web (Core A), the question may naturally arise: food web — then what? In other words, what happens at the end of a food chain or set of relationships within the web. Obviously, generation upon generation of plants and animals don't accumulate to any extent. All organisms die and eventually are decomposed. The materials are recycled through the ecosystem. An attempt has been made, not to account for the cycling of specific materials, but simply to develop an appreciation of the role of decomposers in the natural economy and to develop the concept of a cycle in general.

The accumulation of dead materials is reviewed with discussion of the class compost (Activity 4-10 and 4-17). A short activity (4-11) follows that suggests the role of macrodecomposers (e.g., earthworms, ants, snails, sow bugs, etc.) in the environment. At this point, the concept of habitat is strengthened through the consideration of the essential components of shelter, food and moisture. Attention is then later given to composted material and the role of microbes in decomposition. This activity (4-17) serves to recall both that microbes are small living organisms and that decomposition of the compost is due to these microbes.

The subject of habitat requirements is considered using the compost microbes. Two successive activities (4-12 and 4-13) demonstrate the effect of moisture and temperature on microbial growth. After some of the requirements for microbial growth have been established, one factor (temperature) is then carried to extreme (boiling). This suggests that variation of single environmental factors may limit microbial growth and in turn be used to advantage (food preservation). This concept is extended to the "real world" by a visit to a grocery store, where foods are examined, in Activity 4-15. The various methods of food packaging are examined in terms of conditions for microbial growth considered

Activity 4-9 introduces the term scavenger. The term scavenger is used for dying material that plays this role they function a simpler food web. In other words, scavengers are: oppos, snail, and sow bug. They have a wide distribution and they roll into a ball to protect themselves from predators. The maintenance of the sow bug components of a habitat is examination of compost pile in Activity 4-12 and 4-13 by the microorganisms. The subject of habitat requirements is considered using the compost microbes. Two successive activities (4-12 and 4-13) demonstrate the effect of moisture and temperature on microbial growth. After some of the requirements for microbial growth have been established, one factor (temperature) is then carried to extreme (boiling). This suggests that variation of single environmental factors may limit microbial growth and in turn be used to advantage (food preservation). This concept is extended to the "real world" by a visit to a grocery store, where foods are examined, in Activity 4-15. The various methods of food packaging are examined in terms of conditions for microbial growth considered.
IV. TRANSFER AND CYCLING OF MATERIALS IN MY ENVIRONMENT

B. DECOMPOSERS IN MY ENVIRONMENT

[Core A), the question other words, what relationships within the ants and animals don't eventually are decomposers. An attempt to discuss specific materials, e.g., earthworms, microbes in decomposers in the cycle in general.

...with discussion of fort activity (4-11) is (e.g., earthworms, At this point, the consideration of the e. Attention is then microbes in decomposers that microbes are the compost is due to...]

...and rephrased using the compost 13) demonstrate the growth. After some of established, one factor ). This suggests that it microbial growth and...]

...Activity 4-12 provides a link between the concept of habitat requirements and the function of microbes as decomposers. An assortment of organic materials (mostly foodstuffs of plant origin) are subjected to wet and dry conditions. The samples exposed to moist storage will usually develop very obvious microbial (fungus) growth. The success of this activity depends upon the careful choice of test materials: If beans, peas, or other seeds are used, be certain that they are intended for use as food and not for gardening. Seeds prepared for planting usually are treated to prevent fungus growth. If bread is used, be sure that it contains no preservative (now a common ingredient) to prevent mold. The bread should be stale to begin with since fresh bread may contain enough moisture to support mold even in a dry chamber. Be sure that selection of otherwise dry materials excludes salted and sugared products. Microbial growth in these materials will be inhibited by the high osmotic...}

BACKGROUND INFORMATION FOR THE TEACHER

Activity 4-9 introduces the concept of scavengers in the ecosystem. The term scavenger is usually applied to an animal that feeds upon dead or dying material that is usually discarded by other living things. In this role they function as decomposers, breaking down complex materials to simpler ones. Because these animals are obviously larger than microbes, they may be considered macro decomposers. Some animals that function as scavengers are: opposum, hyena, rat, vulture, gull, crow, earthworm, ant, snail, and sow bug. The latter are used in this activity because of their wide distribution and ease of handling in the classroom. Sow bugs (some that roll into a ball are known as pill bugs) are really small terrestrial crustaceans and not insects. An important function served by the maintenance of sow bugs in the classroom is to reinforce the essential components of a habitat: shelter (physical location), food (nutrients), and water (moisture). Activity 4-10 is simply the initiation of a class compost pile and Activity 4-11 is the making of the pillarium (sow bug habitat).
earlier. The core is concluded by directing attention again to the positive aspects of microbial activity. Microbes (yeast) are used to produce bread and wine in the classroom and the important role of decomposers in cycling things through the environment serves as a logical springboard to Core C.

Activity 4-13 is a new activity established earlier. They are carried by a specific condition in operation. This is a straight precaution.

Activity 4-14 will condition carried to extra increased to boiling inhibit deliberate use of extreme preservation.

Activity 4-15 is a very high should be placed on the water and should be directed towards and preservation.

Activity 4-16 uses a force they breathe (produce gas) that demonstrates that a change in the air by a similar process the decomposition of microbes. Students are in a process like they are a...
ion again to the yeast) are used important role that serves as

V. TRANSFER AND CYCLING OF MATERIALS IN MY ENVIRONMENT

1. DECOMPOSERS IN MY ENVIRONMENT

BACKGROUND INFORMATION FOR THE TEACHER (continued)

pressure of salt or sugar. In certain communities, the storage of hay for livestock feed may be of local importance. Be sure to use hay or straw for this sample. Hay is harvested in a green condition before maturation of seeds on the plant. Nutrients are therefore retained with a greater likelihood of mold. Straw is a term applied to the stalks of a plant whose seeds have been harvested for grain. These stalks contain little or no residual nutrients and are less likely to develop microbial growth in a short time.

Activity 4-13 is a variation of the habitat-requirement theme established earlier. The concept that microbial growth may be limited by a specific condition is expanded to another example, that of refrigeration. This is a straightforward experiment and requires no special precautions.

Activity 4-14 will develop the point that a given environmental condition carried to extreme may be lethal. In this case, temperature increased to boiling inhibits microbial growth. This will suggest the deliberate use of extreme conditions (heat, cold, dryness) in food preservation.

Activity 4-15 is a visit to a local grocery store. Emphasis here should be placed on the variety of packaging and storage methods employed and should be directed toward the students' "real" world of food storage and preservation.

Activity 4-16 uses a simple demonstration that humans change the air they breathe (produce carbon dioxide). An experiment then follows that demonstrates that a sample of class compost (containing microbes) changes the air in a similar way. The conclusion to be developed is that the decomposition occurring in the compost pile is due to living microbes. Students are led to believe that microbes are carrying on a process like they are and therefore microbes are probably alive.
UNIT IV. TRANSFER AND CYCLING OF MATERIALS IN MY ENVIRONMENT

CORE B. DECOMPOSERS IN MY ENVIRONMENT

BACKGROUND

The success of the indicator solution to the indicator is a substance by changing changes to a green or dioxide (CO₂) forms a this experiment brought the presence of CO₂.

Activity 4-17 decomposes microbes. Part I core which man benefits this. Part II, the use of the application of carbon

The last activity decomposes in the cy
T IV. TRANSFER AND CYCLING OF MATERIALS IN MY ENVIRONMENT

B. DECOMPOSERS IN MY ENVIRONMENT

BACKGROUND INFORMATION FOR THE TEACHER (continued)

The success of this activity depends upon the use of a chemical indicator solution to detect carbon dioxide dissolved in water. An indicator is a substance that shows the presence of a chemical substance by changing color. Bromthymol blue is an indicator that changes to a green or yellow color in the presence of an acid. Carbon dioxide (CO₂) forms an acid when dissolved in water. Therefore in this experiment bromthymol blue can be used to indicate, indirectly, the presence of CO₂.

Activity 4-17 directs attention again to the positive role of microbes. Part I consists of a demonstration of fermentation in which man benefits directly from the products of microbial action. In Part II, the use of yeast in baking demonstrates the practical application of carbon dioxide production by microbes.

The last activity in this core, (4-20) should make the role of decomposers in the cycling of materials become more apparent.
## UNIT IV
### CORE B

**PLANNING GUIDE**

**NOTE:** Some activities indicated in italics and an * in the Teaching Date column must be prepared several days or weeks in advance. Use this guide to create a teaching and preparation schedule. All supplies needed for each activity are listed below. Check the planning guide for each activity before ordering supplies.

<table>
<thead>
<tr>
<th>Activity Number, Page, Tentative Teaching Date</th>
<th>Materials You Furnish</th>
<th>Materials in Supply Kit</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>4-9. Starting The Run Around</strong></td>
<td>35mm Slide projector</td>
<td>Flash cards:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Hawk</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Frog</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Mosquito</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Man</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Cow</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Grass</td>
</tr>
<tr>
<td></td>
<td>Slide 4-13</td>
<td>Slide 4-14</td>
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<tr>
<td></td>
<td>Slide 4-15</td>
<td>Slide 4-16</td>
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<tr>
<td></td>
<td>Slide 4-17</td>
<td>Slide 4-18</td>
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<tr>
<td></td>
<td>Slide 4-19</td>
<td>Slide 4-20</td>
</tr>
<tr>
<td></td>
<td>Slide 4-21</td>
<td></td>
</tr>
<tr>
<td><strong>4-10. Decomposition In Class</strong></td>
<td>Bottle caps</td>
<td>Plastic shoe boxes with</td>
</tr>
<tr>
<td></td>
<td>Plastic bags</td>
<td>lids</td>
</tr>
<tr>
<td></td>
<td>Pieces of plastic</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Pieces of glass</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Potting soil or peat moss</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Organic matter</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Large spoons to stir compost</td>
<td></td>
</tr>
<tr>
<td></td>
<td>35mm Slide projector</td>
<td></td>
</tr>
<tr>
<td>Page ___</td>
<td>Worksheet 4-4</td>
<td></td>
</tr>
<tr>
<td>Date planned ___</td>
<td>Slide 4-22</td>
<td></td>
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</tr>
</tbody>
</table>

- Vulture On Carcass
- Beetle On Carcass
- Ant Close Up Carcass
- Ant Hill Activity
- Log
- Rotting Log - Student Board
- Board Turned Over
- Microscopic Decay
- Four per class
- Compost Pile Data
- Worksheet 4-4
- Any soft drink
- Four
- Approximately 2 liters of ammonia, etc.
- Approximately 2 liters of water
- Enough to fill 4-5 one-gallon jugs
- Dried leaves, grass, etc.
- Four
PLANNING GUIDE

Activities (indicated in italics and an * in the margin) must be prepared several days or weeks in advance. Use this summary as a teaching and preparation schedule. All supplies needed are listed.

<table>
<thead>
<tr>
<th>Supplies Needed</th>
<th>Notes and Suggestions to Teacher</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Materials in Supply Kit</strong></td>
<td></td>
</tr>
<tr>
<td>Flash cards: Hawk, Frog, Mosquito, Man, Cow, Grass</td>
<td></td>
</tr>
<tr>
<td>Slide 4-13, 4-14, 4-15, 4-16, 4-17, 4-18, 4-19, 4-20, 4-21</td>
<td>Vulture On Carcass, Beetle On Carcass, Ant Close Up Carrying Food, Ant Hill Activity, Log, Rotting Log - Sow Bugs, Slugs, Etc., Board, Board Turned Over - Sow Bugs, Slugs, Etc., Microscopic Decomposers</td>
</tr>
<tr>
<td>Plastic shoe boxes with lids, Worksheet 4-4, Slide 4-22</td>
<td>Four per class, Compost Pile Daily Records, Worksheet 4-4, Any soft drink bottle caps. Need at least four, Four, Approximately 2&quot; x 2&quot; cut from plastic bottles such as bleach, ammonia, etc., Approximately 2&quot; x 2&quot; from any glass source, Enough to fill the four shoe boxes two-thirds full. Purchase at local garden shop, Dried leaves, grass clippings, pieces of apple, banana, etc., Four</td>
</tr>
</tbody>
</table>
### Check List of Supplies Needed

<table>
<thead>
<tr>
<th>Activity Number, Page, Tentative Teaching Date</th>
<th>Materials You Furnish</th>
<th>Materials in Supply Kit</th>
<th>(Italics)</th>
</tr>
</thead>
<tbody>
<tr>
<td>4-11. Pillarium</td>
<td>Rubber bands</td>
<td>One per student</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Leaves</td>
<td>Dried leaves</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Potting soil</td>
<td>Purchase at Activity 4-</td>
<td></td>
</tr>
<tr>
<td>Page ______ Date planned ______</td>
<td>Toothpicks</td>
<td>one-half</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Potatoes</td>
<td>One box</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Knife</td>
<td>Six</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>One</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Consult the Teacher</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>making the welts</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Pill bugs</td>
<td>Fifty (approx)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Plastic tumblers</td>
<td>One per student</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Sponge</td>
<td>Cut sponge in each pill</td>
<td></td>
</tr>
<tr>
<td>4-12. Wet And Dry</td>
<td>Wax Crayons</td>
<td>One per student</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Assorted dry foods</td>
<td>Examples: egg, cake,</td>
<td></td>
</tr>
<tr>
<td>Page ______ Date planned ______</td>
<td>Dark storage place</td>
<td>flour, jelly, teflon,</td>
<td></td>
</tr>
<tr>
<td></td>
<td>35mm Slide projector</td>
<td>jelly</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Hel</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Plastic petri dishes</td>
<td>Four per student</td>
<td></td>
</tr>
<tr>
<td></td>
<td>with covers</td>
<td>Four per student</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Filter paper discs (7 cm)</td>
<td>One per student</td>
<td></td>
</tr>
</tbody>
</table>
PLANNING GUIDE

Some activities (indicated in italics and an in the margin) must be prepared several days or weeks in advance. Use this summary as teaching and preparation schedule. All supplies needed are listed.

<table>
<thead>
<tr>
<th>List of Supplies Needed</th>
<th>Notes and Suggestions to Teacher (Italics and Arrow Indicate Advance Preparation Directions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fish</td>
<td>Materials in Supply Kit</td>
</tr>
</tbody>
</table>
|            | One per student  
|            | Dried leaves  
|            | Purchase at local garden shop. You may have enough from Activity 4-10. You need enough to fill 15 plastic tumblers one-half full.  
|            | One box  
|            | Six  
|            | Consult the Teacher Preparation section of Activity 4-11 for making the sow bug traps. They must be set two days before the activity begins.  
|            | Fifty (approximately 2-3 per student)  
|            | One per student  
|            | Cut sponge into small pieces (1" X 1"). Place one small piece in each pillarium. |
| Plugs bugs | Plastic tumblers  
| Sponge     | Sponge Cut sponge into small pieces (1" X 1"). Place one small piece in each pillarium. |
| Plastic petri dishes with covers | Plastic petri dishes with covers  
| Filter paper discs (7 cm) | Filter paper discs (7 cm)  
| Medicine droppers | Medicine droppers  
| One per student | One per student  
| Four per student | Four per student  
| One per student | One per student  

Examples: cornflakes  
egg noodles  
oat flakes  
flour  
tea  
beans, dried for cooking  
peas, dried for cooking
<table>
<thead>
<tr>
<th>Activity Number, Page, Tentative Teaching Date</th>
<th>Check List of Supplies Needed</th>
<th>(Italics and Underline)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>4-12. Wet And Dry (continued)</strong></td>
<td>Art supplies for poster</td>
<td>Slide 4-23 Worksheet 4-5 Wet And Dry Secure art suppl experiment as</td>
</tr>
<tr>
<td><strong>4-13. Cool And Warm</strong></td>
<td>Ice chest or refrigerator</td>
<td>Worksheet 4-6 Slide 4-24 Cool And Warm Secure art suppl experiment as</td>
</tr>
<tr>
<td>Page ____ Date planned ____</td>
<td>Baby food jars or milk cartons</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Saran Wrap</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Food samples</td>
<td></td>
</tr>
<tr>
<td></td>
<td>35mm Slide projector</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Art supplies for poster</td>
<td></td>
</tr>
<tr>
<td><strong>4-14. Hamburger Lab</strong></td>
<td>Fresh ground beef</td>
<td>Two teaspoons per student One roll Supply of</td>
</tr>
<tr>
<td>Page ____ Date planned ____</td>
<td>Masking tape</td>
<td>One</td>
</tr>
<tr>
<td></td>
<td>Water</td>
<td>One</td>
</tr>
<tr>
<td></td>
<td>35mm Slide projector</td>
<td>Two pieces per student Two per student</td>
</tr>
<tr>
<td></td>
<td>Warm storage place</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Hot plate</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Teaspoon measure</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Cotton</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Test tubes, Pyrex (15 x 150 mm)</td>
<td></td>
</tr>
</tbody>
</table>
# PLANNING GUIDE

The activities (indicated in italics and an in the margin) must be prepared several days or weeks in advance. Use this summary as a teaching and preparation schedule. All supplies needed are listed.

## Notes and Suggestions to Teacher

( Italics and Arrow Indicate Advance Preparation Directions)

### Of Supplies Needed

<table>
<thead>
<tr>
<th>Materials in Supply Kit</th>
<th>Notes and Suggestions to Teacher</th>
</tr>
</thead>
<tbody>
<tr>
<td>Slide 4-23&lt;br&gt;Worksheet 4-5</td>
<td>Worksheet 4-5&lt;br&gt;Wet And Dry&lt;br&gt;Secure art supplies to make large poster depicting this experiment as described in Activity 4-12.</td>
</tr>
<tr>
<td>Worksheet 4-6&lt;br&gt;Slide 4-24</td>
<td>One&lt;br&gt;Two per student&lt;br&gt;One roll&lt;br&gt;Provide food samples for those students that forget to bring their sample.</td>
</tr>
<tr>
<td>Hot plate&lt;br&gt;Teaspoon measure&lt;br&gt;Cotton&lt;br&gt;Test tubes, Pyrex (15 x 150 mm)</td>
<td>Two teaspoons per student&lt;br&gt;One roll&lt;br&gt;Supply of&lt;br&gt;One&lt;br&gt;One&lt;br&gt;Two pieces per student&lt;br&gt;Two per student</td>
</tr>
<tr>
<td>Activity Number, Page, Tentative Teaching Date</td>
<td>Check List of Supplies Needed</td>
</tr>
<tr>
<td>-----------------------------------------------</td>
<td>------------------------------</td>
</tr>
<tr>
<td>4-14. Hamburger Lab (Continued)</td>
<td><strong>Materials You Furnish</strong></td>
</tr>
<tr>
<td></td>
<td>Test tube holder</td>
</tr>
<tr>
<td></td>
<td>Worksheet 4-7</td>
</tr>
<tr>
<td></td>
<td>1000 ml Beaker</td>
</tr>
<tr>
<td></td>
<td>Test tube brush</td>
</tr>
<tr>
<td></td>
<td>Slide 4-25</td>
</tr>
<tr>
<td>4-15. Storing Problems</td>
<td>Cassette tape recorder</td>
</tr>
<tr>
<td></td>
<td>Blank tapes</td>
</tr>
<tr>
<td></td>
<td>Question list</td>
</tr>
<tr>
<td></td>
<td>Pencil and paper</td>
</tr>
<tr>
<td>Page ____</td>
<td>Your weekly groceries</td>
</tr>
<tr>
<td>Date planned ____</td>
<td>35mm Slide projector</td>
</tr>
<tr>
<td></td>
<td>Worksheet 4-8</td>
</tr>
<tr>
<td></td>
<td>Slide 4-26</td>
</tr>
<tr>
<td></td>
<td>Slide 4-27</td>
</tr>
</tbody>
</table>
PLANNING GUIDE

Some activities (indicated in italics and an "*" in the margin) must be prepared several days or weeks in advance. Use this summary as a teaching and preparation schedule. All supplies needed are listed.

<table>
<thead>
<tr>
<th>List of Supplies Needed</th>
<th>Notes and Suggestions to Teacher</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test tube holder</td>
<td>Four per class</td>
</tr>
<tr>
<td>Worksheet 4-7</td>
<td>Hamburger Lab</td>
</tr>
<tr>
<td>1000 ml Beaker</td>
<td>One for boiling water</td>
</tr>
<tr>
<td>Test tube brush</td>
<td>One for cleaning test tubes</td>
</tr>
<tr>
<td>Slide 4-25</td>
<td>Worksheet 4-7</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Camera (Polaroid Square Shooter)</td>
<td>Optional</td>
</tr>
<tr>
<td></td>
<td>Optional</td>
</tr>
<tr>
<td>Worksheet 4-8</td>
<td>You must contact your local store manager well in advance (at least one week) before this activity. See activity for details.</td>
</tr>
<tr>
<td>Slide 4-26</td>
<td></td>
</tr>
<tr>
<td>Slide 4-27</td>
<td></td>
</tr>
<tr>
<td>Slide 4-28</td>
<td></td>
</tr>
</tbody>
</table>

At least 30 items of great variety

Review Of Success
Question 1 Review Of Success
Question 2 Review Of Success
Question 3 Review Of Success
### PLANNING GUIDE

#### NOTE:
Some activities (indicated in italics and an * in the margin) be prepared several days or weeks in advance. Use this as a teaching and preparation schedule. All supplies needed.

### Check List of Supplies Needed

<table>
<thead>
<tr>
<th>Activity Number, Page, Tentative Teaching Date</th>
<th>Materials You Furnish</th>
<th>Materials in Supply Kit</th>
</tr>
</thead>
<tbody>
<tr>
<td>4-17. Compost Microbes</td>
<td>Compost</td>
<td>Worksheet 4-4</td>
</tr>
<tr>
<td></td>
<td>Soda straws</td>
<td>250 ml Flasks</td>
</tr>
<tr>
<td>Page ____</td>
<td>Wax crayon</td>
<td>Rubber stoppers</td>
</tr>
<tr>
<td>Date planned ____</td>
<td>Water</td>
<td>Tygon tubing</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Test tubes (15 X 150 mm)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Carbon dioxide test</td>
</tr>
<tr>
<td></td>
<td></td>
<td>solution (bromthymol blue)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Rubber stoppers</td>
</tr>
<tr>
<td>4-18. A Real Gas</td>
<td>Dried yeast</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Large bowls</td>
<td></td>
</tr>
<tr>
<td>Page ____</td>
<td>Frozen grape juice</td>
<td></td>
</tr>
<tr>
<td>Date planned ____</td>
<td>Table sugar</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Tablespoon</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Teaspoon</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Bread pans</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Clean cloths</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Flour sifter</td>
<td></td>
</tr>
<tr>
<td></td>
<td>But'ter</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Flour (sifted all purpose)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>250 ml Flask</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Rubber stopper (one-hole, #8)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Tygon tubing</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

From Activity 4:
- One per student
- Filled in with:
  - One per pair of:
    - One-hole, #8
    - 12" pieces
- One per student
- Ten drops per student
- Supply of:
  - No-hole, #1
  - One

Two packages
- Two
- One can (nonconductive, prevent fermantation):
  - Several tablespoons
- One
- One
- Two
- One
- 1/4 Lb.
- Two pounds
- One
- One
- One piece 12" long
The activities (*indicated in italics and an * in the margin*) must be prepared several days or weeks in advance. Use this summary as a teaching and preparation schedule. All supplies needed are listed.

### Materials in Supply Kit

<table>
<thead>
<tr>
<th>Item</th>
<th>Notes and Suggestions to Teacher</th>
</tr>
</thead>
<tbody>
<tr>
<td>Worksheet 4-4</td>
<td>From Activity 4-10</td>
</tr>
<tr>
<td>250 ml Flasks</td>
<td>One per student</td>
</tr>
<tr>
<td>Rubber stoppers</td>
<td>Filled in with student observations</td>
</tr>
<tr>
<td>Tygon tubing</td>
<td>One per pair of students</td>
</tr>
<tr>
<td>Test tubes (15 x 150 mm)</td>
<td>One-hole, #8, one per pair of students</td>
</tr>
<tr>
<td>Carbon dioxide test solution (bromthymol blue)</td>
<td>12&quot; pieces, one per pair of students</td>
</tr>
<tr>
<td>Rubber stoppers</td>
<td>One per student</td>
</tr>
<tr>
<td></td>
<td>Ten drops per student</td>
</tr>
<tr>
<td></td>
<td>Supply of</td>
</tr>
<tr>
<td></td>
<td>No-hole, #1, one per student</td>
</tr>
<tr>
<td>250 ml Flask</td>
<td>Two packages</td>
</tr>
<tr>
<td>Rubber stopper (one-hole, #8)</td>
<td>One can (nonconcentrated juice has preservatives added to prevent fermentation)</td>
</tr>
<tr>
<td>Tygon tubing</td>
<td>Several tablespoons full</td>
</tr>
<tr>
<td></td>
<td>One</td>
</tr>
<tr>
<td></td>
<td>Two</td>
</tr>
<tr>
<td></td>
<td>Two</td>
</tr>
<tr>
<td></td>
<td>One 1/4 lb.</td>
</tr>
<tr>
<td></td>
<td>Two pounds</td>
</tr>
<tr>
<td></td>
<td>One</td>
</tr>
<tr>
<td></td>
<td>One piece 12&quot; long</td>
</tr>
</tbody>
</table>
### Activity Number, Page, Tentative Teaching Date

<table>
<thead>
<tr>
<th>Activity Number, Page, Tentative Teaching Date</th>
<th>Check List of Supplies Needed</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Materials You Furnish</td>
</tr>
<tr>
<td>4-18. A Real Gas (Continued)</td>
<td>Oven</td>
</tr>
<tr>
<td>4-19. Completing The Run Around</td>
<td>Butcher paper, Magazines, Tape or glue, Felt pens</td>
</tr>
<tr>
<td>Page _____ Date planned _____</td>
<td></td>
</tr>
<tr>
<td>4-20. Review Of Success</td>
<td>35mm Slide projector</td>
</tr>
</tbody>
</table>
| Page _____ Date planned _____                  |                     | Review Of Success, Question 1 Rev, Question 2 Rev, Questions 3 at
PLANNING GUIDE

Some activities *indicated in italics and an ✈️ in the margin* must be prepared several days or weeks in advance. Use this summary as a teaching and preparation schedule. All supplies needed are listed.

### List of Supplies Needed

<table>
<thead>
<tr>
<th>Dish</th>
<th>Materials in Supply Kit</th>
<th>Notes and Suggestions to Teacher</th>
</tr>
</thead>
<tbody>
<tr>
<td>400 ml Beakers</td>
<td>Two</td>
<td><em>At home or school to bake bread</em></td>
</tr>
<tr>
<td>Test tube</td>
<td>One</td>
<td></td>
</tr>
<tr>
<td>Measuring cup</td>
<td>One</td>
<td></td>
</tr>
<tr>
<td>Flash cards</td>
<td>One deck per class</td>
<td><em>The Long Journey, one per student</em></td>
</tr>
<tr>
<td>Booklet</td>
<td>One large piece, one per student</td>
<td><em>Many with pictures</em></td>
</tr>
<tr>
<td></td>
<td>Enough for all students to use generously</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Four per class</td>
<td></td>
</tr>
<tr>
<td>Worksheet 4-9</td>
<td>Review Of Success</td>
<td></td>
</tr>
<tr>
<td>Slide 4-29</td>
<td>Question 1 Review Of Success</td>
<td></td>
</tr>
<tr>
<td>Slide 4-30</td>
<td>Question 2 Review Of Success</td>
<td></td>
</tr>
<tr>
<td>Slide 4-31</td>
<td>Questions 3 and 4 Review Of Success</td>
<td></td>
</tr>
</tbody>
</table>
OBJECTIVE FOCUS FOR THIS ACTIVITY

UNIT GOALS:

1. Appreciate the cycling relationships of the materials and organisms in the environment through:
   a. Understanding of what a cycle is.
   b. Understanding of the role of decomposers.

CORE B OBJECTIVES:

2. Indicate how knowledge of decomposers can improve man's environment.

3. Conclude that microbes contribute to man's well-being as well as pose problems for man.

TEACHING STRATEGIES

Activity 4-9. Starting The Run Around

This activity should be used only as an introduction to the concepts of Core B. It is not intended that the aspects of the environment hinted at in the slides be pursued in any depth. Simply elicit preliminary discussion and pose the unifying questions.

NOTE: Materials required for Activity 4-10 must be secured now.

Place the six flash cards in the chalk tray in front of the class so all students can see them.

Begin by asking:

WHO CAN ARRANGE THESE FLASH CARDS IN AN ORDER THAT SHOWS A FOOD CHAIN?

MATERIALS

Flash cards: Hawk
Frog
Mosquito
Mah
Cow
Grass
*35mm Slide projector
Slides 4-13 through 4-21
*Not furnished in materials kit
CUS FOR THIS ACTIVITY

OBJECTIVES:

Indicate how knowledge of decomposers can improve man's environment.

Conclude that microbes contribute to man's well-being as well as pose problems for man.

TEACHING STRATEGIES

. Starting The Run Around

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- have viewed an introductory slide sequence on decomposers.
- have participated in a preliminary discussion of decomposition.
- contemplate the question, "Why aren't we being buried in dead things?"

Students:

-- should recall their food chain work in earlier activities and place the cards in a logical food chain.
ACTIVITY 4-9

TEACHING STRATEGIES

Have a volunteer arrange the flash cards in a logical order and explain his arrangement as he does so. When a reasonable food chain has been formed, write the names above the cards and connect them with arrows as you did in Core A of Unit IV.

HAWK → FROG → MOSQUITO → MAN → COW → GRASS

The focus of the next question sequence is on the two ends of the food chain. Start with the end the students can recall from Unit III by asking:

WHAT DOES GRASS EAT? WHAT DO PLANTS EAT?

If students do not know this let them speculate and discuss what they think plants eat. It really doesn't matter that they have the answer at this point. The contemplation practice is much more meaningful to the students than the answer.

After students have had time to discuss what plants eat, focus their attention on the other end of the food chain by asking:

WHAT EATS HAWKS?

The intent of this question is to draw attention to the fact that in forming food chains it looks like there is an end of the line. Of course, there is no end of the line but students have probably never thought about the continuation of the story. Therefore, the intent of this question is not to get an answer but rather to pose a question that students would probably not ask themselves. Continue to promote thinking by asking:
TEACHING STRATEGIES

Volunteer arrange the flash cards in a logical order in his arrangement as he does so. When a reason-chain has been formed, write the names above the connect them with arrows as you did in Core A of

FROG—MOSQUITO—MAN—COW—GRASS

of the next question sequence is on the two ends of chain. Start with the end the students can in Unit III by asking:

DOES GRASS EAT? WHAT DO PLANTS EAT?

If they do not know this let them speculate and discuss what plants eat. It really doesn't matter that the answer at this point. The contemplation of this question is much more meaningful to the students than the students have had time to discuss what plants eat, or attention on the other end of the food chain by

EATS HAWKS?

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ANTICIPATED STUDENT BEHAVIORS

Students:

--should recall their work with plants and respond, "They make their own food," "The sun," "They don't eat."

--will probably be perplexed and say, "I don't know."
DOES SOMETHING HAVE TO EAT A HAWK? OR DOES THERE HAVE TO BE SOMETHING IN THE WORLD THAT EATS HAWKS?

Then ask:

DO HAWKS LIVE VERY LONG? FOREVER?

WHAT HAPPENS TO DEAD HAWKS?

WHAT HAPPENS TO ANY ANIMAL WHEN IT DIES?

ARE THERE A LOT OF ANIMALS IN THE WORLD?

ARE A LOT OF THEM DYING EVERY DAY?

Ask the next three questions, anticipating a variety of student responses and answers that need not be corrected or modified at this point. They are meant only to be introductory in nature.

WHY DON'T WE SEE A LOT OF DEAD ANIMALS?

WHAT HAPPENS TO THEM?

WHY AREN'T THEY PILING UP OUTSIDE?

LET'S LOOK AT SOME SLIDES THAT MIGHT GIVE US SOME CLUES.
THING HAVE TO EAT A HAWK? OR DOES WE TO BE SOMETHING IN THE WORLD THAT KS?

LIVE VERY LONG? FOREVER?
PENS TO DEAD HAWKS?
PENS TO ANY ANIMAL WHEN IT DIES?
A LOT OF ANIMALS IN THE WORLD?
OF THEM Dying EVERY DAY?
three questions, anticipating a variety of uses and answers that need not be corrected at this point. They are meant only to be in nature.
WE SEE A LOT OF DEAD ANIMALS?
PENS TO THEM?
THEY PILING UP OUTSIDE?
K AT SOME SLIDES THAT MIGHT GIVE US

Students:

--will probably think there is something that eats hawks, but probably will not know what.

--will probably not know how long hawks live, but will undoubtedly decide that they do not live forever.

--respond, "Stop flying," "Fall to the ground," "Rot."

--should relate their experiences with dead animals and say such things as, "Rot," "Turn color," "Get buried," etc.

--respond, "Yes."

--respond, "Yes."

--respond, "They don't live here," "We don't look for them."

--respond, "I don't know."

--respond, "I don't know."
Project Slide 4-13 and say:

DESCRIBE WHAT YOU SEE.

Then ask:

WHAT DO YOU NOW KNOW HAPPENS TO SOME DEAD ANIMALS?

DOES ANYONE KNOW WHAT WE CALL THINGS THAT EAT OTHER DEAD THINGS?

Introduce the word scavenger to your students at this point as the word scientists use to describe animals that eat and gather things that are usually discarded by most other animals. Scavengers could literally (Webster's New World Dictionary) be described as the "junkmen" of the natural world. Core C of this unit will cope with other aspects of the "junk" and "junkmen" of the world.

After developing an initial understanding of the word scavenger and having discussed the scene in Slide 4-13 for as long as students desired, project Slide 4-14 and ask:

DESCRIBE WHAT YOU SEE IN THIS SCENE?

WHAT IS THE SCAVENGER IN THIS PICTURE?

WHAT DOES A SCAVENGER DO?
### Teaching Strategies

side 4-13 and say:

*BE WHAT YOU SEE.*

**DO YOU NOW KNOW HAPPENS TO SOME DEAD THINGS?**

**ANYONE KNOW WHAT WE CALL THINGS THAT ARE DEAD THINGS?**

the word scavenger to your students at this point, and scientists use to describe animals that eat and dispose of things that are usually discarded by most other creatures. Scavengers could literally (Webster's New Dictionary) be described as the "junkmen" of the world. Core C of this unit will cope with other "junk" and "junkmen" of the world.

Having an initial understanding of the word scavenger and having discussed the scene in Slide 4-13 for students desired, project Slide 4-14 and ask:

*BE WHAT YOU SEE IN THIS SCENE? Is THE SCAVENGER IN THIS PICTURE? Does A SCAVENGER DO?*

### Anticipated Student Behaviors

**Students:**

--- should describe the scene in their own words, pointing out the dead animal and the ugly bird eating the dead animal.

--- respond, "They get eaten by other animals."

--- respond, "Cannibals," "I don't know."


--- respond, "The bug," "The beetle."

--- respond, "Eats things that others usually do not."
Now project Slide 4-15 and ask:

WHAT ANIMAL DO YOU SEE IN THIS PICTURE?
WHAT IS IT DOING?
WOULD YOU CALL HIM A SCAVENGER?
WHY?

Then project Slide 4-16 and ask:

WHAT DO WE SEE IN THIS PICTURE?
CAN AN ANT EAT A LOT OF DEAD THINGS?
WHY NOT?
CAN A WHOLE HILL OF ANTS EAT A LOT?
WHY?
HOW MANY ANTS ARE THERE IN (your city)?

Project Slide 4-17 and ask:

WHAT DO YOU SEE HERE?
DOES ANYTHING EAT LOGS?

Project Slide 4-18 and ask:

WHAT IS HAPPENING TO THE LOG?
WHAT IS CAUSING THE LOG TO CHANGE?
DO MOST ANIMALS EAT LOGS?
TEACHING STRATEGIES

Slide 4-15 and ask:

**ANIMAL DO YOU SEE IN THIS PICTURE?**

**IS IT DOING?**

**YOU CALL HIM A SCAVENGER?**

Slide 4-16 and ask:

**DO WE SEE IN THIS PICTURE?**

**ANT EAT A LOT OF DEAD THINGS?**

**IT?**

**WHOLE HILL OF ANTS EAT A LOT?**

**ANY ANTS ARE THERE IN (your city)?**

Slide 4-17 and ask:

**YOU SEE HERE?**

**ANYTHING EAT LOGS?**

Slide 4-18 and ask:

**S HAPPENING TO THE LOG?**

**CAUSING THE LOG TO CHANGE?**

**ANIMALS EAT LOGS?**

ANTICIPATED STUDENT BEHAVIORS

**ACTIVITY 4-9**

Students:

--respond, "An ant."

--respond, "Carrying a big piece of food."

--respond, "Yes."

--should give a working definition of a scavenger and relate how an ant fits the definition.

--respond, "An ant hill."

--respond, "No."

--respond, "It is too small."

--probably respond, "Yes."

--respond, "There are so many of them."

--respond, "Wow, a bunch!"

--respond, "A log."

--probably will predict, "No."

--respond, "It looks funny," "Rotten," "It's disappearing."

--should infer, "Probably the worms and bugs."

--respond, "No."
WHAT WOULD YOU CALL THESE "WORMS AND BUGS" THAT DO?

At this point introduce the word "decompose" to your students. Explain that compose means to put together and that decompose means to break apart. Point out that as the "worms and bugs" eat the log, they break it apart and we thus say it has been decomposed. Explain that in addition to calling some organisms scavengers, we might also describe some as decomposers.

After introducing the word, project Slide 4-19 and ask:

WHAT DO YOU SEE HERE?

IS IT BEING DECOMPOSED?

Project Slide 4-20 and say:

HOW DOES THIS SLIDE LOOK COMPARED TO THE LAST ONE?

IS IT BEING DECOMPOSED?

WHAT DOES DECOMPOSE MEAN?

DO YOU SEE ANY SCAVENGERS?

Now project Slide 4-21 and say:

DESCRIBE WHAT YOU SEE IN THIS PICTURE.

Point to the scene showing what is being viewed under the microscope and ask:
TEACHING STRATEGIES

WOULD YOU CALL THESE "WORMS AND BUGS" DO?

Introduce the word "decompose" to your students. Explain that compose means to put together; decompose means to break apart. Point out that "worms and bugs" eat the log, they break it apart, say it has been decomposed. Explain that in calling some organisms scavengers, we describe some as decomposers.

Introducing the word, project Slide 4-19 and ask:

DO YOU SEE HERE?

BEING DECOMPOSED?

DE 4-20 and say:

DOES THIS SLIDE LOOK COMPARED TO THE ONE?

BEING DECOMPOSED?

DOES DECOMPOSE MEAN?

YOU SEE ANY SCAVENGERS?

Slide 4-21 and say:

BE WHAT YOU SEE IN THIS PICTURE.

Scene showing what is being viewed under the microscope and ask:

ANTICIPATED STUDENT BEHAVIORS

Students:

--respond, "Scavengers."

--respond, "A board."

--respond, "No," "Doesn't look like it."

--observe and respond, "It's the bottom of the board," "It is rotten."

--respond, "Yes."

--should give a reasonable definition in their own words.

--respond, "Yes," "The bugs," etc.

--should observe the slide and describe the scene, identifying the person, the microscope, and that something is being seen through the microscope.
WHAT DO YOU SUPPOSE THESE THINGS ARE?

Then say:

EARLIER WE STUDIED SOME VERY SMALL THINGS THAT WE COULD NOT SEE. WHAT DID WE CALL THEM?

Then say:

MANY MICROBES BREAK THINGS APART BY EATING THEM. MICROBES THAT DO THIS ARE DECOMPOSERS.

CAN WE SEE ALL DECOMPOSERS?

Then say:

SOME DECOMPOSERS ARE LARGE AND SOME ARE SO SMALL WE CANNOT SEE THEM WITHOUT A MICROSCOPE. WE WILL BE STUDYING SOME OF THESE IN OUR NEXT ACTIVITIES.

Returning to the original questioning conclude by asking:

WHY AREN'T DEAD ANIMALS PILING UP ALL AROUND US?

WHO MIGHT EAT A DEAD HAWK?

Do not worry about an absolute answer here since it will be asked again at the end of this core.

NOTE: Please read the teacher preparation section of Activity 4-11 now!
TEACHING STRATEGIES

DO YOU SUPPOSE THESE THINGS ARE?

IER WE STUDIED SOME VERY SMALL THINGS THAT CULD NOT SEE. WHAT DID WE CALL THEM?

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D SEE ALL DECOMPOSERS?

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IGHT EAT A DEAD HAWK?
	ery about an absolute answer here since it will gain at the end of this core.

Please read the teacher preparation section of activity 4-11 now!

ANTICIPATED STUDENT BEHAVIORS

Students:

—should speculate as to the nature of the microorganisms. They might guess scavengers or decomposers.

—should recall, "Microbes."

—infer, "No, some are too small."

—respond, "Things are eating them," "They are being decomposed."

## UNIT IV, CORE B
### ACTIVITY 4-9: "Starting The Run Around"

**Activity name suggested by class:**

<table>
<thead>
<tr>
<th>Teacher</th>
<th>BSCS USE: Post</th>
<th>Tally</th>
<th>Rev</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Day 1</th>
<th>Day 2</th>
<th>Day 3</th>
<th>Day 4</th>
<th>Day 5</th>
<th>Day 6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Date taught (month and date, e.g. 11/2)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Minutes of class time on science each day</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Minutes of preparation each day</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Students absent on each date (Use ID Number)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

5. **Interest of class as expressed by apparent attention to what is happening.**

<table>
<thead>
<tr>
<th>Number of students responding with:</th>
<th>Name students you noted especially:</th>
</tr>
</thead>
<tbody>
<tr>
<td>HIGH INTEREST</td>
<td></td>
</tr>
<tr>
<td>MODERATE INTEREST</td>
<td></td>
</tr>
<tr>
<td>INDIFFERENCE</td>
<td></td>
</tr>
<tr>
<td>MODERATE RESISTANCE</td>
<td></td>
</tr>
<tr>
<td>STRONG DISLIKE</td>
<td></td>
</tr>
<tr>
<td>HARD TO RATE</td>
<td></td>
</tr>
</tbody>
</table>

6. **Equipment in kit:**
   - □ None  □ Satisfactory  □ Too  □ Too  □ Difficult
   - □ needed  □ fragile  □ complicated to use

7. **Equipment I got:**
   - □ None  □ Easy  □ Hard to get, □ Hard to get, □ Unobtainable, needed to get  □ but okay  □ add to kit  □ add to kit

8. **Materials used:**

<table>
<thead>
<tr>
<th>Worksheet #</th>
<th>Game #</th>
<th>Slides (show slide nos.)</th>
<th>Transparency #</th>
<th>Card(s) #</th>
<th>Tape(s) #</th>
<th>Other #</th>
</tr>
</thead>
<tbody>
<tr>
<td>Worthwhile as is</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Revise slightly</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Revise much</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Worthless: omit</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

9. **Maturity level is**
   - □ just right  □ too childish  □ too mature  □ Explain:

10. **Vocabulary level is**
    - □ just right  □ too easy  □ too difficult  □ Explain:

11. **Were teacher instructions clear enough to follow?**
    - □ Yes  □ No - Pages and Problem:

12. **Were clues to success and reviews of success helpful?**
    - □ Yes  □ No - Why not?

13. **Did the activity fulfill the purpose stated by the Guide?**
    - □ Yes  □ No - Comment:

14. **Were any parts of this activity omitted?**
    - □ No  □ Yes - Explain:

15. **Your rating of this activity:**
    - □ Worthwhile  □ Of value—needs the □ Worth salvaging—make  □ Worthless
      --keep as is  □ revision suggested  □ major changes described  □ drop it
Equipment I got:
- None
- Easy
- Hard to get
- Hard to get, Unobtainable

Add to kit:
- But okay
- Add to kit

Materials used:

<table>
<thead>
<tr>
<th>Worksheet</th>
<th>Game</th>
<th>Slides (show slide nos.)</th>
<th>Transparency</th>
<th>Card(s)</th>
<th>Tape(s)</th>
<th>Other</th>
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<tr>
<td>Revise slightly</td>
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<tr>
<td>Revise much</td>
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<tr>
<td>Worthless: omit</td>
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</tbody>
</table>

Maturity level is:
- Just right
- Too childish
- Too mature

Vocabulary level is:
- Just right
- Too easy
- Too difficult

Were teacher instructions clear enough to follow?
- Yes
- No - Pages and Problem:

Were clues to success and reviews of success helpful?
- Yes
- No - Why not?

Did the activity fulfill the purpose stated by the Guide?
- Yes
- No - Comment:

Were any parts of this activity omitted?
- No
- Yes - Explain:

Your rating of this activity:
- Worthwhile
- Of value - needs the
- Worth salvaging - make
- Worthless

- keep as is

- revision suggested

- major changes described

- drop it

SPECIFIC CONCERNS ABOUT THIS ACTIVITY:

There are always parts of activities that are good and need not be changed.

What parts of this activity should be retained when the curriculum is revised?
Page(s):

Did students have difficulty arranging a reasonable food chain?
- No
- Yes: Comment.

Did students have problems recognizing or describing any slide?
- No
- Yes: If yes, which? Explain.

Concern (or questions) about content:

Messages for staff (read immediately):

Have you answered each question, attached annotated Guide, your revisions, student work, etc.?
REPORT OF WHAT HAPPENED AND SUGGESTIONS FOR REVISION

1. Whenever practical write all over your second copy of the Guide. Tear out the activity and send the annotated Guide in with this form.
3. Tell us what you did. Think of what you needed, what you had to work out for yourself, how you presented something to make it go over.
4. Describe the revisions you said were needed in answering the questions on the other side of this form.
5. As a reminder of things that help in revision, read through the following list and check off things you want to be sure to note this time. (We know you can't tell about everything every time!)

THE LESSON
☐ how you organized materials or class.
☐ things added (a question, a picture, etc.).
☐ equipment, supplies, visual aids.
☐ things that went wrong, misunderstandings.
☐ what you would do differently or avoid next time.
☐ turmoil in the class caused by the activity, or disruptive students, or interruptions, and how you dealt with them.

THE STUDENTS
☐ who had problems and what they were.
☐ how someone "caught on" (or who never did).
☐ who was really "turned off" (or on).
☐ reactions of parents, teachers, students.
☐ special evidence of learning or applying ideas.

Teacher ____________________
OBJECTIVE FOCUS FOR THIS ACTIVITY

UNIT GOALS:

1. Appreciate the cycling relationships of the materials and organisms in the environment through:
   a. Understanding of what a cycle is.
   b. Understanding of the role of decomposers.
   d. Recognition of examples of man's impact upon the environment.

CORE B OBJECTIVES:

1. Know the habitat requirements of microbes and other decomposers.
2. Indicate how knowledge of decomposers can improve man's environment.

TEACHING STRATEGIES

Activity 4-10. Decomposition In Class

This activity will be a long-range activity and a group project rather than an individual one. Students should build on their background of understanding about decomposition and develop some practical experience with composting. These ideas should relate to man's ability to use his knowledge of decomposition to improve his environment and to the student's ability to improve his own environment through a knowledge of decomposition.
FOCUS FOR THIS ACTIVITY

GOALS:
1. Appreciate the cycling relationships of the materials and organisms in the environment through:
   a. Understanding of what a cycle is.
   b. Understanding of the role of decomposers.
   d. Recognition of examples of man's impact upon the environment.

OBJECTIVES:
1. Know the habitat requirements of microbes and other decomposers.
2. Indicate how knowledge of decomposers can improve man's environment.

TEACHING STRATEGIES

10. Decomposition In Class
   This will be a long-range activity and a group her than an individual one. Students should 
   make an understanding about decom- 
   d develop some practical experience with 
   These ideas should relate to man's ability 
   knowledge of decomposition to improve his 
   and to the student's ability to improve 
   ironment through a knowledge of decomposition.

UNIT IV. TRANSFER AND CYCLING OF MATERIALS IN MY ENVIRONMENT

CORE B. DECOMPOSERS IN MY ENVIRONMENT

ACTIVITY 4-10. DECOMPOSITION IN CLASS

ANTICIPATED STUDENT BEHAVIORS

At the end of this activity, each student should:
- be able to define compost as "a mixture of 
  decaying materials."
- be able to relate the idea of composting to 
  fertilizers and gardening.
- associate decomposition of dead material with 
  the soil-building process.
- be prepared to develop a concept of biodegradable 
  and nonbiodegradable materials in Core C.
### ACTIVITY 4-10

<table>
<thead>
<tr>
<th>MATERIALS</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 Plastic shoe boxes with lids</td>
</tr>
<tr>
<td>4 Bottle caps</td>
</tr>
<tr>
<td>4 Plastic bags</td>
</tr>
<tr>
<td>4 Pieces of plastic approximately (2&quot; X 2&quot;)</td>
</tr>
<tr>
<td>4 Pieces of glass approximately (2&quot; X 2&quot;)</td>
</tr>
<tr>
<td>Other items of students' choice</td>
</tr>
<tr>
<td>Organic matter such as: Leaves, Grass clippings, Pieces of apple, banana, etc.</td>
</tr>
<tr>
<td>Worksheet 4-4</td>
</tr>
<tr>
<td>Slide 4-22</td>
</tr>
<tr>
<td>*35mm Slide projector</td>
</tr>
<tr>
<td>*4 Large spoons</td>
</tr>
</tbody>
</table>

*Not furnished in materials kit

### TEACHING STRATEGIES

This activity involves setting up compost piles, watching them for several weeks, recording changes in the compost, and then relating these changes to microbe activity and decomposition. Ultimately this will allow the student to complete the cycle of materials relationships in the environment. The important aspects of this activity will come out in Activity 4-17. This activity will involve setting up the compost piles and giving the students clues for their observations.

Begin by asking:

**WHERE WOULD YOU PUT SOMETHING IF YOU WANTED IT TO DECOMPOSE QUICKLY?**

Then say:

**THINGS CAN BE DECOMPOSED IN SOIL. WHY DO YOU SUPPOSE THIS MIGHT BE A GOOD PLACE TO DECOMPOSE THINGS?**

Now introduce the term "compost pile." Explain that it is the procedure outlined below that people use to create natural fertilizer by decomposition.

Now give each student Worksheet 4-4. Project Slide 4-22 and explain the worksheet to your students. Help students each day to verbalize and write observations of their compost piles. Have students date their worksheet appropriately each day and write something in the record column. Take about five minutes at the beginning of your class period for the next two weeks to stir up the compost and allow students to observe it. The things students will
TEACHING STRATEGIES

Activity involves setting up compost piles, watching for several weeks, recording changes in the compost, relating these changes to microbe activity and decomposition. Ultimately this will allow the student to see the cycle of materials relationships in the environment. The important aspects of this activity will be outlined below that people use to create fertilizer by decomposition. Teach students the term "compost pile." Explain that it is the worksheet to your students. Help students verbalize and write observations of their experiences. Have students date their worksheet approach day and write something in the record column. Five minutes at the beginning of your class the next two weeks to stir up the compost and ants to observe it. The things students will observe:

ANTICIPATED STUDENT BEHAVIORS

Students:

-Would you put something if you wanted it to decompose quickly?

-Can be decomposed in soil. Why do you think this might be a good place to decompose?

-Respond by guessing, "Where the bugs are," "In the ground," "In a lake," "I don't know."

-Should speculate on soil and give possible explanations such as, "Worms live there," "It's dirty," etc.
observe will be the changes in color, texture, size, and odor of all the things you put in the pile. Help students daily but do not tell them what is happening.

Now proceed to set up the class compost piles. Divide the class into four teams. Set the compost piles up slowly, explaining what to do at each step. Have students record on their worksheets what each thing is like that they put into the pile.

As each item is put in the box help focus attention by asking questions such as:

**WHAT COLOR IS (item)?**

**HOW DOES THE (item) FEEL?**

**HOW DOES THE (item) SMELL?**

The compost piles should be set up as shown in diagram 4-3. Place about 1/2 inch of potting soil on the bottom of the shoe boxes. Then put a layer of organic matter on top of the soil. Then place another layer of soil in the boxes on top of the organic material. Continue this pattern until the boxes are about 2/3 full. In the various layers of organic matter, have students place the bottle cap, plastic bag, piece of plastic, piece of glass, and other items of their choice that they can bring the next day.

When all the contents are in the boxes, add enough water to the boxes to make all the contents damp. Continue to add moisture to the boxes as needed periodically. After the contents are in the boxes, place a lid on each box and store them in a dark, warm place in your room.

Each day for the next two weeks the boxes should be brought out and examined. The contents of the boxes should be stirred and mixed each day. Obviously the compost is going
### TEACHING STRATEGIES

1. Be the changes in color, texture, size, and the things you put in the pile. Help students do not tell them what is happening.
2. Help to set up the class compost piles. Divide the four teams. Set the compost piles up slowly, what to do at each step. Have students record worksheets what each thing is like that they the pile.
3. Item is put in the box help focus attention by questions such as:
   - COLOR IS (item)?
   - DOES THE (item) FEEL?
   - DOES THE (item) SMELL?

### ANTICIPATED STUDENT BEHAVIORS

Students:

--- respond appropriately.
--- respond appropriately.
--- respond appropriately.
ACTIVITY 4-10

MATERIALS

Diagram 4-3

Plastic Shoe box

<table>
<thead>
<tr>
<th>Organic material</th>
<th>Soil</th>
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</thead>
<tbody>
<tr>
<td></td>
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</table>

Before mixing

<table>
<thead>
<tr>
<th>Organic material</th>
<th>Soil</th>
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<td></td>
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</table>

After mixing

TEACHING STRATEGIES

to get smelly! Students will get the odor effect as you take the lid off each day. They will not have to put their noses down into the compost to get the smell effect. You can store the boxes another place if they are too offensive for your room. If you live in a warm area they can be stored and/or opened out of doors. Use your discretion here.

Certain components in the compost piles will change drastically in the two-week period and others will change very little. These changes will be noted and discussed further by students in Activities 4-22 and 4-26. So for the next two weeks, work with your students' ability to observe, remember, compare, and record their findings.

To terminate this "set up" day, ask students to make some guesses as to what is going to happen by asking:

**DO YOU SUPPOSE THIS PILE OF STUFF IS GOING TO CHANGE? HOW?**

**WHAT DO YOU THINK WILL HAPPEN TO THE (item)?**

Repeat this question for all the objects you have placed in the compost pile.
LY! Students will get the odor effect as you pack each day. They will not have to put them down into the compost to get the smell effect. Reuse the boxes another place if they are too warm for your room. If you live in a warm area they can be kept closed and/or opened out of doors. Use your ingenuity here.

Components in the compost piles will change over the two-week period and others will change more slowly. These changes will be noted and discussed in activities 4-22 and 4-26. So for four weeks, work with your students' ability to predict, compare, and record their findings.

On this "set up" day, ask students to make some guesses as to what is going to happen by asking:

**SUPPOSE THIS PILE OF STUFF IS GOING TO CHANGE? HOW?**

**DO YOU THINK WILL HAPPEN TO THE (item)?**

This question for all the objects you have in your compost pile.

**ANTICIPATED STUDENT BEHAVIORS**

**Students:**

- should make their guesses.
- should make their guesses.
- should make guesses for all the objects in the compost pile.
Each succeeding day give students much help with observations and records. Continue to focus their attention each day with questions such as:

1. **DOES THE (item) LOOK THE SAME TODAY AS IT DID YESTERDAY?**
2. **HOW IS IT DIFFERENT?**
3. **WHY IS IT NOT DIFFERENT?**
4. **WHAT COLOR IS (item) TODAY?**
5. **HAS THE COLOR OF (item) CHANGED SINCE YESTERDAY?**
6. **DOES THE (item) FEEL THE SAME AS YESTERDAY?**
7. **DOES THE (item) SMELL THE SAME AS YESTERDAY?**
8. **WHAT IS HAPPENING IN OUR COMPOST PILE?**

A strategy for terminating the compost pile is given in Activity 4-16.

For the next several weeks you will need to allow time each day for students to observe and record changes in the compost pile. Activity 4-11 introduces a second subject, the pillarium, to be observed daily for one week. The experiments in Activities 4-12, 4-13, and 4-14 also require short periods of daily observation. Use Tallysheet 4-4 to record the length of time and any amount of confusion that may occur in performing these multiple observations.
TEACHING STRATEGIES

1. Give students much help with observations. Continue to focus their attention on questions such as:

   - Item look the same today as it did yesterday?
   - Is it different?
   - Is it not different?
   - Color of item today?
   - Color of item changed since yesterday?
   - Item feel the same as yesterday?
   - Item smell the same as yesterday?
   - What is happening in our compost pile?

For terminating the compost pile is given in 16.

2. Several weeks you will need to allow time for students to observe and record changes in the items. Activity 4-11 introduces a second subject, a mixture, to be observed daily for one week. The Tallysheets for periods of daily observation. Use Tallysheet 16 to record the length of time and any amount of confusion that occur in performing these multiple tasks.

3. Students:

   --respond appropriately.
   --should identify appropriate changes.
   --should realize some of the properties of the items and conclude that they are not going to decompose.
   --respond appropriately.
   --should consult their records, compare, respond appropriately.
   --respond appropriately.
   --respond appropriately.

   --should look at their records and conclude that some things are decomposing and some are not.

ANTICIPATED STUDENT BEHAVIORS

ACTIVITY 4-10
Two difficulties may arise in the next sequence of activities (4-10 through 4-14). Students will be expected to observe and record multiple experiments on a daily basis. In order to (1) determine the length of time spent daily on observing and recording and (2) determine if students were confused shifting from one experiment to another, please keep a daily record of these two factors on this tallysheet. Categories for recording are explained below.

**Time:** Record the approximate time (in minutes) each day that students take to observe and record all continuing experiments. The daily observations (Activities 4-10 through 4-14) overlap as shown below so by the fifth teaching day after Activity 4-10 students may be observing five things.

<table>
<thead>
<tr>
<th>TEACHING DAYS</th>
<th>1</th>
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<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
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<tbody>
<tr>
<td>4-10 (Compost Pile)</td>
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<td>4-11 (Pillarium)</td>
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<td>4-12 (Wet/dry)</td>
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<td>4-13 (Cool/warm)</td>
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<td>4-14 (Hamburger)</td>
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**Rating of Confusion:** You are asked to make two ratings - first consider the whole group and check one of the following categories each day; second, if there are a few students who are lost even though the group as a whole has little or no problem, list those students.

- **No confusion** The group was able to observe and record without confusion in shifting from one experiment to another.
- **Little confusion** The group was able to observe and record multiple experiments with teacher guidance, confusion in shifting was relieved.
- **Moderate confusion** The group was able to observe and record multiple experiments with continued help and clarification from the teacher.
- **Much confusion** The group was unable to keep track of multiple experiments; recording was done on the wrong sheets; students experienced a very high level of frustration; were still confused after teacher guidance.

Write in the date of your tally and amount of time students spent observing and recording. Circle the activities which were being observed and recorded on that date. Circle the amount of confusion expressed on that date.
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Write in the date of your tally and amount of time students spent observing and recording. Circle the activities which were being observed and recorded on that date. Circle the amount of confusion expressed on that date.

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<th>DATE:</th>
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<td>Act. 4-10</td>
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<td>4-10</td>
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<td>4-10</td>
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</tbody>
</table>

Rating of Group Confusion

- **No confusion**
  - No

- **Little confusion**
  - Lit.

- **Moderate confusion**
  - Mod.

- **Much confusion**
  - Much

If only a few students are confused, list them by name or ID no.
### UNIT IV, CORE B
### ACTIVITY 4-10: "Decomposition In Class"

**Teacher**

**Activity name suggested by class:**

<table>
<thead>
<tr>
<th>BSCS USE:</th>
<th>Post</th>
<th>Tally</th>
<th>Rev</th>
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</thead>
</table>

<table>
<thead>
<tr>
<th>Day 1</th>
<th>Day 2</th>
<th>Day 3</th>
<th>Day 4</th>
<th>Day 5</th>
<th>Day 6</th>
</tr>
</thead>
</table>

1. Date taught (month and date, e.g. 11/2)
2. Minutes of class time on science each day
3. Minutes of preparation each day
4. Students absent on each date (Use ID Number)

5. Interest of class as expressed by **apparent attention** to what is happening.
   **Number of students responding with:**
   **Name students you noted especially:**
   - High Interest
   - Moderate Interest
   - Indifference
   - Moderate Resistance
   - Strong Dislike
   - Hard to Rate

6. Equipment in kit:
   - None
   - Satisfactory
   - Too needed
   - Too fragile
   - Complicated to use

7. Equipment I got:
   - None
   - Easy
   - Hard to get
   - But okay
   - Add to kit
   - Unobtainable
   - Add to kit

8. Materials used:
   - Worksheet
   - Game
   - Slides (show slide nos.)
   - Transparency
   - Card(s)
   - Tape(s)
   - Other

<table>
<thead>
<tr>
<th>Worksheet</th>
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<th>Slides (show slide nos.)</th>
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<tr>
<td>Worthwhile as is</td>
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<td>Revise slightly</td>
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<tr>
<td>Worthless: omit</td>
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</tr>
</tbody>
</table>

9. Maturity level is
   - Just right
   - Too childish
   - Too mature
   - Explain:

10. Vocabulary level is
    - Just right
    - Too easy
    - Too difficult
    - Explain:

11. Were teacher instructions clear enough to follow?  
    - Yes  
    - No - Pages and Problem:

12. Were clues to success and reviews of success helpful?  
    - Yes  
    - No - Why not?

13. Did the activity fulfill the purpose stated by the Guide?  
    - Yes  
    - No - Comment:

14. Were any parts of this activity omitted?  
    - No  
    - Yes - Explain:

15. Your rating of this activity:
    - Worthwhile
    - Of value--needs the ___ revision suggested
    - Worth salvaging--make major changes described
    - Worthless--keep as is
    - Drop it

6. Equipment in kit: □ None □ Satisfactory □ Too □ Too Difficult
   □ fragile □ complicated
   □ needed □ to use
   □ Too needed □ to get □ Hard to get, □ Hard to get, □ Unobtainable, □ to get □ but okay □ add to kit □ add to kit

Equipment I got: □ None □ Easy □ Hard to get, □ Hard to get, □ Unobtainable, □ to get □ but okay □ add to kit □ add to kit

7. Materials used:

<table>
<thead>
<tr>
<th></th>
<th>Worksheet</th>
<th>Game</th>
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Revise slightly:  
Revise much:  
Worthless: omit

9. Maturity level is □ just right □ too childish □ too mature Explain:
10. Vocabulary level is □ just right □ too easy □ too difficult Explain:

11. Were teacher instructions clear enough to follow? □ Yes □ No - Pages and Problem:
12. Were clues to success and reviews of success helpful? □ Yes □ No - Why not?
13. Did the activity fulfill the purpose stated by the Guide? □ Yes □ No - Comment:
14. Were any parts of this activity omitted? □ No □ Yes - Explain:
15. Your rating of this activity:
   □ Worthwhile □ Of value--needs the □ Worth salvaging--make □ Worthless--keep as is □ revision suggested □ major changes described □ drop it

SPECIFIC CONCERNS ABOUT THIS ACTIVITY:

16. There are always parts of activities that are good and need not be changed. What parts of this activity should be retained when the curriculum is revised?
   Page(s) __________________:

17. Are any students having difficulty completing Worksheet 4-4?
   □ No □ Yes: How many? □ 1/4 □ 1/2 □ 3/4 □ all: Comment.

18. Concern (or questions) about content:

19. Messages for staff (read immediately):

Have you answered each question, attached annotated Guide, your revisions, student work, etc.?
UNIT IV, CORE B
ACTIVITY 4-10: "Decomposition In Class"

Teacher

REPORT OF WHAT HAPPENED AND SUGGESTIONS FOR REVISION

1. Whenever practical write all over your second copy of the Guide. Tear out the activity and send the annotated Guide in with this form.
3. Tell us what you did. Think of what you needed, what you had to work out for yourself, how you presented something to make it go over.
4. Describe the revisions you said were needed in answering the questions on the other side of this form.
5. As a reminder of things that help in revision, read through the following list and check off things you want to be sure to note this time. (We know you can't tell about everything every time!)

THE LESSON
☐ things added (a question, a picture, etc.).
☐ equipment, supplies, visual aids.
☐ things that went wrong, misunderstandings.
☐ what you would do differently or avoid next time.
☐ turmoil in the class caused by the activity, or disruptive students, or interruptions, and how you dealt with them.

THE STUDENTS
☐ who had problems and what they were.
☐ how someone "caught on" (or who never did).
☐ who was really "turned off" (or on).
☐ reactions of parents, teachers, students.
☐ special evidence of learning or applying ideas.
OBJECTIVE FOCUS FOR THIS ACTIVITY

UNIT GOALS:

1. Appreciate the cycling relationships of the materials and organisms in the environment through:
   a. Understanding of what a cycle is.
   b. Understanding of the role of decomposers.

CORE B OBJECTIVES:

1. Know the habitat requirements of microbes and other decomposers.
2. Indicate how knowledge of decomposers can improve man's environment.

TEACHING STRATEGIES

Activity 4-11. Making A Pill Bug Habitat (Pillarium)

This activity will allow students to view some decomposers in action. It will help further develop the idea of breakdown of organic matter and the omnipresence of the creatures which cause the breakdown. In addition students will have some concrete experiences caring for a living thing that they may not normally have contact with or even think about.

Teacher Preparation:

In your materials kit you have been given about 50 pill bugs. These have been provided only in case you live in an area where you cannot easily trap some or the weather is such that it would not be possible.

About two days before you set up the pillaria in this activity you will want to set traps for isopods (more accurate name for pill bugs, sow bugs, etc.)

MATERIALS

*1 Rubber band per/student
2 or 3 Pill bugs per/student
1 Plastic tumbler per/student
*Leaves (dried)

(Continued on next page)

*Not furnished in materials kit
FOR THIS ACTIVITY

Appreciate the cycling relationships of the materials and organisms in the environment through:

1. Understanding of what a cycle is.
2. Understanding of the role of decomposers.

OBJECTIVES:

- Know the habitat requirements of microbes and other decomposers.
- Indicate how knowledge of decomposers can improve man's environment.

TEACHING STRATEGIES

Making A Pill Bug Habitat (Pillarium)

This will allow students to view some action. It will help further develop a breakdown of organic matter and the the creatures which cause the breakdown; students will have some concrete thing for a living thing that they may contact with or even think about.

Directions:

- If you have been given about 50 pill bugs, this kit is provided only in case you live in an area where you cannot easily trap some or the that it would not be possible.

Before you set up the pillaria in this I want to set traps for isopods (more bugs, sow bugs, etc.)

UNIT IV.
TRANSFER AND CYCLING OF MATERIALS IN MY ENVIRONMENT

CORE B.
DECOMPOSERS IN MY ENVIRONMENT

ACTIVITY 4-11. MAKING A PILL BUG HABITAT (PILLARIUM)

ANTICIPATED STUDENT BEHAVIORS

At the end of this activity, each student should:

-- have made a pill bug habitat.
-- have observed and recorded changes in the pill bug habitat.
-- have participated in a discussion of the pill bug and its habitat.
### ACTIVITY 4-11

#### MATERIALS

- Potting soil
- Small sponges
- Toothpicks
- 6 Potatoes
- Knife

#### TEACHING STRATEGIES

Although land isopods can be collected in most areas of the United States by searching under rocks and logs, collection can be simplified by the use of traps made from potatoes.

Cut a large white potato in half lengthwise. Scoop out the middle leaving a crust about 1/3 - 1/2 inch thick. Secure the two halves together again with toothpicks. A hole should be scooped out of one end of the potato for an entrance. (See Diagram 4-4.)

The traps should be placed under trees or shrubs in places where you can find some isopods. Leaves and soil should be used to partially cover the potato trap. If the ground area is very dry, water should be poured on the area around the potato.

After 24 to 48 hours, the traps generally will contain isopods, depending upon the number in your location. If animals are scarce, a number of traps should be placed in different areas.

Involve your students in making the traps and setting the traps **two days before** you proceed with the rest of this activity.

When you have gathered your catch from your traps and have combined them with those provided, proceed to set up the pillaria as follows:

1. Set up your own pillarium before class to serve as a model for students.
2. Provide each student with the materials shown in Diagram 4-5.
3. Show students your model pillarium.
and isopods can be collected in most areas of states by searching under rocks and logs, can be simplified by the use of traps made

white potato in half lengthwise. Scoop off the crust leaving a crust about 1/3 - 1/2 inch thick. Press the two halves together again with toothpicks. The leaves should be scooped out of one end of the potato. (See Diagram 4-4.)

Traps should be placed under trees or shrubs in places where isopods can be found. Leaves and soil should partially cover the potato trap. If the ground is dry, water should be poured on the area around the potato.

48 hours, the traps generally will contain isopods, depending upon the number in your location. If the traps are scarce, a number of traps should be placed in areas.

Students in making the traps and setting the traps before you proceed with the rest of this activity. After you have gathered your catch from your traps and have compared it with those provided, proceed to set up your own pillarium before class to serve as a model pillarium for students.

Each student with the materials shown in 4-5.
4. Have each student set up a similar pillarium as directed by Diagram 4-5. Each should include: Saran Wrap top, thin layer of soil covering the bottom, dried leaves, small moistened sponge, and his "share" of the pill bugs.

5. Caution students that the sponge must be kept moist or the pill bugs might die.

After the students have set up their pill bug habitat, mention to them that they will be expected to observe the activity of the pill bugs every day for a week. Some observable changes in the leaves should occur during this week. No formal records will be kept for this activity since the compost activity will be going on at the same time. Simply allow students to have fun watching the sow bugs each day. Focus their attention on only one aspect of their habitat -- the dried leaves. Ask them to watch for any changes in the leaves. Some observable changes in the leaves should occur during this week. When they have noted the changes discuss the results as follows:

WHAT HAS HAPPENED TO THE LEAVES?
Each student set up a similar pillarium as indicated by Diagram 4-5. Each should include: Saran wrap, thin layer of soil covering the bottom, leaves, small moistened sponge, and his "share" pill bugs.

Instruct students that the sponge must be kept moist or the pill bugs will die.

Students have set up their pill bug habitat, and they will be expected to observe the changes in the leaves every day for a week. Some changes in the leaves should occur during this time. Records will be kept for this activity, and compost activity will be going on at the same time to allow students to have fun watching the change. Focus their attention on only one habitat -- the dried leaves. Ask them if they notice any changes in the leaves. Some observable changes should occur during this week.

Students: Have noted the changes, discuss the results as appropriate.

---

**WORK TIME**

---

**WAITING TIME**

---

**ABOUT ONE WEEK LATER**

---

As "...HAPPENED TO THE LEAVES?"

---

--respond, "They have changed," "The pill bugs have eaten parts of the leaves."
WHAT DO WE CALL ORGANISMS THAT BREAKDOWN THINGS LIKE THIS?

Accept decomposers and scavengers as the best answers and review these words if they do not state them.

WHAT ARE SOME OTHER DECOMPOSERS OR SCAVENGERS?

If answers are not forthcoming remind them of Slides 4-13 through 4-21 in Activity 4-9.

The containers can be dismantled at this time and the pill bugs released outside or you may have all the contents placed in one large container for continuing the observation. They may become another set of classroom pets that can be kept with minimal effort. Periodically add small pieces of potato to their container, more leaves, and small amounts of moisture.

Continue recording on Tallysheet 4-4.
DO WE CALL ORGANISMS THAT BREAKDOWN THINGS THIS?

Composers and scavengers as the best answers and use words if they do not state them.

ARE SOME OTHER DECOMPOSERS OR SCAVENGERS?

If not forthcoming remind them of Slides 4-13 21 in Activity 4-9.

Worms can be dismantled at this time and the pill led outside or you may have all the contents in a large container for continuing the observa-

Students:

--respond, "Decomposers," "Scavengers."

--recall previous experiences and relate slides viewed earlier and say, "Worms," "Microbes," "Fungi," "Ants," etc.

According to Tallysheet 4-4.
UNIT IV, CORE B
ACTIVITY 4-11: “Making A Pill Bug Habitat (Pillarium)”

| Teacher |
|---|---|---|---|---|
| Activity name suggested by class: | BSCS USE: Post | Tally | Rev |

<table>
<thead>
<tr>
<th>Day 1</th>
<th>Day 2</th>
<th>Day 3</th>
<th>Day 4</th>
<th>Day 5</th>
<th>Day 6</th>
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<td>1. Date taught (month and date, e.g. 11/2)</td>
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<td>2. Minutes of class time on science each day</td>
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<td>3. Minutes of preparation each day</td>
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<td>4. Students absent on each date (Use ID Number)</td>
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</table>

5. Interest of class as expressed by apparent attention to what is happening.

Number of students responding with: Name students you noted especially:

<table>
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<tr>
<th>HIGH INTEREST</th>
<th>MODERATE INTEREST</th>
<th>INDIFFERENCE</th>
<th>MODERATE RESISTANCE</th>
<th>STRONG DISLIKE</th>
<th>HARD TO RATE</th>
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</table>

6. Equipment in kit: □ None □ Satisfactory □ Too □ Too fragile □ Difficult needed □ needed fragile complicated to use

7. Equipment I got: □ None □ Easy □ Hard to get, □ Hard to get, □ Unobtainable, needed to get □ but okay □ add to kit □ add to kit

8. Materials used:

<table>
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<tr>
<th>Worksheet</th>
<th>Game</th>
<th>Slides (show slide nos.)</th>
<th>Transparency</th>
<th>Card(s)</th>
<th>Tape(s)</th>
<th>Other</th>
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9. Maturity level is □ just right □ too childish □ too mature | Explain:

10. Vocabulary level is □ just right □ too easy □ too difficult | Explain:

11. Were teacher instructions clear enough to follow? □ Yes □ No - Pages and Problem:

12. Were clues to success and reviews of success helpful? □ Yes □ No - Why not?

13. Did the activity fulfill the purpose stated by the Guide? □ Yes □ No - Comment:

14. Were any parts of this activity omitted? □ No □ Yes - Explain:

15. Your rating of this activity:

□ Worthwhile □ Of value--needs the revision suggested □ Worth salvaging--make major changes described □ Worthless --keep as is □ Of value--needs the revision suggested □ Worth salvaging--make major changes described □ Worthless --drop it
Equipment in kit: □ None □ Satisfactory □ Too □ Too □ Difficult
needed fragile complicated to use
Equipment I got: □ None □ Easy □ Hard to get, □ Hard to get, □ Unobtainable,
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keep as is revision suggested major changes described drop it

SPECIFIC CONCERNS ABOUT THIS ACTIVITY:

16. There are always parts of activities that are good and need not be changed.
What parts of this activity should be retained when the curriculum is revised?
Page(s) ____________________

17. Was the method of trapping isopods described in this activity effective?
□ Yes (about how many did each student get? _____) □ No: Comment.

18. What changes did the students observe in their pillaria over the week?

19. Concern (or questions) about content:

20. Messages for staff (read immediately):

Have you answered each question, attached annotated Guide, your revisions, student work, etc.?
REPORT OF WHAT HAPPENED AND SUGGESTIONS FOR REVISION

1. Whenever practical write all over your second copy of the Guide. Tear out the activity and send the annotated Guide with this form.
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THE LESSON
- how you organized materials or class.
- things added (a question, a picture, etc.).
- equipment, supplies, visual aids.
- things that went wrong, misunderstandings.
- what you would do differently or avoid next time.
- turmoil in the class caused by the activity, or disruptive students, or interruptions, and how you dealt with them.

THE STUDENTS
- who had problems and what they were.
- how someone "caught on" (or who never did).
- who was really "turned off" (or on).
- reactions of parents, teachers, students.
- special evidence of learning or applying ideas.
OBJECTIVE FOCUS FOR THIS ACTIVITY

UNIT GOALS:

1. Appreciate the cycling relationships of the materials and organisms in the environment through:
   b. Understanding of the role of decomposers.
   d. Recognition of examples of man's impact upon the environment.

CORE B OBJECTIVES:

1. Know the habitat requirements of microbes and other decomposers.
2. Indicate how knowledge of decomposers can improve man's environment.
3. Conclude that microbes contribute to man's well-being as well as pose problems for man.

TEACHING STRATEGIES

Activity 4-12. Wet And Dry

This activity will demonstrate that moisture is essential for a good decomposer habitat. Preliminary discussion should be based upon the previous activity in which the students set up their pill bug habitat.
UNIT IV. TRANSFER AND CYCLING OF MATERIALS IN MY ENVIRONMENT

CORE B. DECOMPOSERS IN MY ENVIRONMENT

ACTIVITY 4-12. WET AND DRY

ANTICIPATED STUDENT BEHAVIORS

At the end of this activity, each student should:

- prepare a petri dish with filter paper inside.
- select material sample for testing.
- use medicine dropper to moisten filter paper.
- observe microbe growth in moist dishes and not in dry dishes.
- infer that microbes require some special conditions for growth.
- infer that the absence of a required condition may prevent growth of some microbes.
- associate certain food packaging with prevention of spoilage.

TEACHING STRATEGIES

2. Wet And Dry

y will demonstrate that moisture is essential decomposer habitat. Preliminary discussion sed upon the previous activity in which the up their pill bug habitat.

OBJECTIVES:

Know the habitat requirements of microbes and other decomposers.

Indicate how knowledge of decomposers can improve man's environment.

Conclude that microbes contribute to man's well-being as well as pose problems for man.

US FOR THIS ACTIVITY

ALS:

Appreciate the cycling relationships of the materials and organisms in the environment through:

b. Understanding of the role of decomposers.

d. Recognition of examples of man's impact upon the environment.

UNIT IV. TRANSFER AND CYCLING OF MATERIALS IN MY ENVIRONMENT

CORE B. DECOMPOSERS IN MY ENVIRONMENT

ACTIVITY 4-12. WET AND DRY

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- associate certain food packaging with prevention of spoilage.

TEACHING STRATEGIES

2. Wet And Dry

y will demonstrate that moisture is essential decomposer habitat. Preliminary discussion sed upon the previous activity in which the up their pill bug habitat.
ACTIVITY 4-12

MATERIALS

- 4 Plastic petri dishes w/covers (9 cm) per student
- 4 Filter paper discs (7 cm) per student
- 1 Medicine dropper per student
- *1 Wax crayon per student
- *Assorted dry materials (for example): Corn flakes, Egg noodles, Oat flakes, Flour, Tea, Hay, Beans dried for cooking, Peas dried for cooking
- *Cardboard carton, file drawer, or other dark storage place
- 35mm Slide projector
- Slide 4-23
- Worksheet 4-5
- *Art supplies for poster

*Not furnished in materials kit

TEACHING STRATEGIES

Begin by asking:

WHAT DID WE PUT INTO THE PILL BUG HABITAT?

WHY DO YOU SUPPOSE WE PUT IN THE LEAVES?

WHY DID WE PUT IN THE WET SPONGE?

Discuss the idea that, in addition to a place to live (shelter), most organisms require food and moisture. Ask:

DO WE NEED FOOD AND WATER?

Then, pointing to the class compost pile, say:

DO YOU SUPPOSE THAT OUR COMPOST WOULD DECOMPOSE IF THE PILE WERE COMPLETELY DRY?

DO YOU THINK THAT MICROSCOPIC DECOMPOSERS (MICROBES) ALSO NEED MOISTURE?

Display the assorted dry materials you have selected and ask:

WHAT ARE ALL OF THESE THINGS?

WOULD YOU DESCRIBE THEM AS WET OR DRY?

WHAT WOULD HAPPEN TO THESE DRY THINGS IF THEY GOT WET?

DOES IT MATTER IF DRY FOOD GETS WET?
TEACHING STRATEGIES

Asking:

Did we put into the pill bug habitat?

Do you suppose we put in the leaves?

Did we put in the wet sponge?

The idea that, in addition to a place to live, most organisms require food and moisture. Ask:

Do they need food and water?

Pointing to the class compost pile, say:

Suppose that our compost would decompose if the pile were completely dry?

Think that microscopic decomposers (bacteria) also need moisture?

As you have selected some assorted dry materials you have selected and

Are all of these things?

You describe them as wet or dry?

Could happen to these dry things if they were wet?

What matter if dry food gets wet?

ANTICIPATED STUDENT BEHAVIORS

Students:


--respond, "For food," "To eat."

--respond, "For water," "For humidity."

--respond, "Yes."

--possibly will have no idea.

--respond, "Yes," "Maybe," "Don't know."

--respond, "Food."

--respond, "Dry."

--should make various guesses.

--should relay experiences and guesses.
TODAY WE ARE GOING TO SEE IF IT MAKES ANY DIFFERENCE OR NOT.

Distribute materials and worksheets. Each student should select two materials to be tested.

WHAT ARE ALL THE THINGS YOU HAVE SELECTED?

WOULD YOU DESCRIBE THEM AS WET OR DRY?

A disk of filter paper should be placed in the bottom of each petri dish. The dishes should be arranged on the work space in pairs. Place a sample of different materials (three or four flakes, three or four beans, 1/8 teaspoon of tea, etc.) in each of the pairs of dishes. The filter paper in one dish of each of the pairs should be moistened with a full medicine dropper of water. The paper in the matching dish should remain dry. Replace the covers on all dishes and label "wet" or "dry," the name of the material, the students' initials and date.

Then ask:
TEACHING STRATEGIES

We are going to see if it makes any difference or not. Use materials and worksheets. Each student should select materials to be tested.

All the things you have selected? You describe them as wet or dry?

Filter paper should be placed in the bottom of each dish. The dishes should be arranged on the work surface. Place a sample of different materials (e.g., paper flakes, three or four beans, 1/8 teaspoon of salt) in each of the pairs of dishes. The filter paper dish of each of the pairs should be moistened with a medicine dropper of water. The paper in the filter dish should remain dry. Replace the covers on all the dishes and label "wet" or "dry," the name of the material, initials and date.

ANTICIPATED STUDENT BEHAVIORS

Students:

- Select materials that interest them. (Duplication of tests is perfectly acceptable as long as a wide variety of materials is tested by the class.)

- Respond, "Food."

- Respond, "Dry."

- Set up experimental dishes.

WORK TIME

SELECTION TIME
### Teaching Strategies

**Why did we set up two dishes for each material?**

If students do not see the reason for the control, probe until it is clear that you must have something to compare the wet one to and that each day their observations should be a comparison between the two dishes. Help students each day to realize how valuable the control dish is and also help them verbalize and write the differences on their worksheets.

The assembled dishes should be placed in a dark, dry storage place for several days. Make a paste for this experiment and display it near where the dishes are being stored. Be creative in the poster and include the question being answered in the experiment. By placing this experiment in a specific place you will help students keep the simultaneous experiments separated in their own mind. Use the poster to focus attention on the experiment each time students record their observations. The absolute duration of this activity is not critical. The activity may be terminated as soon as fungus growth develops. It may be extended slightly for your planning convenience.

Use magnifiers to aid in observations!

Ask students to read over what they have recorded. Then ask them to write near the top of the worksheet what question this experiment was trying to answer (why they were doing the experiment). At the bottom of the worksheet, ask them to write what they found out. Help those who need it to put their ideas in writing.
TEACHING STRATEGIES

WE SET UP TWO DISHES FOR EACH MATERIAL?

Do not see the reason for the control, probe clear that you must have something to compare to and that each day their observations should be made between the two dishes. Help students realize how valuable the control dish is and em verbalize and write the differences on their

Dishes should be placed in a dark, dry place for several days. Make a paste for this and display it near where the dishes are being creative in the poster and include the question and in the experiment. By placing this experiment specific place you will help students keep the experiments separated in their own mind. Use o focus attention on the experiment each time ord their observations. The absolute duration orvity is not critical. The activity may be soon as fungus growth develops. It may be ghly for your planning convenience.

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ANTICIPATED STUDENT BEHAVIORS

Students:

--should relate the idea of a control, i.e., to have something to compare with later to see if anything would have happened without the water. Since the only thing that was different was the addition of water we will be able to know that it caused the change.

--place their assembled dishes in the storage place. Make daily observations.
When the observations have been made and the worksheets completed, use the following questions as a basis for discussing the results:

LOOK AT YOUR WORKSHEETS. WHAT HAPPENED TO OUR DRIED FOOD WHEN WE MADE IT WET?

DID IT DECOMPOSE?

WHAT CAUSED THE FOOD TO GET MOLDY AND DECOMPOSE?

If students do not answer this, ask:

WHY DIDN'T THE DRY FOOD GET MOLDY AND DECOMPOSE?

Remind students that the only difference between the dishes was that one had water and the other didn't and therefore, wetness is a condition necessary for the mold to grow.

WHAT DO YOU SUPPOSE NEEDS THE WATER?

WHAT ELSE DID WE LOOK AT RECENTLY THAT NEEDED WATER?

DO DEAD THINGS NEED WATER?

ARE MOLDS ALIVE?

Accept any level of interest in this question and any answer.

Then ask:

HOW ARE THESE FOODS USUALLY STORED?
TEACHING STRATEGIES

Anticipated Student Behaviors

Students:

- complete worksheets.

- examine their results and state, "They molded," "They got gushy," "They got soggy."

- respond, "Yes."

- respond, "The water."

- respond, "No water," "Not wet."

- respond, "The molds."

- recall, "Sow bugs."

- probably say, "No."

- probably will say, "Yes," or be perplexed.

- respond, "In dry places."
<table>
<thead>
<tr>
<th>MATERIALS</th>
<th>TEACHING STRATEGIES</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>WHAT KIND OF PACKAGES DO THEY USUALLY COME IN?</strong></td>
</tr>
<tr>
<td></td>
<td>Continue recording the appropriate information on Tallysheet 4-4.</td>
</tr>
</tbody>
</table>
**TEACHING STRATEGIES**

**IND OF PACKAGES DO THEY USUALLY COME IN?**

ording the appropriate information on 4-4.

---

**ANTICIPATED STUDENT BEHAVIORS**

Students:

--respond with appropriate answers that relate dryness and air tightness.
UNIT IV, CORE B  
ACTIVITY 4-12: "Wet And Dry"

Teacher

<table>
<thead>
<tr>
<th>Activity name suggested by class:</th>
<th>BSCS USE: Post ____ Tally ____ Rev ____</th>
</tr>
</thead>
</table>

**Day 1** | **Day 2** | **Day 3** | **Day 4** | **Day 5** | **Day 6** |
---|---|---|---|---|---|
1. Date taught (month and date, e.g. 11/2) | | | | | |
2. Minutes of class time on science each day | | | | | |
3. Minutes of preparation each day | | | | | |
4. Students absent on each date (Use ID Number) | | | | | |

5. Interest of class as expressed by **apparent attention** to what is happening.
   Number of students responding with: Name students you noted especially:
   HIGH INTEREST | MODERATE INTEREST | INDIFFERENCE | MODERATE RESISTANCE | STRONG DISLIKE | HARD TO RATE |
---|---|---|---|---|---|

6. Equipment in kit: □ None □ Satisfactory □ Too □ Too □ Difficult  
   □ needed □ fragile □ complicated □ to use |
7. Equipment I got: □ None □ Easy □ Hard to get, □ Hard to get, □ Unobtainable,  
   □ needed □ to get □ but okay □ add to kit □ add to kit |
8. Materials used: Worksheet #1 #2 #3 Game # Slides (show slide nos.) Transparency #1 #2 #3 Card(s) # Tape(s) # Other  
   Worthwhile as is | Revise slightly | Revise much | Worthless: omit |
---|---|---|---|
9. Maturity level is □ just right □ too childish □ too mature □ Explain: |
10. Vocabulary level is □ just right □ too easy □ too difficult □ Explain: |
11. Were teacher instructions clear enough to follow? □ Yes □ No - Pages and Problem: |
12. Were clues to success and reviews of success helpful? □ Yes □ No - Why not? |
13. Did the activity fulfill the purpose stated by the Guide? □ Yes □ No - Comment: |
14. Were any parts of this activity omitted? □ No □ Yes - Explain: |
15. Your rating of this activity: □ Worthwhile □ Of value--needs the □ Worth salvaging--make □ Worthless  
   □ keep as is □ revision suggested □ major changes described □ drop it
Equipment I got:  □ None  □ Easy  □ Hard to get, □ Hard to get, □ Unobtainable, needed to get but okay add to kit add to it

Materials used:  

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Maturity level is  □ just right  □ too childish  □ too mature Explain:

Vocabulary level is  □ just right  □ too easy  □ too difficult Explain:

Were teacher instructions clear enough to follow?  □ Yes  □ No - Pages and Problem:

Were clues to success and reviews of success helpful?  □ Yes  □ No - Why not?

Did the activity fulfill the purpose stated by the Guide?  □ Yes  □ No - Comment:

Were any parts of this activity omitted?  □ No  □ Yes - Explain:

Your rating of this activity:
□ Worthwhile  □ Of value -- needs the □ Worth salvaging -- make □ Worthless -- keep as is □ revision suggested □ major changes described □--drop it

SPECIFIC CONCERNS ABOUT THIS ACTIVITY:

There are always parts of activities that are good and need not be changed. What parts of this activity should be retained when the curriculum is revised? Page(s) ____________:

Did students see the need for a control?  □ Yes  □ No: How many did not understand?  □ 1/4  □ 1/2  □ 3/4  □ all: Comment.

Concern (or questions) about content:

Messages for staff (read immediately):

Have you answered each question, attached annotated Guide, your revisions, student work, etc.?
UNIT IV, CORE B
ACTIVITY 4-12: "Wet And Dry"

Teacher ______________

REPORT OF WHAT HAPPENED AND SUGGESTIONS FOR REVISION

1. Whenever practical write all over your second copy of the Guide. Tear out the activity and send the annotated Guide in with this form.


3. Tell us what you did. Think of what you needed, what you had to work out for yourself, how you presented something to make it go over.

4. Describe the revisions you said were needed in answering the questions on the other side of this form.

5. As a reminder of things that help in revision, read through the following list and check off things you want to be sure to note this time. (We know you can’t tell about everything every time!)

THE LESSON

☐how you organized materials or class.
☐things added (a question, a picture, etc.).
☐equipment, supplies, visual aids.
☐things that went wrong, misunderstandings.
☐what you would do differently or avoid next time.
☐turmoil in the class caused by the activity, or disruptive students, or interruptions, and how you dealt with them.

THE STUDENTS

☐who had problems and what they were.
☐how someone “caught on” (or who never did).
☐who was really “turned off” (or on).
☐reactions of parents, teachers, students.
☐special evidence of learning or applying ideas.
### Objective Focus for This Activity

**Unit Goals:**

1. Appreciate the cycling relationships of the materials and organisms in the environment through:
   - b. Understanding of the role of decomposers.
   - d. Recognition of examples of man's impact upon the environment.

**Core B Objectives:**

1. Know the habitat requirements of microbes and other decomposers.
2. Indicate how knowledge of decomposers can improve man's environment.
3. Conclude that microbes contribute to man's well-being as well as pose problems for man.

### Teaching Strategies

**Activity 4-13. Cool And Warm**

In this activity students will again associate microbes with the spoilage of food. They will realize the need to refrigerate certain foods to prevent their spoilage. The magnitude of the results will vary depending on what foods the students bring in. Capitalize on the variety of results to illustrate that refrigeration is more critical with some foods than with others.
CUS FOR THIS ACTIVITY

OBJECTIVES:

Appreciate the cycling relationships of the materials and organisms in the environment through:

b. Understanding of the role of decomposers.

d. Recognition of examples of man's impact upon the environment.

OBJECTIVES:

Know the habitat requirements of microbes and other decomposers.

Indicate how knowledge of decomposers can improve man's environment.

Conclude that microbes contribute to man's well-being as well as pose problems for man.

TEACHING STRATEGIES

3. Cool And Warm

Activity students will again associate microbes with age of food. They will realize the need to certain foods to prevent their spoilage. The results will vary depending on what foods bring in. Capitalize on the variety of illustrate that refrigeration is more critical aids than with others.

UNIT IV. Transfer and Cycling of Materials in My Environment

CORE B. Decomposers in My Environment

ACTIVITY 4-13. COOL AND WARM

ANTICIPATED STUDENT BEHAVIORS

At the end of this activity, each student should:

--have brought a sample of food from home.

--have identified the foodstuff brought from home and stated reason for refrigeration.

--have divided the sample in half, placed both portions in containers, properly labeled both samples, and placed one in the refrigerator and one in the classroom.

--have observed both bowls for a week and recorded observations on Worksheet 4-6.

--have given a report to the class discussing the results of the experiment.

--have inferred that spoilage is decomposition and is caused by microbes.

--have concluded that refrigeration reduces decomposition and therefore, spoilage.
ACTIVITY 4-13

MATERIALS

*Ice chest or refrigerator
*2 Baby food jars or milk cartons per student
*Saran Wrap
*Food samples usually refrigerated
*35mm Slide projector
Slide 4-24
Worksheet 4-6
*Art supplies for poster

*Not furnished in materials kit

TEACHING STRATEGIES

Begin by reviewing what was learned in Activity 4-12 about how decomposition may be prevented in some foods by storing them in a drying condition.

Then ask:

CAN ALL FOODS BE STORED DRY?

WHICH ONES CAN NOT BE STORED DRY?

Assign the students to bring from home a small sample of food which is kept in the refrigerator. (It is advisable to have a few foodstuffs on hand which are normally refrigerated for students who forget to bring samples from home.)

The next day ask each student to identify this foodstuff and explain why he thinks it is kept in the refrigerator.

After all students have shown their food, ask:

WHAT WOULD HAPPEN IF YOU DID NOT KEEP IT IN THE REFRIGERATOR?

LET'S SEE WHAT HAPPENS IF WE LEAVE PART OF YOUR FOOD OUT OF THE REFRIGERATOR.

Have students divide their food in half in whatever way is appropriate for the food they have brought.

Put each half into a jar or milk carton and label with the student's name and either "refrigerator" or "room." Have the students cover the containers with Saran Wrap and place one container in the refrigerator or cooler and the other in the room in a warm, dark place.
TEACHING STRATEGIES

Reviewing what was learned in Activity 4-12 about desiccation may be prevented in some foods by storing them in a dry condition.

ALL FOODS BE STORED DRY?

ONES CAN NOT BE STORED DRY?

- Students to bring from home a small sample of food that is kept in the refrigerator. (It is advisable to have a few foodstuffs on hand which are normally kept in the refrigerator, just in case some students forget to bring samples from home.)

- Ask each student to identify this foodstuff and state why he thinks it is kept in the refrigerator.

- After students have shown their food, ask:

WOULD HAPPEN IF YOU DID NOT KEEP IT IN THE REFRIGERATOR?

SEE WHAT HAPPENS IF WE LEAVE PART OF YOUR FOOD OUT OF THE REFRIGERATOR.

- Students divide their food in half in whatever way seems appropriate for the food they have brought.

- Half into a jar or milk carton and label with the name and either "refrigerator" or "room." Have students cover the containers with Saran Wrap and place one in the refrigerator or cooler and the other in a warm, dark place.

ANTICIPATED STUDENT BEHAVIORS

Students:

--respond, "No."


--identify foodstuff and state reasons for keeping it in refrigerator: "Keep it cold," "Keep it from rotting," "Don't know."

--respond, "I don't know," "Melt," "Rot."
Again make a poster to display where you are keeping this experiment stored. Do not keep it in the same place as the compost or the "wet-dry" foods. Separate these experiments physically in the room so students do not get them confused. Make your reference poster creative and related to "cold-warm" conditions. Make it distinctive enough so it doesn't look at all like the "wet-dry" poster.

Have the students observe both containers each day for the next week to notice differences. Many interesting changes should take place, depending on the variety of beautiful molds. In addition, smells will develop that are not so beautiful. Changes in texture and color will accompany the other changes. Try to make students aware of these changes through your questioning as they work in the lab by asking questions like those outlined in the strategy of Activity 4-12. Have the students record their observations each day on Worksheet 4-6. Encourage them to keep good records of the kinds of changes mentioned above. Assist them in their verbalization and writing of the results on their worksheets. The food at room temperature should spoil, mold, and change much more quickly than the refrigerated ones.

When the results are obviously different (2 to 5 days), have each student use his worksheet for notes and give a report to the class on the results of his experiment. Have each student explain the difference between refrigeration and nonrefrigeration of his food and, in as much detail as he can, how his food changed.

Try to capitalize on each student report, not by repeating anything the student said, but by emphasizing the value of refrigeration on that particular food.
TEACHING STRATEGIES

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Students:

- Record results: 2 to 5 days

Results are obviously different (2 to 5 days), student use his worksheet for notes and give a one class on the results of his experiment. Student explain the difference between refrigeration and non-refrigeration of his food and, in as much as can, how his food changed.

Analyze on each student report, not by repeating the student said, but by emphasizing the refrigeration on that particular food.

ANTICIPATED STUDENT BEHAVIORS

Students:
After all student reports have been given, ask a few unifying questions such as:

WHAT HAPPENS TO MOST FOODS IF WE TAKE THEM OUT OF THE REFRIGERATOR AND LEAVE THEM OUT?

WHAT CAUSES THEM TO SPOIL?

SHOULD WE EAT SPOILED FOOD?

WHY NOT?

WHY KEEP FOODS IN THE REFRIGERATOR?

WHY DO YOU THINK THAT REFRIGERATION KEEPS FOOD FROM SPOILING?

End this activity by asking:

LET'S SEE HOW MANY FOODS WE CAN LIST THAT SHOULD BE KEPT IN THE REFRIGERATOR.

When in doubt about a particular food, advise students that it usually will not hurt to put the food in the refrigerator so put it in.

Continue recording the time and confusion information requested on Tallysheet 4-4.
TEACHING STRATEGIES

student reports have been given, ask a few questions such as:

HAPPENS TO MOST FOODS IF WE TAKE THEM OUT OF REFRIGERATOR AND LEAVE THEM OUT?

CAUSES THEM TO SPOIL?

DO WE EAT SPOILED FOOD?

DO YOU THINK THAT REFRIGERATION KEEPS FOOD FROM SPOILING?

activity by asking:

SEE HOW MANY FOODS WE CAN LIST THAT SHOULD BE IN THE REFRIGERATOR.

About a particular food, advise students usually will not hurt to put the food in the freezer or so put it in.

According the time and confusion information on Tallysheet 4-4.

ANTICIPATED STUDENT BEHAVIORS

Students:

--should compare the results of individual student reports and generalize by saying, "Many foods spoil, rot, or get overripe."

--recall past work and answer, "Microbes," "Decomposers," "Molds."

--respond, "No."

--respond, "It would make you sick," "It smells."

--infer that refrigeration reduces spoilage and danger of illness.

--infer that it is too cold for microbes to grow.

--respond with many foods.
### UNIT IV, CORE B

**ACTIVITY 4-13: "Cool And Warm"**

**Teacher**

<table>
<thead>
<tr>
<th>Day</th>
<th>Date taught (month and date, e.g. 11/2)</th>
<th>Minutes of class time on science each day</th>
<th>Minutes of preparation each day</th>
<th>Students absent on each date (Use ID Number)</th>
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<td>Day 6</td>
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**5. Interest of class as expressed by apparent attention to what is happening.**

- **HIGH INTEREST**
- **MODERATE INTEREST**
- **INDIFFERENCE**
- **MODERATE RESISTANCE**
- **STRONG DISLIKE**
- **HARD TO RATE**

**Number of students responding with:**

Name students you noted especially:

(Number)

**6. Equipment in kit:**

- None
- Satisfactory
- Too fragile
- Too complicated
- Difficult

**7. Equipment I got:**

- None
- Easy
- Hard to get
- Hard to get, but okay
- Unobtainable

**8. Materials used:**

<table>
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<th>Worksheet #</th>
<th>Game #</th>
<th>Slides (show slide nos.) #</th>
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**9. Maturity level is**

- **just right**
- **too childish**
- **too mature**

**Vocabulary level is**

- **just right**
- **too easy**
- **too difficult**

**10. Were teacher instructions clear enough to follow?**

- Yes
- No - Pages and Problem:

**11. Were clues to success and reviews of success helpful?**

- Yes
- No - Why not?

**12. Did t' activity fulfill the purpose stated by the Guide?**

- Yes
- No - Comment:

**13. Were any parts of this activity omitted?**

- No
- Yes - Explain:

**14. Your rating of this activity:**

- Worthwhile
- Of value--needs the
- Worth salvaging--make
- Worthless

---

- revision suggested
- major changes described
- drop it
Equipment I got:  

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There are always parts of activities that are good and need not be changed.  

What parts of this activity should be retained when the curriculum is revised?  

Page(s)  

Were students able to write down observations of their food?  

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Concern (or questions) about content:  

Messages for staff (read immediately):  

Have you answered each question, attached annotated Guide, your revisions, student work, etc.?  

SIDE A
UNIT IV, CORE B
ACTIVITY 4-13: "Cool And Warm"

Teacher ____________________

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☐ reactions of parents, teachers, students.
☐ special evidence of learning or applying ideas.
OBJECTIVE FOCUS FOR THIS ACTIVITY

UNIT GOALS:

1. Appreciate the cycling relationships of the materials and organisms in the environment through:
   
   b. Understanding of the role of decomposers.
   
   d. Recognition of examples of man's impact upon the environment.

2. Comprehend the role of man as an integral part of nature, not apart from nature.

CORE B OBJECTIVES:

1. Know the habitat requirements of microbes and other decomposers.

2. Indicate how knowledge of decomposers can improve man's environment.

3. Conclude that microbes contribute to man's well-being as well as pose problems for man.

TEACHING STRATEGIES

Activity 4-14. The Hamburger Lab

In this activity students will compare spoilage in two hamburger samples left at room temperature for three days. One sample is left uncooked and the other is boiled for fifteen minutes. Students will conclude that boiling food aids in reducing contamination and spoilage.
CUS FOR THIS ACTIVITY

OBJECTIVES:

- Appreciate the cycling relationships of the materials and organisms in the environment through:
  - Understanding of the role of decomposers.
  - Recognition of examples of man's impact upon the environment.
- Comprehend the role of man as an integral part of nature, not apart from nature.

OBJECTIVES:

- Know the habitat requirements of microbes and other decomposers.
- Indicate how knowledge of decomposers can improve man's environment.
- Conclude that microbes contribute to man's well-being as well as pose problems for man.

TEACHING STRATEGIES

4. The Hamburger Lab

Activity students will compare spoilage in two samples left at room temperature for three days. One is left uncooked and the other is boiled for the same length of time. Students will conclude that boiling reduces contamination and spoilage.

UNIT IV. TRANSFER AND CYCLING OF MATERIALS IN THE ENVIRONMENT

CORE B. DECOMPOSERS IN MY ENVIRONMENT

ACTIVITY 4-14. THE HAMBURGER LAB

ANTICIPATED STUDENT BEHAVIORS

At the end of this activity, each student should:

- Have properly set up the cooked versus uncooked hamburger experiment.
- Have observed changes in hamburger associated with cooking.
- Have recorded observations at the beginning of the experiment.
- Have observed experiment for three days and recorded observations on day three.
- Have described changes which occurred in the hamburger over three days.
**ACTIVITY 4-14**

**MATERIALS**

- Hot plate
- Teaspoon measure
- *2 Teaspoons fresh ground beef per student
- 2 Pieces of cotton per student
- *Masking tape for labeling
- *Water (supply of)
- 2 Test tubes per student, Pyrex (15 x 150 mm)
- Test tube holder
- Worksheet 4-7
- Beaker for boiling water, 1000 ml
- Test tube brush
- *35mm Slide projector
- Slide 4-25

*Not furnished in materials kit

**TEACHING STRATEGIES**

Begin by saying:

**WHICH DO YOU THINK WOULD DECOMPOSE FASTER -- COOKED FOOD OR UNCOOKED FOOD?**

**LET'S FIND OUT! EACH OF YOU WILL NEED THE FOLLOWING THINGS FROM THE SUPPLY TABLE:**

As you tell the students, write these items on the chalkboard.

- 2 TEASPOONS OF GROUND BEEF
- 2 TEST TUBES
- 2 PIECES OF COTTON FOR PLUGS ON TEST TUBES
- MASKING TAPE -- TWO STRIPS PER STUDENT FOR MARKING TEST TUBES
- BEAKER OF WATER

Instruct the students to get supplies and return to desks.

After the students have obtained their supplies, say:

**SHAPE EACH PIECE OF HAMBURGER SO THAT IT WILL FIT INTO THE TEST TUBE. PUT ONE PIECE INTO EACH TEST TUBE AND FILL EACH HALF FULL OF WATER. BE SURE THE HAMBURGER IS UNDER THE WATER.**
**TEACHING STRATEGIES**

**ANTICIPATED STUDENT BEHAVIORS**

At the end of this activity, each student should:

--have inferred that changes were caused by microbes.
--have inferred that boiling of food kills microbes and thus reduces spoilage.

**Students:**

--respond with their guesses.

---

**TEACHING STRATEGIES**

**saying:**

DO YOU THINK WOULD DECOMPOSE FASTER -- \_\_\_\_\_ FOOD OR UNCOOKED FOOD?  

**FIND OUT! EACH OF YOU WILL NEED THE FOLLOWING THINGS FROM THE SUPPLY TABLE:**  

you tell the students, write these on the chalkboard.)

- SPOONS OF GROUND BEEF
- TUBES
- PIECES OF COTTON FOR PLUGS ON TEST TUBES
- SEALING TAPE -- TWO STRIPS PER STUDENT FOR SEALING TEST TUBES
- BOTTLE OF WATER

the students to get supplies and return to desks.

---

**picece of hamburger so that it will

into the test tube. Put one piece into each tube and fill each half full of water. Be

the hamburger is under the water.

---

**ANTICIPATED STUDENT BEHAVIORS**

**WORK TIME**

--shape and place hamburger and water in test tubes.
NOW PUT A PIECE OF COTTON IN THE TOP OF EACH TUBE.

WHAT SHOULD WE DO WITH THESE TWO TEST TUBES?

If students do not get this experimental design, ask:

WHAT DID WE SAY WE WANTED TO FIND OUT?

SO WHAT SHOULD WE DO?

If students still have trouble, explain the procedure comparing it to the wet-dry experiment. Emphasize the need for control!

TAKE A PIECE OF MASKING TAPE AND LABEL ONE OF THE TEST TUBES WITH YOUR NAME, #1, AND "UNCOOKED." LABEL THE OTHER TEST TUBE WITH YOUR NAME, #2, AND "COOKED." PLACE THE TAPE AROUND THE TUBE ABOVE THE WATER LEVEL.

Then ask:

WHY DO WE HAVE TWO TEST TUBES?
### Teaching Strategies

| **PUT A PIECE OF COTTON IN THE TOP OF EACH TUBE.** |
| **SHOULD WE DO WITH THESE TWO TEST TUBES?** |
| If students do not get this experimental design, ask: |
| **WHAT DID WE SAY WE WANTED TO FIND OUT?** |
| **SO WHAT SHOULD WE DO?** |
| If students still have trouble, explain the procedure comparing it to the wet-dry experiment. Emphasize the need for control! |
| **A PIECE OF MASKING TAPE AND LABEL ONE OF THE TUBES WITH YOUR NAME, #1, AND "UNCOOKED." LABEL THE other TEST TUBE WITH YOUR NAME, #2, AND "COOKED."** |
| **THE TAPE AROUND THE TUBE ABOVE THE WATER LEVEL.** |

### Anticipated Student Behaviors

| **Students:** |
| **--stopper tube with cotton.** |
| **--respond, "Cook one and not the other."** |
| **--respond, "Which would decompose faster, cooked or uncooked."** |
| **--respond, "Cook one and not the other."** |
| **--label test tubes.** |
| **--will, we hope, have the idea of control and respond, "Control," "A tube to compare with."** |
To The Teacher.

All sixteen tubes can be boiled at one time in a beaker of water on your hot plate.

After 15 minutes, have the students remove their test tubes from the water with test tube holders and put them with the "uncooked hamburger" test tubes. Have students use a 250 ml beaker as a "holder" for their test tubes while working with them and during storage.

Distribute Worksheet 4-7 and say:

WE ARE GOING TO LET THESE TWO TEST TUBES SIT FOR THREE DAYS TO SEE WHAT HAPPENS. IN ORDER TO COMPARE THEM, WE NEED TO WRITE DOWN WHAT WE SEE TODAY.

TAKE YOUR "UNCOOKED" TEST TUBE FROM THE BEAKER AND OBSERVE IT CAREFULLY. MAKE A DRAWING ON YOUR WORKSHEET OF WHAT YOU SEE AND WRITE A BRIEF DESCRIPTION BELOW IT.
<table>
<thead>
<tr>
<th>TEACHING STRATEGIES</th>
<th>ANTIMICROBIAL STRATEGIES</th>
</tr>
</thead>
<tbody>
<tr>
<td>THE &quot;COOKED HAMBURGER&quot; TEST TUBE TO THE Y TABLE AND PUT IT IN THE BOILING WATER.</td>
<td>Students:</td>
</tr>
<tr>
<td>IT FOR 15 MINUTES. WATCH IT WHILE IT'S NG TO SEE WHAT HAPPENS.</td>
<td>--cook hamburger and observe changes while the meat is cooking.</td>
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<td>Cher.</td>
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<td>Pl tubes can be boiled at one time in a beaker of our hot plate.</td>
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<tr>
<td>SHEET OF WHAT YOU SEE AND WRITE A BRIEF IXION BELOW IT.</td>
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<tr>
<td>--observe test tube #1 and describe how it looks by writing and/or drawing it.</td>
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<tr>
<td>ALLOW PLENTY OF WORK TIME</td>
<td></td>
</tr>
<tr>
<td>HELP STUDENTS WITH VERBALIZATION AND WRITING</td>
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</tbody>
</table>
NOW TAKE THE TEST TUBE WITH THE COOKED HAMBURGER, #2, AND OBSERVE IT CAREFULLY. ON THE BOTTOM OF YOUR WORKSHEET, AGAIN MAKE A DRAWING OF WHAT YOU SEE AND WRITE A BRIEF DESCRIPTION.

Allow plenty of work time. Help students with verbalization.

When students have completed this part of the worksheet have them think about what they believe will happen in this experiment. Have each student write down his prediction for the cooked and uncooked hamburger in the space provided in the left margin of the worksheet.

Have students now store their test tubes in the appropriate place you have selected as "Hamburger Corner." Again have students help you make a poster depicting the experiment.

Students will not make further written observations on this experiment until three days have passed, but do allow them time each day to observe the test tubes for changes if they desire. After three days, have students get their tubes and their worksheets.

Begin the class by saying:

BEFORE WE TALK ABOUT HOW THE HAMBURGER HAS CHANGED, TAKE YOUR "UNCOOKED" TEST TUBE, #1, AND LOOK AT IT CAREFULLY. ON YOUR WORKSHEET WRITE DOWN WHAT IT LOOKS LIKE NOW AND MAKE A DRAWING OF IT.
**TEACHING STRATEGIES**

KE THE TEST TUBE WITH THE COOKED HAMBURGER, OBSERVE IT CAREFULLY. ON THE BOTTOM OF WORKSHEET, AGAIN MAKE A DRAWING OF WHAT YOU WRITE A BRIEF DESCRIPTION.

**ANTICIPATED STUDENT BEHAVIORS**

Students:

<table>
<thead>
<tr>
<th>ACTIVITY 4-14</th>
</tr>
</thead>
<tbody>
<tr>
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</tr>
<tr>
<td><strong>HELP STUDENTS WITH VERBALIZATION AND WRITING</strong></td>
</tr>
</tbody>
</table>

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As have completed this part of the worksheet, think about what they believe will happen in general. Have each student write down his pre-experiment ideas in the left margin of the worksheet.

Now store their test tubes in the appropriate vials we selected as "Hamburger Corner." Again have students work in groups and make a poster depicting the experiment.

Do not make further written observations on this worksheet until three days have passed, but do allow them to observe the test tubes for changes if they wish. After three days, have students get their tubes back and have them observe and describe test tube #1 by writing and/or drawing it.

---

**WORK TIME**
TAKE THE "COOKED" TEST TUBE, #2, AND LOOK AT IT CAREFULLY. DRAW AND DESCRIBE THE "COOKED" HAMBURGER.

HAS A CHANGE TAKEN PLACE IN THE TEST TUBE? WHAT HAPPENED IN THE UNCOOKED TEST TUBE?

HOW IS IT DIFFERENT FROM WHEN WE STARTED THE EXPERIMENT?

WHAT MADE IT CHANGE?

WHAT HAPPENED IN THE COOKED TEST TUBE?

WHY DIDN'T THE COOKED HAMBURGER CHANGE?

Explain that it was the heat, not the water, that killed the microbes. The meat could have been fried or baked or grilled with the same result.
TEACHING STRATEGIES

THE "COOKED" TEST TUBE, #2, AND LOOK AT IT TILLY. DRAW AND DESCRIBE THE "COOKED"
RGER.

CHANGE TAKEN PLACE IN THE TEST TUBE?
HAPPENED IN THE UNCOOKED TEST TUBE?
IT DIFFERENT FROM WHEN WE STARTED THE MENT?

MADE IT CHANGE?
HAPPENED IN THE COOKED TEST TUBE?
DN'T THE COOKED HAMBURGER CHANGE?

It was the heat, not the water, that killed it. The meat could have been fried or baked or

ANTICIPATED STUDENT BEHAVIORS

Students:

--observe and describe test tube #2 by writing and/or drawing it.

--respond, "Yes."
--respond, "It rotted," "It looks bad," "It is decaying or decomposing."
--respond, "It stinks," "The color changed," "It's slimy," "It has decomposed."

--infer microbes.
--respond, "Nothing," "Not much difference."
--infer that the microbes were killed or kept from growing by boiling.

ACCEPT ALL ANSWERS
WHAT OTHER WAYS DO WE KNOW THAT KEEP MICROBES FROM GROWING ON FOOD?

WHAT DO THESE THREE WAYS OF PREVENTING MICROBES FROM GROWING TELL US ABOUT FOOD?

WHAT DO THESE TELL US ABOUT MICROBES?

ARE MICROBES ALIVE?

WHAT ARE WAYS WE CAN KILL MICROBES?

Have students end this experiment by writing the conclusion of the experiment in the space provided in the right hand margin of the worksheet. Collect their worksheets and use their statements as an indication of the success of the experiment in developing the cooking concept.

Dispose of the waste hamburger appropriately and use test tube brush to clean the tubes.

Complete Tallysheet 4-5 as a rating of student ability to observe and record. Complete recording on Tallysheet 4-4 and send it in. After reviewing Worksheet 4-7 and completing Tallysheet 4-5, send these student worksheets to BSCS.
# Teaching Strategies

**Her Ways Do We Know That Keep Microbes Growing on Food?**
- These three ways of preventing microbes growing tell us about food?
- These tell us about microbes?
- Microbes alive?
- Ways we can kill microbes?

## Anticipated Student Behaviors

**Activity 4-14**

**Students:**
- Respond, "Keep food cold," "Keep food in the refrigerator," "Keep food dry."
- Conclude that heat, cold, and dryness help keep food from spoiling.
- Conclude that they need certain conditions to grow and can be stopped.
- Should guess that they are alive.
- Respond, "Boil," "Dry," "Cool."

Spend as much time on this topic as you feel is necessary and as the interest and needs of your students indicate.
Please rate each student on the amount of help needed and the aptness of his observations in completing Worksheet 4-7 by using the following criteria:

Rating Help Needed By Student

Written on own. This category should be checked if the student needs little help in recording observations on Worksheet 4-7.

Written, much help. This category should be checked if the student needs a great deal of help in recording observations on Worksheet 4-7.

Not written. Check this category if the student has not completed Worksheet 4-7.

Rating of Student Observations

Good. This category should be checked if student observations are fairly comprehensive in terms of color, texture, size, smell, etc.

Off track. This category should be checked if student observations lack important changes or include many irrelevant details.

Reactions. This category should be checked if student observations are subjective rather than objective observations.

Entries lack meaning. This category should be checked if student observations are not readable or don't make sense. Also check this category if there are no entries.

<table>
<thead>
<tr>
<th>Written on own</th>
<th>Written, much help</th>
<th>Not written</th>
<th>Off track</th>
<th>Subjective</th>
<th>Entries lack meaning</th>
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Attach ID list here. 01
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<table>
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Attach ID list here.
UNIT IV, CORE B
ACTIVITY 4-14: "The Hamburger Lab"

<table>
<thead>
<tr>
<th>Activity name suggested by class:</th>
<th>BSCS USE: Post ___ Tally ___ Rev ___</th>
</tr>
</thead>
</table>

1. Date taught (month and date, e.g. 11/2)
2. Minutes of class time on science each day
3. Minutes of preparation each day
4. Students absent on each date
(Use ID Number)

5. Interest of class as expressed by apparent attention to what is happening.
   Number of students responding with: Name students you noted especially:
   (Number)
<table>
<thead>
<tr>
<th>HIGH INTEREST</th>
<th>MODERATE INTEREST</th>
<th>INDIFFERENCE</th>
<th>MODERATE RESISTANCE</th>
<th>STRONG DISLIKE</th>
<th>HARD TO RATE</th>
</tr>
</thead>
</table>

6. Equipment in kit: □ None □ Satisfactory □ Too □ Too fragile □ Difficult to use
7. Equipment I got: □ None □ Easy □ Hard to get, □ Hard to get, □ Unobtainable, needed to get, □ okay, □ add to kit
8. Materials used:
<table>
<thead>
<tr>
<th>Worksheet</th>
<th>Game</th>
<th>Slides (show slide nos.)</th>
<th>Transparency</th>
<th>Card(s)</th>
<th>Tape(s)</th>
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   Worthwhile as is: □ just right □ too childish □ too mature |
   Revise slightly: □ |
   Revise much: □ |
   Worthless: omit |

9. Maturity level is □ just right □ too childish □ too mature |
10. Vocabulary level is □ just right □ too easy □ too difficult |

11. Were teacher instructions clear enough to follow? □ Yes □ No - Pages and Problem: |
12. Were clues to success and reviews of success helpful? □ Yes □ No - Why not? |
13. Did the activity fulfill the purpose stated by the Guide? □ Yes □ No - Comment: |
14. Were any parts of this activity omitted? □ No □ Yes - Explain: |

15. Your rating of this activity: □ Worthwhile □ Of value--needs the □ Worth salvaging--make □ Worthless |
    □ keep as is □ revise slightly □ revise much □ Worthless |
    □ explain why |

16. Evaluation:
Equipment in kit? □ None □ Satisfactory □ Too □ Too □ Difficult
   needed      fragile     complicated     to use
Equipment I got: □ None □ Easy □ Hard to get, □ Hard to get, □ Unobtainable,
   needed     to get      but okay       add to kit    add to kit

8. Materials used:

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9. Maturity level is  □ just right □ too childish □ too mature Explain:
10. Vocabulary level is □ just right □ too easy □ too difficult Explain:
11. Were teacher instructions clear enough to follow?  □ Yes □ No - Pages and Problem:
12. Were clues to success and reviews of success helpful? □ Yes □ No - Why not?
13. Did the activity fulfill the purpose stated by the Guide? □ Yes □ No - Comment:
14. Were any parts of this activity omitted? □ No □ Yes - Explain:
15. Your rating of this activity:
   □ Worthwhile  □ Of value--needs the  □ Worth salvaging--make  □ Worthless
   --keep as is --revision suggested --major changes described --drop it

SPECIFIC CONCERNS ABOUT THIS ACTIVITY:
15. There are always parts of activities that are good and need not be changed.
What parts of this activity should be retained when the curriculum is revised?
Page(s) ____________________:

17. About how many students seem to understand the purpose of this experiment?
   □ None □ 1/4 □ 1/2 □ 3/4 □ all: Comment.

18. Concern (or questions) about content:

19. Messages for staff (read immediately):

Have you answered each question, attached annotated Guide, your revisions, student work, etc.?
REPORT OF WHAT HAPPENED AND SUGGESTIONS FOR REVISION

1. Whenever practical write all over your second copy of the Guide. Tear out the activity and send the annotated Guide in with this form.
3. Tell us what you did. Think of what you needed, what you had to work out for yourself, how you presented something to make it go over.
4. Describe the revisions you said were needed in answering the questions on the other side of this form.
5. As a reminder of things that help in revision, read through the following list and check off things you want to be sure to note this time. (We know you can't tell about everything every time!)

THE LESSON
- how you organized materials or class.
- things added (a question, a picture, etc.).
- equipment, supplies, visual aids.
- things that went wrong, misunderstandings.
- what you would do differently or avoid next time.
- turmoil in the class caused by the activity, or disruptive students, or interruptions, and how you dealt with them.

THE STUDENTS
- who had problems and what they were.
- how someone "caught on" (or who never did).
- who was really "turned off" (or on).
- reactions of parents, teachers, students.
- special evidence of learning or applying ideas.
OBJECTIVE FOCUS FOR THIS ACTIVITY

UNIT GOALS:

1. Appreciate the cycling relationships of the materials and organisms in the environment through:
   b. Understanding of the role of decomposers.
   c. Realization that certain materials are in finite supply.
   d. Recognition of examples of man's impact upon the environment.

2. Comprehend the role of man as an integral part of nature, not apart from nature.

CORE B OBJECTIVES:

1. Know the habitat requirements of microbes and other decomposers.

2. Indicate how knowledge of decomposers can improve man's environment.

3. Conclude that microbes contribute to man's well-being as well as pose problems for man.

TEACHING STRATEGIES

Activity 4-15. Stor(ing) Problems

In this activity students will visit a grocery store to find out how the grocer deals with the problem of food spoilage. Students will learn what grocery stores do to preserve food. They will also become aware of some of the special problems in preserving very perishable products such as meats, fresh fruits, vegetables, bakery, and dairy products. In the grocery store the various ways the foods are displayed and stored on the
FOCUS FOR THIS ACTIVITY

OBJECTIVES:

- Appreciate the cycling relationships of the materials and organisms in the environment through:
  - Understanding of the role of decomposers.
  - Realization that certain materials are in finite supply.
  - Recognition of examples of man's impact upon the environment.
- Comprehend the role of man as an integral part of nature, not apart from nature.

TEACHING STRATEGIES

15. Storing Problems

- Activity students will visit a grocery store to see how the grocery deals with the problem of food storage. They will learn what grocery stores do to store perishable items such as meats, fresh fruits, vegetables, bakery products. In the grocery store the various products are displayed and stored on the

UNIT IV. TRANSFER AND CYCLING OF MATTER IN MY ENVIRONMENT

CORE B. DECOMPOSERS IN MY ENVIRONMENT

ACTIVITY 4-15. STORING PROBLEMS

ANTICIPATED STUDENT BEHAVIORS

At the end of this activity, each student should:

- have participated in the discussion to define questions.
- have visited the grocery store.
- have participated in post-visit discussion.
- have observed the various ways food storage problems are handled in a store.
- have interviewed various people in the grocery store.
**ACTIVITY 4-15**

<table>
<thead>
<tr>
<th>MATERIALS</th>
</tr>
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<tbody>
<tr>
<td><em>Cassette tape recorder (optional)</em></td>
</tr>
<tr>
<td><em>Blank cassette(s)</em></td>
</tr>
<tr>
<td><em>Question list</em></td>
</tr>
<tr>
<td>Camera (Polaroid Square Shooter)</td>
</tr>
<tr>
<td><em>Pencil and paper</em></td>
</tr>
</tbody>
</table>

*Not furnished in materials kit*

<table>
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<td>shelves and in the supply room should be observed. Interviews with various people in the store such as the general manager, the butcher, the bakery manager, and the produce manager should further establish the store's problems.</td>
</tr>
</tbody>
</table>

**Teacher Preparation:**

1. Be sure to contact the store manager well in advance (at least one week) of the date you hope to visit the store. Select with him a mutually acceptable date and time for the trip. Also mention specifically who you would like to include or which departments you would like to visit such as the general manager for general remarks, the butcher, the bakery manager, and the produce manager. It is also advisable to call him the day before the scheduled trip to verify that all systems are still "go" for the visit.

2. If you decide to use the tape recorder in the store, ask the manager if this is okay.

The day before the visit ask:

- WHERE IS A LOT OF FOOD STORED?
- HOW DO THEY STORE ALL THAT FOOD?
- WE ARE GOING TO VISIT A GROCERY STORE TOMORROW. WHAT ARE SOME OF THE DIFFERENT PARTS OF THE STORE WE MIGHT VISIT?
### TEACHING STRATEGIES

In the supply room, the supply person should be observed. Interview various people in the store such as the general manager, the butcher, the bakery manager, and the produce manager further establish the store's problems.

### Preparation:
- Be sure to contact the store manager well in advance (at least one week) of the date you hope to visit the store. Select with him a mutually acceptable date and time for the trip. Also mention specifically who you would like to include or which departments you like to visit such as the general manager for general remarks, the butcher, the bakery manager, or the produce manager. It is also advisable to him the day before the scheduled trip to verify all systems are still "go" for the visit. If you decide to use the tape recorder in the store, ask the manager if this is okay.
- Before the visit ask:
  - IS A LOT OF FOOD STORED?
  - THEY STORE ALL THAT FOOD?
  - GOING TO VISIT A GROCERY STORE TOMORROW. WHAT DO YOU THINK ARE SOME OF THE DIFFERENT PARTS OF THE STORE THAT YOU VISIT?

### ANTIMIPATED STUDENT BEHAVIORS

Students:

--respond, "Stores," etc.

--should give a variety of responses.


ACCEPT ALL ANSWERS
BEFORE WE GO, WE SHOULD HAVE SOME QUESTIONS IN MIND TO ASK PEOPLE WORKING THERE. WHAT ARE SOME OF THE THINGS WE COULD ASK ABOUT HOW THEY HANDLE FOOD?

As the students suggest questions, write them on the chalkboard. Pursue this until questions of the following nature have been brought out.

1. What kinds of foods can you store the longest?
2. What kinds of foods spoil the fastest?
3. What are some of the things you do to keep foods from spoiling?
4. Is it against the law to sell food that has been stored a long time?
5. Do foods that spoil easily cost more because they spoil easily?
6. What do you do with spoiled food?
7. How much food has to be disposed of because it has spoiled?
8. Where and how do you store meats?
9. Where and how do you store bakery products?
10. Where and how do you store fresh fruits and vegetables?
11. Where and how do you store dairy products?
12. Does a dented can cause food spoilage?
### TEACHING STRATEGIES

We go, we should have some questions in to ask people working there. What are some things we could ask about how they handle

### ANTICIPATED STUDENT BEHAVIORS

**Students:**

---respond with questions that could be asked about storing foods.

#### QUESTION TIME

<table>
<thead>
<tr>
<th>Question</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>What are some kinds of foods you can store the longest?</td>
<td></td>
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<tr>
<td>What are some kinds of foods that spoil the fastest?</td>
<td></td>
</tr>
<tr>
<td>Are some of the things you do to keep foods from spoiling?</td>
<td></td>
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<tr>
<td>How much is it against the law to sell food that has been stored for a long time?</td>
<td></td>
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<tr>
<td>How do you keep foods that spoil easily cost more because they spoil easily?</td>
<td></td>
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<tr>
<td>What do you do with spoiled food?</td>
<td></td>
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<tr>
<td>How do you store meats?</td>
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<td></td>
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<tr>
<td>How do you store dairy products?</td>
<td></td>
</tr>
<tr>
<td>What can dented cans cause food spoilage?</td>
<td></td>
</tr>
</tbody>
</table>
Divide up the questions evenly between pairs of students and make them responsible for finding the answers. Take paper and pencil, tape recorder, and camera on the trip to help record answers to the questions.

When you arrive at the store tour the store just as a group. Stop at many places and discuss the storage methods that are shown. Start with easy ones that students have had experience with in class, i.e., cold, hot, dry, etc. Then proceed to more subtle ones of wrapping bottles, cans, etc. Do not lecture! Ask students to tell you what they see and why. It might be difficult for students to distinguish between meaningful packaging and gimmicks to sell! Help them.

After the group tour, talk to various people in the store that you have arranged to meet with. Then before leaving the store give students some free time to roam and find other examples on their own.

The day after the visit, discuss all the questions and answers students gathered at the store. Then ask:

WHY CAN SOME FOODS BE KEPT IN THE GROCERY STORE LONGER THAN OTHERS?

WHAT IS IT THAT DECOMPOSES THE FOOD?

HOW WERE THINGS STORED AT THE STORE?
TEACHING STRATEGIES

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AN SOME FOODS BE KEPT IN THE GROCERY STORE R THAN OTHERS?

IS IT THAT DECOMPOSES THE FOOD?

HERE THINGS STORED AT THE STORE?

ANTICIPATED STUDENT BEHAVIORS

Students:

--respond, "Some rot faster."

--respond, "Microbes," "Molds."

<table>
<thead>
<tr>
<th>MATERIALS</th>
<th>TEACHING STRATEGIES</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>SHOULD YOU STORE THINGS AT HOME THE WAY THEY ARE STORED IN THE GROCERY STORE?</td>
</tr>
<tr>
<td></td>
<td>WHY?</td>
</tr>
</tbody>
</table>
TEACHING STRATEGIES

DO YOU STORE THINGS AT HOME THE WAY THEY ARE IN THE GROCERY STORE?

ANTICIPATED STUDENT BEHAVIORS

Students:

--respond, "Yes."

--respond, "So they won't rot, decompose."
UNIT IV, CORE B
ACTIVITY 4-15: "Stor(ing) Problems"

Activity name suggested by class: 

Teacher

<table>
<thead>
<tr>
<th>BSCS USE: Post ___ Tally ___ Rev ___</th>
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</thead>
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<table>
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<tr>
<th>Day 1</th>
<th>Day 2</th>
<th>Day 3</th>
<th>Day 4</th>
<th>Day 5</th>
<th>Day 6</th>
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<td>2. Minutes of class time on science each day</td>
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<td>4. Students absent on each date (Use ID Number)</td>
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5. Interest of class as expressed by apparent attention to what is happening.
   Number of students responding with: Name students you noted especially:
   (Number)
   - HIGH INTEREST
   - MODERATE INTEREST
   - INDIFFERENCE
   - MODERATE RESISTANCE
   - STRONG DISLIKE
   - HARD TO RATE

6. Equipment in kit:  □ None □ Satisfactory □ Too fragile □ Too complicated to use

7. Equipment I got:  □ None □ Easy □ Hard to get, □ Hard to get, □ Unobtainable, needed to get but okay □ add to kit

8. Materials used:
   - Worksheet
   - Game
   - Slides (show slide nos.)
   - Transparency
   - Card(s)
   - Tape(s)
   - Other
   Worthwhile as is
   Revise slightly
   Revise much
   Worthless: omit

9. Maturity level is  □ just right □ too childish □ too mature  Explain:
10. Vocabulary level is  □ just right □ too easy □ too difficult  Explain:

11. Were teacher instructions clear enough to follow?  □ Yes  □ No - Pages and Problem:
12. Were clues to success and reviews of success helpful?  □ Yes  □ No - Why not?
13. Did the activity fulfill the purpose stated by the Guide?  □ Yes  □ No - Comment:
14. Were any parts of this activity omitted?  □ No  □ Yes - Explain:

15. Your rating of this activity:
   □ Worthwhile  □ Of value -- needs the □ Worth salvaging -- make revision suggested
   □ Worthless □ -- keep as is   □ major changes described  □ -- drop it
7. Equipment I got:  
   - None
   - Easy
   - Hard to get, Hard to get,
   - Unobtainable,
   - needed
to get
   - but okay
   - add to kit
   - add to kit

8. Materials used:

<table>
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   - Explain:

10. Vocabulary level is

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   - Explain:

11. Were teacher instructions clear enough to follow?  
   - Yes
   - No - Pages and Problem:

12. Were clues to success and reviews of success helpful?  
   - Yes
   - No - Why not?

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   - Yes
   - No - Comment:

14. Were any parts of this activity omitted?  
   - No
   - Yes - Explain:

15. Your rating of this activity:

   - Worthwhile
   - Of value--needs the
   - Worth salvaging--make
   - Worthless
   - keep as is
   - revision suggested
   - major changes described
   - drop it

SPECIFIC CONCERNS ABOUT THIS ACTIVITY:

16. There are always parts of activities that are good and need not be changed.
   What parts of this activity should be retained when the curriculum is revised?
   Page(s) ____________________:

17. Were students able to record the answers to their questions while on the trip?  
   - Yes
   - No: Comment.

18. Were students able to attend to the goals of the trip (i.e. learning about storage methods)?  
   - Yes
   - No: Comment.

19. Concern (or questions) about content:

20. Messages for staff (read immediately):

Have you answered each question, attached annotated Guide, your revisions, student work, etc.?

SIDE A
REPORT OF WHAT HAPPENED AND SUGGESTIONS FOR REVISION

1. Whenever practical write all over your second copy of the Guide. Tear out the activity and send the annotated Guide in with this form.
3. Tell us what you did. Think of what you needed, what you had to work out for yourself, how you presented something to make it go over.
4. Describe the revisions you said were needed in answering the questions on the other side of this form.
5. As a reminder of things that help in revision, read through the following list and check off things you want to be sure to note this time. (We know you can't tell about everything every time!)

THE LESSON
☐ how you organized materials or class.
☐ things added (a question, a picture, etc.).
☐ equipment, supplies, visual aids.
☐ things that went wrong, misunderstandings.
☐ what you would do differently or avoid next time.
☐ turmoil in the class caused by the activity, or disruptive students, or interruptions, and how you dealt with them.

THE STUDENTS
☐ who had problems and what they were.
☐ how someone "caught on" (or who never did).
☐ who was really "turned off" (or on).
☐ reactions of parents, teachers, students.
☐ special evidence of learning or applying ideas.

Teacher ____________________
OBJECTIVE FOCUS FOR THIS ACTIVITY

UNIT GOALS:

1. Appreciate the cycling relationships of the materials and organisms in the environment through:
   a. Understanding of the role of decomposers.
   b. Recognition of examples of man's impact upon the environment.

CORE B OBJECTIVES:

1. Know the habitat requirements of microbes.
2. Indicate how knowledge of decomposers can improve man's environment.
3. Conclude that microbes contribute to man's well-being as well as pose problems for man.

TEACHING STRATEGIES

Activity 4-16. Review Of Success

This review of success consists of two parts. In Part I students will discuss real foods and their storage. Part II consists of three multiple choice questions. The questions are designed to be a reward for the work just completed.

Review the last series of experiences your students have had by allowing them to explain how to handle a variety of real and everyday food types. Display a wide variety of real foods. Your weekly groceries or the home economics teacher's would be appropriate!

MATERIALS

*Your weekly groceries (at least 30 items of great variety)
Slides 4-26 through 4-28
Worksheet 4-8
*35mm Slide projector

*Not furnished in materials kit
CUS FOR THIS ACTIVITY

OBJECTIVES:

- Appreciate the cycling relationships of the materials and organisms in the environment through:
  - Understanding of the role of decomposers.
  - Recognition of examples of man's impact upon the environment.

- Know the habitat requirements of microbes.
- Indicate how knowledge of decomposers can improve man's environment.
- Conclude that microbes contribute to man's well-being as well as pose problems for man.

TEACHING STRATEGIES

6. Review Of Success

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UNIT V. TRANSFER AND CYCLING OF MATERIALS IN MY ENVIRONMENT

CORE B. DECOMPOSERS IN MY ENVIRONMENT

ACTIVITY 4-16. REVIEW OF SUCCESS

ANTICIPATED STUDENT BEHAVIORS

At the end of this activity, each student should:

- Have answered the three questions on their worksheets.
- Have participated in a discussion of food storage using real foods as a basis.
### TEACHING STRATEGIES

Have students take turns in selecting a food and explaining to the class these things:

1. What it is.
2. Where it comes from (if possible).
3. How has it been handled up to this point to get it to your room?
4. How does a grocer handle it?
5. How do you handle it when you get it home?
   - Do you cook it?
   - How do you store it?
6. Does it spoil easily?
7. How expensive is it?
8. Is it needed in a balanced diet?

After completing this discussion reward students with the questions in Part II of this review.

Distribute Worksheet 4-8 and have students put their names on it.

Project each question separately. (Slides 4-26 through 4-28 separately.) Read the choices aloud to the students. Allow ample time for them to mark their worksheets. Repeat this procedure for the next two questions.

After all students have had the opportunity to answer all of the questions, collect the worksheets. Then project each slide and discuss the answers with them. Have them defend their choices. After class tally the students' answers on Tallysheet 4-6. Consider whether the whole class needs further review or if a few individuals need special attention.

Then proceed to the next activity.
### Teaching Strategies

Students take turns in selecting a food and explaining these things:
- What is it?
- Where it comes from (if possible).
- Has it been handled up to this point to get it to room?
- Does a grocer handle it?
- Do you handle it when you get it home?
- Do you store it?
- Does it spoil easily?
- Expensive is it?
- Is it needed in a balanced diet?

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Worksheet 4-8 and have students put their names each question separately. (Slides 4-26 through.) Read the choices aloud to the students. the time for them to mark their worksheets. Repeat procedure for the next two questions.

Students have had the opportunity to answer all questions, collect the worksheets. Then project and discuss the answers with them. Have them their choices. After class tally the students' Tallysheet 4-6. Consider whether the whole further review or if a few individuals need mention.

### Anticipated Student Behaviors

**Students:**

- Place an X on "The refrigerator" in question #1.
- Place an X on the "Wet and warm" in question #2.
- Place an X on the "Sandwich" in question #3.
UNIT IV, CORE B
TALLYSHEET 4-6: Summary of Student Responses to Worksheet 4-8
Activity 4-16: "Review of Success"

Circle student answers below taken from Worksheet 4-8. In the column for totals write down the number of students who circled each letter.

<p>| | | | |</p>
<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td>1 (milk in ref.)</td>
<td>2 (wet and warm)</td>
<td>3 (unwrapped sandwich)</td>
<td></td>
</tr>
<tr>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
</tr>
<tr>
<td>A</td>
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<td>C</td>
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<tr>
<td>09</td>
<td>A</td>
<td>B</td>
<td>C</td>
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</tbody>
</table>

Attach ID list here.
Does this review give an accurate indication of student understanding?  □ Yes  □ No 
If not, what other evidence do you have of student learning?
### UNIT IV, CORE B
ACTIVITY 4-16: "Review Of Success"

**Teacher**

<table>
<thead>
<tr>
<th>BSCS USE:</th>
<th>Post</th>
<th>Tally</th>
<th>Rev</th>
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**Activity name suggested by class:**

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<th>Day 1</th>
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5. Interest of class as expressed by apparent attention to what is happening.

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6. Equipment in kit:
- None
- Satisfactory
- Too
- Too fragile
- Difficult
- Too complicated
- Unobtainable, add to kit
- Hard to get, add to kit

7. Equipment I got:
- None
- Easy
- Hard to get, needed to get
- Hard to get, but okay
- Unobtainable, add to kit

8. Materials used:

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9. Maturity level is
- Just right
- Too childish
- Too mature
- Explain:

10. Vocabulary level is
- Just right
- Too easy
- Too difficult
- Explain:

11. Were teacher instructions clear enough to follow?
- Yes
- No - Pages and Problem:

12. Were clues to success and reviews of success helpful?
- Yes
- No - Why not?

13. Did the activity fulfill the purpose stated by the Guide?
- Yes
- No - Comment:

14. Were any parts of this activity omitted?
- No
- Yes - Explain:

15. Your rating of this activity:
- Worthwhile
- Of value—needs the revision suggested
- Worth salvaging—make major changes—keep as is
- Worthless—drop it
Equipment I got:

- None
- Easy
- Hard to get
- Unobtainable

I needed:

- Complicated
- Fragile
- None
- Easy
- Hard to get
- But okay

Add to kit:

- Add to kit

Materials used:

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<tr>
<td>Revise slightly</td>
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Explain:

10. Vocabulary level is

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Explain:

11. Were teacher instructions clear enough to follow?

- Yes
- No

Pages and Problem:

12. Were clues to success and reviews of success helpful?

- Yes
- No

Why not?

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14. Were any parts of this activity omitted?

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Explain:

15. Your rating of this activity:

- Worthwhile
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- Worthless—keep as is
- Worthless—drop it

SPECIFIC CONCERNS ABOUT THIS ACTIVITY:

16. There are always parts of activities that are good and need not be changed.

What parts of this activity should be retained when the curriculum is revised?

Page(s):

17. Did any student give away the answer to any question on Worksheet 4-8?

- No
- Yes: Comment.

18. Concern (or questions) about content:

19. Messages for staff (read immediately):

Have you answered each question, attached annotated Guide, your revisions, student work, etc.?
REPORT OF WHAT HAPPENED AND SUGGESTIONS FOR REVISION

1. Whenever practical write all over your second copy of the Guide. Tear out the activity and send the annotated Guide in with this form.
3. Tell us what you did. Think of what you needed, what you had to work out for yourself, how you presented something to make it go over.
4. Describe the revisions you said were needed in answering the questions on the other side of this form.
5. As a reminder of things that help in revision, read through the following list and check off things you want to be sure to note this time. (We know you can't tell about everything every time!)

THE LESSON
- how you organized materials or class.
- things added (a question, a picture, etc.).
- equipment, supplies, visual aids.
- things that went wrong, misunderstandings.
- what you would do differently or avoid next time.
- turmoil in the class caused by the activity, or disruptive students, or interruptions, and how you dealt with them.

THE STUDENTS
- who had problems and what they were.
- how someone "caught on" (or who never did).
- who was really "turned off" (or on).
- reactions of parents, teachers, students.
- special evidence of learning or applying ideas.

Teacher ____________________
OBJECTIVE FOCUS FOR THIS ACTIVITY

UNIT GOALS:

1. Appreciate the cycling relationships of the materials and organisms in the environment through:
   a. Understanding of what a cycle is.
   b. Understanding of the role of decomposers.
   d. Recognition of examples of man's impact upon the environment.

CORE B OBJECTIVES:

1. Know the habitat requirements of microbes and other decomposers.

2. Indicate how knowledge of decomposers can improve man's environment.

3. Conclude that microbes contribute to man's well-being as well as pose problems for man.

TEACHING STRATEGIES

Activity 4-17. Compost Microbes

This activity will demonstrate one way in which microbes are similar to other living things. It will reinforce the idea that microbes are living organisms and that decomposition occurs through microbial action. In this case the class compost will be the resource of microbial activity.
FOCUS FOR THIS ACTIVITY

UNIT IV.
TRANSFER AND CYCLING
OF MATERIALS IN MY
ENVIRONMENT

CORE B.
DECOMPOSERS IN MY
ENVIRONMENT

ACTIVITY 4-17. COMPOST MICROBES

TEACHING STRATEGIES

Activity 17. Compost Microbes

--Activity will demonstrate one way in which microbes relate to other living things. It will reinforce the idea that microbes are living organisms and that decomposers are involved. In this case the compost will be the resource of microbial activity.

ANTICIPATED STUDENT BEHAVIORS

At the end of this activity, each student should:

--have described a change in something in the compost pile.
--have related the idea of composting to fertilizers and gardening.
--have associated decomposition of dead material with the soil-building process.
--have filled a test tube with indicator solution and labeled that tube.
--have exhaled breath into the indicator solution through a straw.
ACTIVITY 4-17

MATERIALS

1 Flask (250 ml) wide mouth per pair of students
1 Rubber stopper (#8) one-hole per pair of students
1 Tygon tubing, 5/16" O.D., 12" long per pair of students
1 Test tube, (15 X 150 mm) per student
1 Rubber stopper (#1) no-hole per student
CO₂ test solution (Bromthymol blue)
*Compost from Activity 4-10
*1 Soda straw per student
*1 Wax crayon per pair of students
*Records of changes in class compost
*Water

*Not furnished in materials kit

TEACHING STRATEGIES

Begin this activity by doing your usual observation routine with the class compost pile. Stir the contents with water appropriately and record changes.

Then ask:

LET'S LOOK AT OUR RECORDS. HAS THE PILE CHANGED SINCE WE STARTED?

HOW HAS IT CHANGED?

HOW HAS THE (an item put in) CHANGED?

Repeat this question for a number of the materials.

WHERE ARE THE THINGS GOING THAT ARE BEING DECOMPOSED?
TEACHING STRATEGIES

activity by doing your usual observation routine class compost pile. Stir the contents with water and record changes.

LOOK AT OUR RECORDS. HAS THE PILE CHANGED SINCE WE STARTED?

LOOK AT (an item put in) CHANGED?

ARE THE THINGS GOING THAT ARE BEING OSED?

ANTICIPATED STUDENT BEHAVIORS

At the end of this activity, each student should:

--have observed the change in color of the indicator solution.
--associate the change in indicator solution with carbon dioxide.
--infer that carbon dioxide is a normal component of exhaled breath.
--have observed a color change in the indicator solution made by air from the compost.
--infer that microbes in compost produce carbon dioxide.
--infer that microbes are living organisms.

Students:

--respond, "Yes."
--respond, "It stinks," "It's rotten."
--respond appropriately for each material.

INVOLVE YOUR SLOWEST STUDENTS

--respond, "Into the soil."
WHAT DOES THIS DO TO THE AMOUNT OF SOIL IN OUR BOX?

DOES ANYONE KNOW ANYBODY WHO HAS A COMPOST PILE IN HIS YARD?

WHY DO PEOPLE BUILD COMPOST PILES?
If no one says yes or that they don't know why compost piles are built, tell them that you know someone who has a compost pile and that compost piles are built to use in gardens.

WHY IS COMPOST ADDED TO GARDENS?

Explain that one of the reasons compost is added to the soil is to enrich the soil and to fertilize the soil in the garden.

WHAT HAPPENS TO A PLANT OR ANIMAL WHEN IT DIES? OR WHAT HAPPENS WHEN A PART OF THE ORGANISM DIES SUCH AS WHEN A LEAF FALLS?

DO THINGS DECOMPOSE ALL BY THEMSELVES?

WHY DO THINGS DECOMPOSE IN OUR COMPOST PILE?

ARE THESE THINGS ALIVE?

DO THEY BREATHE AS WE DO?

LET'S DO AN EXPERIMENT TO FIND OUT.

Set the class compost piles aside for later use in Core C.
DOES THIS DO TO THE AMOUNT OF SOIL BOX?

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DOES THIS DO TO THE AMOUNT OF SOIL BOX?
The success of the rest of this activity depends upon the use of a chemical indicator solution to detect carbon dioxide dissolved in water. An indicator is a substance that shows the presence of a certain chemical substance by changing color. Bromthymol blue is an indicator that changes to a green or yellow color in the presence of an acid. Carbon dioxide (CO₂) forms an acid when dissolved in water. Therefore in this experiment bromthymol blue can be used to indicate, indirectly, the presence of CO₂.

Distribute the materials and direct each student as follows:

Fill a test tube about 1/2 full with water. Using a medicine dropper add 5-10 drops of the indicator solution (bromthymol blue). Explain that the indicator solution will change color (blue to yellow) when there is carbon dioxide present.

Close the end of the test tube with a rubber stopper (no-hole, #1) and mix the contents by shaking.

Insert a soda straw to the bottom of the tube. Blow bubbles into the solution through the straw. Blow the bubbles in an even flow and do not blow too hard or you will blow all of the liquid out of the test tube.

In a few minutes the solution will change in color from blue to yellow, indicating the presence of carbon dioxide produced in human breath.

Explain:

AS WE BREATHE OUT WE GIVE OFF A GAS CALLED CARBON DIOXIDE. THE CARBON DIOXIDE IN OUR BREATH HAS CHANGED THE COLOR OF THE INDICATOR SOLUTION FROM BLUE TO YELLOW.
**TEACHING STRATEGIES**

6 of the rest of this activity depends upon the chemical indicator solution to detect carbon dioxide in water. An indicator is a substance that changes color to show the presence of a certain chemical substance by color. Bromthymol blue is an indicator that changes from a green or yellow color in the presence of an acid to blue when dissolved in water. Therefore, in this experiment bromthymol blue is used to indicate, indirectly, the presence of CO₂.

The materials and direct each student as follows:

- Fill the test tube about 1/2 full with water. Using a dropper add 5-10 drops of the indicator solution (blue). Explain that the indicator solution changes color (blue to yellow) when there is carbon dioxide present.
- Insert the end of the test tube with a rubber stopper (no need to mix the contents by shaking).
- Insert a straw to the bottom of the tube. Blow air into the solution through the straw. Blow the air at an even flow and do not blow too hard or you will blow all of the liquid out of the test tube.
- Examine the solution for a minute. The solution will change in color from blue to yellow, indicating the presence of carbon dioxide in human breath.

**BREATHE OUT WE GIVE OFF A GAS CALLED CARBON DIOXIDE. THE CARBON DIOXIDE IN OUR BREATH HAS CHANGED THE COLOR OF THE INDICATOR SOLUTION FROM BLUE TO YELLOW.**

---

**ANTICIPATED STUDENT BEHAVIORS**

<table>
<thead>
<tr>
<th>Students:</th>
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<tr>
<td>--blow bubbles for a few minutes through a soda straw.</td>
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<tr>
<td>--observe change in color in indicator solution.</td>
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</table>
MATERIALS

Diagram 4-6

1. 15 x 150 ml test tubes
2. 5/16 Tygon tubing
3. 250 ml wide mouth flask
4. Compost

TEACHING STRATEGIES

Then ask:

**HOW COULD WE FIND OUT IF THE MICROBES PRODUCE CARBON DIOXIDE TOO?**

Discuss the student suggestions for such an experiment. Point out that the class has equipment to do one sort of experiment.

Assign students to work in pairs and distribute the materials. Direct the students to assemble the equipment and proceed as follows. (See Diagram 4-6.)

Transfer about three heaping tablespoons of compost from the class pile to a wide mouth flask. Stopper the flask. Note that the tubing need only be inserted a short distance into the one-hole stopper. Due to the gripping action of the stopper, it is needless to attempt to insert the tubing more than a few millimeters. Prepare the test tube of indicator solution as the earlier one was prepared.

Place the test tube in something so it will stand up. (Beaker or your homemade test tube racks.) Put the free end of the plastic tube in the bottom of the test tube. The experiment should run for about 24 hours, although a weekend would be more satisfactory.

The normal respiration due to the microbial decomposition of the organic compost should produce plenty of CO₂. As the gas bubbles produced pass through the indicator solution, it will turn from blue to yellow.

At the next class period, ask:

**WHAT DID OUR BREATH DO TO THE TEST SOLUTION?**
**TEACHING STRATEGIES**

**ANTICIPATED STUDENT BEHAVIORS**

**ACTIVITY 4-17**

**ULD WE FIND OUT IF THE MICROBES PRODUCE DIOXIDE TOO?**

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class period, ask:

**ID OUR BREATH DO TO THE TEST SOLUTION?**

**Students:**

--respond, "Do an experiment," "Pour some test solution on the compost pile," "Put some in a test tube indicator solution," etc.

--prepare the experiment.

--observe change of color in indicator solution.

--recall that it turned yellow.
ACTIVITY 4-17

MATERIALS

TEACHING STRATEGIES

DO YOU NOTICE ANY CHANGE IN THE SOLUTION IN THE TEST TUBE?

WHAT DOES THIS TELL US?

WHAT DOES THIS TELL US ABOUT THE COMPOST?

DO YOU THINK MICROBES ARE ALIVE?

WHAT ARE ALL THE THINGS WE HAVE NOW LEARNED THAT MICROBES DO THAT MIGHT MAKE YOU THINK THEY ARE ALIVE?
TEACHING STRATEGIES

NOTICE ANY CHANGE IN THE SOLUTION IN ST TUBE?

--respond, "It turned yellow."

DOES THIS TELL US?

--respond, "The bubbles are carbon dioxide," "Microbes breathe too."

DOES THIS TELL US ABOUT THE COMPOST?

--respond, "The compost makes carbon dioxide," "The microbes produce CO₂."

THINK MICROBES ARE ALIVE?

--respond, "Yes."

ARE ALL THE THINGS WE HAVE NOW LEARNED MICROBES DO THAT MIGHT MAKE YOU THINK THEY ARE ALIVE?

--respond, "Breathe, grow, stink, die."
UNIT IV, CORE B
ACTIVITY 4-17: "Compost Microbes"

Teacher

Activity name suggested by class: BSCS USE: Post ___ Tally ____ Rev ___

<table>
<thead>
<tr>
<th>Day 1</th>
<th>Day 2</th>
<th>Day 3</th>
<th>Day 4</th>
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1. Date taught (month and date, e.g. 11/2)

2. Minutes of class time on science each day

3. Minutes of preparation each day

4. Students absent on each date (Use ID Number)

5. Interest of class as expressed by apparent attention to what is happening.

Number of students responding with: Name students you noted especially:

<table>
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<tr>
<th>HIGH INTEREST</th>
<th>MODERATE INTEREST</th>
<th>INDIFFERENCE</th>
<th>MODERATE RESISTANCE</th>
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6. Equipment in kit: □ None □ Satisfactory □ Too □ Too fragile □ Too needed □ Difficult to use

7. Equipment I got: □ None □ Easy □ Hard to get, □ Hard to get but okay □ Unobtainable, needed add to kit □ Unobtainable, add to kit

8. Materials used:

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<tr>
<th>Worksheet #</th>
<th>Game #</th>
<th>Slides (show slide nos.)</th>
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<th>Revise slightly</th>
<th>Revise much</th>
<th>Worthless: omit</th>
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9. Maturity level is □ just right □ too childish □ too mature Explain:

10. Vocabulary level is □ just right □ too easy □ too difficult Explain:

11. Were teacher instructions clear enough to follow? □ Yes □ No - Pages and Problem:

12. Were clues to success and reviews of success helpful? □ Yes □ No - Why not?

13. Did the activity fulfill the purpose stated by the Guide? □ Yes □ No - Comment:

14. Were any parts of this activity omitted? □ No □ Yes - Explain:

15. Your rating of this activity:

□ Worthwhile □ Of value--needs the □ Worth salvaging--make □ Worthless - keep as is □ revision suggested □ major changes described □ drop it
8. Materials used:

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10. Vocabulary level is □ just right □ too easy □ too difficult □ Explain: 

11. Were teacher instructions clear enough to follow? □ Yes □ No - Pages and Problem: 

12. Were clues to success and reviews of success helpful? □ Yes □ No - Why not? 

13. Did the activity fulfill the purpose stated by the Guide? □ Yes □ No - Comment: 

14. Were any parts of this activity omitted? □ No □ Yes - Explain: 

15. Your rating of this activity: □ Worthwhile □ Of value - needs the □ Worth salvaging - make □ Worthless - keep as is □ revision suggested □ major changes described □ drop it 

SPECIFIC CONCERNS ABOUT THIS ACTIVITY:

16. There are always parts of activities that are good and need not be changed. What parts of this activity should be retained when the curriculum is revised? Page(s) __________________: 

17. Did any students have difficulty describing a change in something in the compost pile? □ No □ Yes: Comment. How many? □ 1/4 □ 1/2 □ 3/4 □ all: Comment. 

18. Were there any problems with the indicator solution? □ No □ Yes: Comment. 

19. Concern (or questions) about content: 

20. Messages for staff (read immediately): 

Have you answered each question, attached annotated Guide, your revisions, student work, etc.? SIDE A
UNIT IV, CORE B
ACTIVITY 4-17A "Compost M.robos"

REPORT OF WHAT HAPPENED AND SUGGESTIONS FOR REVISION

1. Whenever practical write all over your second copy of the Guide. Tear out the activity and send the annotated Guide in with this form.
3. Tell us what you did. Think of what you needed, what you had to work out for yourself, how you presented something to make it go over.
4. Describe the revisions you said were needed in answering the questions on the other side of this form.
5. As a reminder of things that help in revision, read through the following list and check off things you want to be sure to note this time! (We know you can't tell about everything every time!)

THE LESSON
☐ how you organized materials or class.
☐ things added (a question, a picture, etc.).
☐ equipment, supplies, visual aids.
☐ things that went wrong, misunderstandings.
☐ what you would do differently or avoid next time.
☐ turmoil in the class caused by the activity, or disruptive students, or interruptions, and how you dealt with them.

THE STUDENTS
☐ who had problems and what they were.
☐ how someone "caught on" (or who never did).
☐ who was really "turned off" (or on).
☐ reactions of parents, teachers, students.
☐ special evidence of learning or applying ideas.

Teacher ____________________
OBJECTIVE FOCUS FOR THIS ACTIVITY

UNIT GOALS:

1. Appreciate the cycling relationships of the materials and organisms in the environment through:
   a. Understanding of the role of decomposers.
   d. Recognition of examples of man's impact upon the environment.

2. Comprehend the role of man as an integral part of nature, not apart from nature.

CORE B OBJECTIVES:

1. Know the habitat requirements of microbes and other decomposers.
2. Indicate how knowledge of decomposers can improve man's environment.
3. Conclude that microbes contribute to man's well-being as well as pose problems for man.

TEACHING STRATEGIES

Activity 4-18. A Real Gas

In this activity students will recognize some of the beneficial aspects of microbes. Part I develops the idea that yeasts are living microbes and introduces, on a practical level, the concept of fermentation. Part II demonstrates another beneficial use of microorganisms by man -- the use of yeast in baking.
CUS FOR THIS ACTIVITY

DALS:

Appreciate the cycling relationships of the materials and organisms in the environment through:

b. Understanding of the role of decomposers.

d. Recognition of examples of man's impact upon the environment.

Comprehend the role of man as an integral part of nature, not apart from nature.

OBJECTIVES:

Know the habitat requirements of microbes and other decomposers.

Indicate how knowledge of decomposers can improve man's environment.

Conclude that microbes contribute to man's well-being as well as pose problems for man.

TEACHING STRATEGIES

8. A Real Gas

Activity students will recognize some of the aspects of microbes. Part I develops the acts are living microbes and introduces, on level, the concept of fermentation. Part II another beneficial use of microorganisms use of yeast in baking.

UNIT IV. TRANSFER AND CYCLING OF MATERIALS IN MY ENVIRONMENT

CORE B. DECOMPOSERS IN MY ENVIRONMENT

ACTIVITY 4-18. A REAL GAS

ANTICIPATED STUDENT BEHAVIORS

At the end of this activity, each student should:

-- have observed the demonstration of wine fermentation.
-- have inferred that yeasts are living organisms.
-- have recognized the role of yeast in making wine.
-- have observed or participated in making bread.
-- have recognized the role of yeast in making bread.
-- have inferred that some microbes are beneficial to man.
ACTIVITY 4-18

MATERIALS

1 Flask (250 ml) wide mouth
1 Rubber stopper one-hole, (#8)
1 Piece Tygon tubing (12"
2 Beakers (400 ml)
1 Test tube
*2 Packages of dried yeast
*2 Large bowls
*Frozen grape juice (1 can; nonconcentrated juice has preservatives added to prevent fermentation)
*Table sugar
*Tablespoon measure
*Teaspoon measure
*2 Bread pans
*2 Clean cloths
*1 Sifter
1 Measuring cup
*1/4 lb. Butter
*2 lbs. Flour (sifted all-purpose)

*Not furnished in materials kit

TEACHING STRATEGIES

Part I. Fermenting Grape Juice

WE HAVE BEEN STUDYING MICROBES THAT DECOMPOSE THINGS. LET'S SEE HOW MANY THINGS WE CAN LIST THAT WE HAVE LEARNED ABOUT THESE MICROBES.

As the students describe things they have learned about microbes, develop a list of these items on the chalkboard. Then ask:

ARE THESE MICROBES ALIVE?

HOW DO YOU KNOW THAT THESE MICROBES ARE ALIVE?

WHAT ARE SOME THINGS THESE MICROBES CAN DO?

ARE SOME MICROBES HARMFUL TO US?

ARE THERE ANY USEFUL MICROBES?

TODAY WE ARE GOING TO WORK WITH ANOTHER MICROBE WHICH IS USEFUL.

Hold up a package of yeast and ask:

WHO CAN TELL US WHAT I HAVE HERE?

DOES ANYONE KNOW WHAT YEAST IS?

ARE YEAST MICROBES ALIVE?

HOW COULD WE FIND OUT IF YEAST MICROBES ARE ALIVE?
**TEACHING STRATEGIES**

- We have been studying microbes that decompose sugar. Let's see how many things we can list we have learned about these microbes.
- Students describe things they have learned about and develop a list of these items on the chalkboard.

**ANTICIPATED STUDENT BEHAVIORS**

**Students:**

- --recall and describe various ideas about microbes.

- --respond, "Yes."

- --cite evidence such as growth, eating things, and smelling.

- --recall, "Cause bread to get moldy," and may suggest, "They cause disease."

- --recall Unit II and respond, "Yes."

- --recall composting setup and respond, "Yes."

- --respond, "Yeast."

- --respond, "I don't know," "Power," "Something you use to make bread."

- --probably respond, "No."

- --responses will vary; may suggest looking at them, feeding them, seeing if they will grow, putting them in bromthymol blue solution.
MATERIALS

Diagram 4-7

- 250 ml wide mouth flask
- BTB solution
- Grape juice

TEACHING STRATEGIES

IF YEAST MICROBES ARE ALIVE, WHAT WOULD THEY HAVE TO DO TO GROW AND STAY ALIVE?

WE ARE GOING TO SEE IF WE CAN FEED OUR YEAST GRAPE JUICE. WHAT DO YOU SUPPOSE WILL HAPPEN IF WE PUT YEAST IN GRAPE JUICE?

Set up the demonstration as shown in Diagram 4-7. Prepare the setup including yeast. Prepare the grape juice according to the directions on the container. Put the remaining grape juice in the refrigerator for tomorrow. Fill the flask about 1/2 full of grape juice, add 1 tablespoon of table sugar and 1/2 teaspoon of dried yeast. Fill the test tube 2/3 full with bromthymol blue. When the apparatus is completely assembled, ask:

WHY DID I CONNECT THE BOTTLE CONTAINING THE YEAST TO THE TEST TUBE?

HOW WILL I KNOW IF YEAST CAN BREATHE?

WE WILL LEAVE THIS SET UP OVERNIGHT AND WILL EXAMINE IT TOMORROW.

Ask:

WHAT CHANGE HAS OCCURRED?
TEACHING STRATEGIES

ANTICIPATED STUDENT BEHAVIORS

Students:

--suggest that they would have to eat.
--respond, "I don't know," "Make wine."

--recall previous activity and say, "To see if they breathe."
--recall previous work and predict, "It will turn yellow."
--respond, "Bromthymol blue has changed to yellow."
WHAT DOES THIS TELL US?

IS THIS EVIDENCE THAT YEAST MICROBES ARE ALIVE?

Review microbes, bromthymol blue, and breathing into the tubes of bromthymol blue if they do not recall.

Pour some of the leftover grape juice from yesterday into a beaker and ask several students to smell it. Then have them smell the fermented grape juice from the setup.

Ask:

DO THEY SMELL THE SAME?

HOW CAN YOU EXPLAIN THE DIFFERENCE IN THE SMELL?

HOW COULD THE YEAST CAUSE THE GRAPE JUICE TO CHANGE?

Discuss all student responses. Finally say:

YEASTS ARE LIVING MICROBES. WHEN YEASTS EAT SOMETHING LIKE GRAPE JUICE THEY GIVE OFF A GAS AND ALCOHOL. MAN USES YEASTS TO MAKE WINE AND BEER. THE SMELL IN THE FLASK WITH THE YEASTS WAS DUE TO ALCOHOL. SOME KINDS OF ALCOHOL ARE POISONOUS, LIKE RUBBING ALCOHOL FOUND IN THE MEDICINE CABINET AT HOME. IT IS DANGEROUS TO DRINK ALCOHOL LIKE THAT WE HAVE PRODUCED SINCE IT MAY BE POISONOUS. PEOPLE WHO MAKE WINE AND BEER ARE VERY CAREFUL NOT TO MAKE THE KIND THAT IS POISONOUS.

DO YOU THINK THAT ALL MICROBES ARE HARMFUL TO MAN?
TEACHING STRATEGIES

DOES THIS TELL US?

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ARE SMELL THE SAME?

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THINK THAT ALL MICROBES ARE HARMFUL?

ANTICIPATED STUDENT BEHAVIORS

Students:
--respond, "CO₂ is produced," "Yeast breathes."
--respond, "Yes."

--respond, "No."

--recognize and respond that the difference must have been caused by the yeast.

--infer that the change must have been caused by something that the yeast gave off or did.

--respond, "No." Some students may suggest that yeasts are bad since drinking alcohol may be harmful.
TEACHING STRATEGIES

Discuss student responses. If students suggest the harmful effects of alcohol and maintain that microbes are bad, ask if they can think of any way that microbes such as yeast may help us. Defer further discussion until the next portion of the activity is completed.

Part II. Making Bread

The recipe that is given is extremely simple, anyone can do it! It is fail safe -- you can't miss. If you are particularly nervous about it, you might enlist the aid of the school home economics teacher. Two batches of bread will be made, one with yeast and one without yeast. Students will observe the effects of yeast in making bread, both in the rising and in the baking of the product. If you have a stove at school to bake the two batches of bread, use that. The results will be dramatic. If not, terminate the experiment after the students observe the difference in rising of the four loaves; then take the dough home and bake it. Bring the four loaves the next day.

Begin the lab by asking:

WHAT WOULD WE NEED IN ORDER TO MAKE A LOAF OF BREAD?

Then say:

WHY DO YOU SUPPOSE YEAST IS USED IN MAKING BREAD?

DO YOU THINK IT WOULD MAKE ANY DIFFERENCE IF BREAD WAS MADE WITHOUT YEAST?
TEACHING STRATEGIES

Student responses. If students suggest the harmful alcohol and maintain that microbes are bad, you can think of any way that microbes such as help us. Defer further discussion until the end of the activity is completed.

Making Bread

IT IS ADVISABLE TO START THIS ACTIVITY EARLY IN THE DAY

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YOULD WE NEED IN ORDER TO MAKE A LOAF OF

YOU SUPPOSE YEAST IS USED IN MAKING

THINK IT WOULD MAKE ANY DIFFERENCE IF WA" "WITH" WITHOUT YEAST?

ANTICIPATED STUDENT BEHAVIORS

Students:

--recall and respond, "Flour," "Salt," "Sugar," and "Yeast."

--respond, "Don't know," "Makes it rise," "To make it taste better."

--respond, "Don't know," "Yes."
Recipe for 2 loaves of bread:

*1 Pkg. quick acting yeast
*2 Cups lukewarm water
*4 Cups sifted all-purpose flour
*1 Tablespoon sugar
*2 Teaspoons salt
1 Measuring cup
*2 Large bowls
*2 Clean cloths
*1 Sifter
*2 Bread pans
*Shortening to grease pans
*Butter

NOTE: You will need enough ingredients for 4 loaves of bread. You will use no yeast in 2 of the loaves.

*Not furnished in materials kit

HOW COULD WE FIND OUT?

IF WE MADE SOME BREAD WITH YEAST AND SOME WITHOUT YEAST, WHAT WOULD YOU PREDICT WOULD BE DIFFERENT?

LET'S MAKE FOUR LOAVES OF BREAD, TWO WITH YEAST AND TWO WITHOUT, AND SEE WHAT HAPPENS.

This could be done as a demonstration or by groups of students. Copy the recipe on the chalkboard or ditto it for students to follow. Follow the recipe below. Repeat the same procedure for the two loaves of unleavened bread, except do not add yeast. You, therefore, need not set the dough aside to rise.

Have the students help you demonstrate as much as possible if you do it as a demonstration.

Bread Recipe

Dissolve yeast in 1 cup of water (lukewarm). While the yeast softens, sift the flour, sugar, and salt together in the large bowl, then stir in the dissolved yeast. Add enough of the second cup of water to hold the dough together. Mix until you have a soft, rather sticky dough. Cover the dough with a moist clean cloth, and let rise until it doubles in size (2-4 hours).

Punch the raised dough down with your fist and give it a good beating. Don't knock all the air bubbles out. Place the dough in a greased 9" X 5" X 3" loaf baking pan. Cover and let the dough rise until it reaches the top of the pan or doubles in size. Then bake at 400° for one hour. If crust begins to burn or gets too brown, cover with aluminum foil. Brush the top with melted butter.
TEACHING STRATEGIES

LD WE FIND OUT?

ADE SOME BREAD WITH YEAST AND SOME
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size. Then bake at 400° for one hour. If
to burn or gets too brown, cover with aluminum
the top with melted butter.

ANTICIPATED STUDENT BEHAVIORS

Students:

--suggest making bread with and without yeast.

--predictions will probably vary considerably.
The difference between the two sets of loaves should be dramatic. The difference will be apparent both before and after baking.

Ask:

WHAT DIFFERENCE DO YOU SEE IN THE TWO SETS OF LOAVES OF BREAD?

WHAT DO YOU THINK CAUSED THIS DIFFERENCE?

THINK ABOUT WHAT HAPPENED WHEN WE PUT YEAST IN THE GRAPE JUICE. CAN YOU EXPLAIN WHY ONE LOAF OF BREAD GOT LARGER?

Review grape juice experience if necessary to elicit desired response.

DO YOU THINK THE TWO LOAVES WILL TASTE ANY DIFFERENT?

Allow students to taste each of the loaves.

Then ask:

WHICH KIND OF BREAD WOULD YOU RATHER HAVE IN A SANDWICH?

WHY?

HOW COULD YEAST MAKE THE BREAD TASTE DIFFERENT?
TEACHING STRATEGIES

- What difference will be apparent both before and after adding the yeast?

- What did you think caused this difference?

- What happened when we put yeast in the juice? Can you explain why one loaf got larger?

- Can you explain why one loaf got larger?

- Juice experience if necessary to elicit sense.

- Do you think the two loaves will taste any different?

- Students to taste each of the loaves.

- If you had to choose, which type of bread would you rather have in each?

- Would yeast make the bread taste different?

ANTICIPATED STUDENT BEHAVIORS

<table>
<thead>
<tr>
<th>Students:</th>
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<tbody>
<tr>
<td>--respond that the loaf without the yeast is smaller and flatter.</td>
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<tr>
<td>--recognize that the yeast must have caused the difference since it was the only difference in the two treatments.</td>
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<tr>
<td>--suggest that the yeast must have caused the bread to rise.</td>
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<tr>
<td>--respond, &quot;Yes,&quot; &quot;No.&quot; &quot;Maybe.&quot;</td>
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<tr>
<td>--respond, &quot;The one with the yeast.&quot;</td>
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<tr>
<td>--respond, &quot;It tastes better,&quot; &quot;Not so hard.&quot;</td>
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<tr>
<td>--suggest that something must be given off by the yeast that makes the bread taste better.</td>
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</table>
ARE ALL MICROBES BAD FOR US?

WE HAVE SEEN THAT YEASTS MAY BE HELPFUL MICROBES. THERE ARE LOTS OF OTHER HELPFUL MICROBES. SOME ARE USED TO MAKE CHEESE, OTHERS HELP MAKE SAUERKRAUT, AND OTHERS ARE USED TO MAKE MEDICINES WHICH HELP US GET WELL WHEN WE ARE SICK.

SCIENTISTS TELL US THAT THERE ARE MANY MORE MICROBES THAT HELP US THAN THERE ARE MICROBES THAT ARE HARMFUL TO US.
### TEACHING STRATEGIES

Are microbes bad for us?

Then that yeasts may be helpful microbes. Lots of other helpful microbes. Some to make cheese, others help make beer, and others are used to make medicines that help us get well when we are sick. Tell us that there are many more microbes that help us than there are microbes harmful to us.

### ANTICIPATED STUDENT BEHAVIORS

**Students:**

--respond, "No."
UNIT IV, CORE B
ACTIVITY 4-18: "A Real Gas"

<table>
<thead>
<tr>
<th>Activity name suggested by class:</th>
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<tbody>
<tr>
<td>BSCS USE: Post ___ Tally ___ Rev ___</td>
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</table>

<p>| 1. Date taught (month and date, e.g. 11/2) |</p>
<table>
<thead>
<tr>
<th>Day 1</th>
<th>Day 2</th>
<th>Day 3</th>
<th>Day 4</th>
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<p>| 2. Minutes of class time on science each day |</p>
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<th>Day 1</th>
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<th>Day 4</th>
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<p>| 3. Minutes of preparation each day |</p>
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<th>Day 1</th>
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<p>| 4. Students absent on each date (Use ID Number) |</p>
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<tr>
<th>Day 1</th>
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<th>Day 4</th>
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</table>

5. Interest of class as expressed by apparent attention to what is happening.
   Number of students responding with: Name students you noted especially:

<table>
<thead>
<tr>
<th>HIGH INTEREST</th>
<th>MODERATE INTEREST</th>
<th>INDIFFERENCE</th>
<th>MODERATE RESISTANCE</th>
<th>STRONG DISLIKE</th>
<th>HARD TO RATE</th>
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6. Equipment in kit: ❑ None ❑ Satisfactory ❑ Too ❑ Too fragile ❑ Too complicated to use
7. Equipment I got: ❑ None ❑ Easy ❑ Hard to get. ❑ Hard to get, but okay ❑ Unobtainable, needed to get ❑ Unobtainable, add to kit ❑ Unobtainable, add to kit

8. Materials used:

<table>
<thead>
<tr>
<th>Materials used:</th>
<th>Worksheet</th>
<th>Game</th>
<th>Slides (show slide nor.)</th>
<th>Transparency</th>
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<th>Tape(s)</th>
<th>Other</th>
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9. Maturity level is ❑ just right ❑ too childish ❑ too mature Explain:
10. Vocabulary level is ❑ just right ❑ too easy ❑ too difficult Explain:

11. Were teacher instructions clear enough to follow? ❑ Yes ❑ No - Pages and Problem:
12. Were clues to success and reviews of success helpful? ❑ Yes ❑ No - Why not?
13. Did the activity fulfill the purpose stated by the Guide? ❑ Yes ❑ No - Comment:

14. Were any parts of this activity omitted? ❑ No ❑ Yes - Explain:
15. Your rating of this activity:
   ❑ Worthwhile ❑ Of value—needs the ❑ Worth salvaging—make revision suggested major changes described ❑ Worthless —keep as is —drop it

SPECIFIC CONCERNS ABOUT THIS ACTIVITY:
Equipment I got:  ☐ None  ☐ Easy  ☐ Hard to get, ☐ Hard to get, ☐ Unobtainable, needed to get but okay add to kit  add to kit

Materials used:  

<table>
<thead>
<tr>
<th>Worthwhile as is</th>
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<th>Game</th>
<th>Slides (show slide nos.)</th>
<th>Transparency</th>
<th>Card(s)</th>
<th>Tape(s)</th>
<th>Other</th>
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<td>Revise slightly</td>
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Vocabulary level is ☐ just right ☐ too easy ☐ too difficult  Explain:

Were teacher instructions clear enough to follow?  ☐ Yes  ☐ No  - Pages and Problem:

Were clues to success and reviews of success helpful?  ☐ Yes  ☐ No  - Why not?

Did the activity fulfill the purpose stated by the Guide?  ☐ Yes  ☐ No  - Comment:

Were any parts of this activity omitted?  ☐ No  ☐ Yes  - Explain:

Your rating of this activity:  ☐ Worthwhile  ☐ Of value--needs the  ☐ Worth salvaging--make  ☐ Worthless--keep as is  Revision suggested  Major changes described  -- Drop it

SPECIFIC CONCERNS ABOUT THIS ACTIVITY:

There are always parts of activities that are good and need not be changed. What parts of this activity should be retained when the curriculum is revised?  

Page(s) ____________________:

Were any students unable to help prepare the bread?  ☐ No  ☐ Yes: Comment.

Were there any negative parent reactions to making wine in school?  ☐ No  ☐ Yes: Comment.

Concern (or questions) about content:

Messages for staff (read immediately):

Have you answered each question, attached annotated Guide, your revisions, student work, etc.?
UNIT IV, CORE B
ACTIVITY 4-18: "A Real Gas"

Teacher ____________________

REPORT OF WHAT HAPPENED AND SUGGESTIONS FOR REVISION

1. Whenever practical write all over your second copy of the Guide. Tear out the activity and send the annotated Guide in with this form.


3. Tell us what you did. Think of what you needed, what you had to work out for yourself, how you presented something to make it go over.

4. Describe the revisions you said were needed in answering the questions on the other side of this form.

5. As a reminder of things that help in revision, read through the following list and check off things you want to be sure to note this time. (We know you can't tell about everything every time!)

   THE LESSON
   □ how you organized materials or class.
   □ things added (a question, a picture, etc.).
   □ equipment, supplies, visual aids.
   □ things that went wrong, misunderstandings.
   □ what you would do differently or avoid next time.
   □ turmoil in the class caused by the activity, or disruptive students, or interruptions, and how you dealt with them.

   THE STUDENTS
   □ who had problems and what they were.
   □ how someone "caught on" (or who never did).
   □ who was really "turned off" (or on).
   □ reactions of parents, teachers, students.
   □ special evidence of learning or applying ideas.
OBJECTIVE FOCUS FOR THIS ACTIVITY

UNIT GOALS:

1. Appreciate the cycling relationships of the materials and organisms in the environment through:
   a. Understanding of what a cycle is.
   b. Understanding of the role of decomposers.
   c. Realization that certain materials are in finite supply.
   d. Recognition of examples of man's impact upon the environment.

2. Comprehend the role of man as an integral part of nature, not apart from nature.

CORE B OBJECTIVES:

1. Know the habitat requirements of microbes and other decomposers.
2. Indicate how knowledge of decomposers can improve man's environment.
3. Conclude that microbes contribute to man's well-being as well as pose problems for man.

TEACHING STRATEGIES

Activity 4-19. Completing The Run Around

This activity is most critical in Core B because it introduces the concept of a cycle and answers some of the questions posed earlier in the core. It is difficult for students to appreciate the very complex idea of the cyclic nature of the living world. This activity will merely serve as an introduction to this idea.
US FOR THIS ACTIVITY

OBJECTIVES:

- Appreciate the cycling relationships of the materials and organisms in the environment through:
  a. Understanding of what a cycle is.
  b. Understanding of the role of decomposers.
  c. Realization that certain materials are in finite supply.
  d. Recognition of examples of man's impact upon the environment.

- Comprehend the role of man as an integral part of nature, not apart from nature.

UNIT IV. TRANSFER AND CYCLING OF MATERIALS IN MY ENVIRONMENT

CORE B. DECOMPOSERS IN MY ENVIRONMENT

ACTIVITY 4-19. COMPLETING THE RUN AROUND

TEACHING STRATEGIES

Completing The Run Around

is most critical in Core B because it introduces a cycle and answers some of the questions asked earlier in the core. It is difficult for students to appreciate the very complex idea of the cyclic living world. This activity will merely introduce to this idea.

ANTICIPATED STUDENT BEHAVIORS

At the end of this activity, each student should:

- be able to define the word cycle.
- be able to cite several examples of cycles.
- have made a representation of a natural cycle.
ACTIVITY 4-19

MATERIALS

Deck of flash cards
Booklet, *The Long Journey*
*Large piece of butcher paper, one per student*
*Many magazines with pictures*
*Tape or glue*
*Felt pens*

*Not furnished in materials kit*

TEACHING STRATEGIES

Begin by placing on the chalk tray the flash cards arranged in the food chain you used with your students at the beginning of Activity 4-9. For example:

[HAWK]→[FROG]→[MOSQUITO]→[MAN]→[COW]→[GRASS]

Then ask:

**WHAT HAVE I SHOWN AT THE BOARD?**

*I ASKED YOU A QUESTION A LONG TIME AGO THAT WE COULDN'T ANSWER VERY WELL: WHAT EATS A HAWK?*

Students will probably have difficulty with this question even at this point. Repeat the questions used earlier in Activity 4-9 and remind them of the slides in Activity 4-9 and the activities 4-10 through 4-17. Ask things such as:

**DO HAWKS LIVE FOREVER?**

**WHAT HAPPENS TO DEAD HAWKS? ANIMALS?**

**WHY AREN'T ANIMALS PILING UP OUTSIDE?**

When students have identified and recalled the role of decomposers from their experience, complete the cycle on the chalkboard as follows:

[HAWK]→[FROG]→[ETC.]

\[\text{DECOMPOSERS}\]

Then ask:
### TEACHING STRATEGIES

- Placing on the chalk tray the flash cards arranged in a chain you used with your students at the beginning of activity 4-9. For example:
  - FROG → MOSQUITO → MAN → COW → GRASS

- Have I shown at the board?

- Did you a question a long time ago that we didn't answer very well: what eats a hawk?

- I probably have difficulty with this question's point. Repeat the questions used earlier in 9 and remind them of the slides in Activity 4-9 activities 4-10 through 4-17. Ask things such as:
  - What live forever?
  - What happens to dead hawks? Animals?
  - Aren't animals piling up outside?

- With the provided questions and activities, have identified and recalled the role of some decomposers from their experience, complete the cycle onward as follows:
  - FROG → ETC.

### ANTICIPATED STUDENT BEHAVIORS

**Students:**

- Recall previous work and say, "Food chain."

- Recall previous experiences and respond, "Decomposers."

- Recall previous experiences and answer appropriately.

- Respond, "They rot," "Decompose."

- Respond, "They get eaten up!"
WHAT HAPPENS TO THE HAWK AFTER DECOMPOSERS EAT IT?
WHAT EATS DECOMPOSERS?
WHAT HAPPENS TO DEAD MICROBES?

If students have difficulty with this question review the discussion held earlier on the class compost pile. Probe and review until students tell you that decomposed things are put back into the soil.

Then ask:
WHAT LIVING THINGS NEED SOIL TO GROW?

Now complete the cycle on the chalkboard as follows:

HAWK → FROG → MOSQUITO → MAN → COW → GRASS
DECOMPOSER

This diagram should raise some questions in your students' minds. You must explain very carefully what you have now made. Ask:

WHAT IS THE SOIL MADE FROM?

Again talk through the cycle and ask:

DOES THIS MEAN GRASS EATS DECOMPOSERS?

Now return to your definition of decomposer as one that breaks other things into small pieces. In this case the decomposers are breaking the dead hawk down into pieces.
TEACHING STRATEGIES

PENS TO THE HAWK AFTER DECOMPOSERS EAT
IS DECOMPOSERS?
PENS TO DEAD MICROBES?

Have difficulty with this question review on held earlier on the class compost pile. View until students tell you that decomposed it back into the soil.

ING THINGS NEED SOIL TO GROW?
the cycle on the chalkboard as follows:

ROG → MOSQUITO → MAN → COW → GRASS → DECOMPOSER

should raise some questions in your students' just explain very carefully what you have now
THE SOIL MADE FROM?
rough the cycle and ask:
IS MEAN GRASS EATS DECOMPOSERS?
your definition of decomposer as one that things into small pieces. In this case the re breaking the dead hawk down into pieces

<table>
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<th>ANTICIPATED STUDENT BEHAVIORS</th>
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Students:

-- respond, "Goes into the soil."
-- respond, "Other decomposers, like microbes."
-- respond, "Microbes are so tiny they don't need anything to decompose them. They go right into the soil."

-- respond, "Plants."

-- respond, "Little pieces of rocks and pieces of once-living things that have been decomposed."

-- respond, "It looks that way."
and returning the pieces into the soil. After this wild idea, ask:

DOES THIS MEAN THAT GRASS TAKES A PIECE OF HAWK OUT OF THE SOIL?

You must help students a great deal at this point and explain to them that materials are cycled through nature and that a "piece" of animal may very well end up in a plant. Of course the "pieces" we are talking about are atoms and molecules and therefore not visible.

Introduce the word "cycle" to your students now by directing their attention to the one on the chalkboard. Say:

NOTICE HOW THESE ARROWS GO AROUND IN A CIRCLE?

Write the word "cycle" on the chalkboard.

SCIENTISTS USE THE WORD "CYCLE" FOR THINGS THAT GO AROUND IN CIRCLES.

HOW DO YOU USE THE WORD CYCLE?

WHAT IS GOING AROUND IN CIRCLES IN A MOTORCYCLE?

Explain that bicycle, tricycle, etc., do stem from the word "cycle" and circles.

The idea of cycles may not be an easy one for your students. Be patient and give them assistance.

Continue now by returning to the booklet, The Long Journey. Read through the booklet again, quickly reviewing the story with your students. Then say:
TEACHING STRATEGIES

ing the pieces into the soil. After this wild

This mean that grass takes a piece of
out of the soil?

Help students a great deal at this point and
them that materials are cycled through nature
"piece" of animal may very well end up in a
course the "pieces" we are talking about are
molecules and therefore not visible.

the word "cycle" to your students now by
their attention to the one on the chalkboard.

How these arrows go around in a circle?

word "cycle" on the chalkboard.

ists use the word "cycle" for things
so around in circles.

Do you use the word cycle?

is going around in circles in a motorcycle?

bike, tricycle, etc., do stem from the
" and circles.

cycles may not be an easy one for your students
and give them assistance.

ow by returning to the booklet, The Long
Read through the booklet again, quickly reviewing
with your students. Then say:

ANTICIPATED STUDENT BEHAVIORS

Students:

--will be confused at this point.

--respond, "Motorcycle."

--respond, "The wheels."
IN THE STORY WE SAW WHERE PART OF OUR HAIR CAME FROM. WHAT WOULD HAPPEN TO YOUR HAIR IF IT WAS CUT OFF AND THROWN OUTSIDE?

Now help your students trace their cut-off hair through The Long Journey back to themselves as shown:

<table>
<thead>
<tr>
<th>AIR → CLOVER → DECOMPOSERS → SOIL → CLOVER → HAMBERGER → STEER → HAY → HAWK DROPPING → SNAKE → FROG</th>
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</table>

WHAT DO WE HAVE DRAWN ON THE CHALKBOARD?

If they do not say this, ask:

DO THINGS GO AROUND IN A CIRCLE?

WHAT DO WE CALL THINGS THAT GO AROUND IN A CIRCLE?

COULD YOUR "PIECES" OF HAIR GO TO SOME OTHER PERSON?

If students answer "No," ask:

COULD SOMEONE ELSE EAT THE HAMBURGER?

COULD THEY THEN GET YOUR HAIR PIECES?

Then ask:

WHAT IS A CYCLE?

WHAT LIVING THINGS SEEM TO HELP MAKE CYCLES OUT OF FOOD CHAINS?
TEACHING STRATEGIES

STORY WE SAW WHERE PART OF OUR HAIR CAME
WHAT WOULD HAPPEN TO YOUR HAIR IF IT WAS
AND THROWN OUTSIDE?

students trace their cut-off hair through
they back to themselves as shown:

AIR — CLOVER

DECOMPOSERS — GRASSHOPPER

SOIL — CLOVER

STEER — HAY — HAWK DROPPING — SNAKE — FROG

WE HAVE DRAWN ON THE CHALKBOARD?

they do not say this, ask:

THINGS GO AROUND IN A CIRCLE?

DO WE CALL THINGS THAT GO AROUND
A CIRCLE?

UR "PIECES" OF HAIR GO TO SOME OTHER

students answer "No," ask:

WON SOMEONE ELSE EAT THE HAMBURGER?

WON THEY THEN GET YOUR HAIR PIECES?

A CYCLE?

ING THINGS SEEM TO HELP MAKE CYCLES OUT

ANTICIPATED STUDENT BEHAVIORS

Students:

--respond, "Blow away," "Decompose."

--respond, "A cycle."

--respond, "Yes."

--respond, "A cycle."

--infer, "Yes."

--respond, "Yes."

--infer, "Yes."

--respond, "Something that goes in circles."

--respond, "Decomposers."
### ACTIVITY 4-19

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<th>MATERIALS</th>
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| TEACHING STRATEGIES |

**WHAT DO DECOMPOSERS DO THAT MAKES THEM SO IMPORTANT IN CYCLES?**

Now direct students to make an example of a cycle. Give them a piece of butcher paper, tape, and many magazines and see if they can picture a cycle. Have them connect their pictures with arrows drawn with the felt pens. They undoubtedly will have to write in the word "Decomposers" in their cycle because they will probably not find pictures of them or will not recognize them if they did. Assist them in this task but do not tell them what to do. When each student has finished his cycle have him display it and explain it to the class. Allow the class to criticize the cycle and find errors. As errors are identified, have students correct them with their felt pens.

This activity will be a good gauge to tell you whether your students understand food chains as well as a cycle. If most students have made a good cycle, continue with the next activity. Give extra help to those who did not comprehend the ideas before going on.
TEACHING STRATEGIES

DO DECOMPOSERS DO THAT MAKES THEM SO IMPORTANT IN CYCLES?

Students to make an example of a cycle. Give one of butcher paper, tape, and many magazines they can picture a cycle. Have them connect the pictures with arrows drawn with the felt pens. They will have to write in the word "Decomposers" cycle because they will probably not find pictures of decomposers will not recognize them if they did. Assist their task but do not tell them what to do. When they have finished their cycle have him display it to the class. Allow the class to criticize and find errors. As errors are identified, have them correct them with their felt pens.

This will be a good gauge to tell you whether your students understand food chains as well as a cycle. If they have made a good cycle, continue with the activity. Give extra help to those who did not understand the ideas before going on.

ANTICIPATED STUDENT BEHAVIORS

Students:

--recall previous work and respond, "Break things down."
UNIT IV, CORE B
ACTIVITY 4-19: "Completing The Run Around"

Teacher

Activity / name suggested by class:

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<th>Tally</th>
<th>Rev</th>
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<th>Day 6</th>
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1. Date taught (month and date, e.g. 11/2)
   - Day 1
   - Day 2
   - Day 3
   - Day 4
   - Day 5
   - Day 6

2. Minutes of class time on science each day
   - Day 1
   - Day 2
   - Day 3
   - Day 4
   - Day 5
   - Day 6

3. Minutes of preparation each day
   - Day 1
   - Day 2
   - Day 3
   - Day 4
   - Day 5
   - Day 6

4. Students absent on each date
   - Day 1
   - Day 2
   - Day 3
   - Day 4
   - Day 5
   - Day 6

(Use ID Number)

5. Interest of class as expressed by apparent attention to what is happening.
   - Number of students responding with
     - HIGH INTEREST
     - MODERATE INTEREST
     - INDIFFERENCE
     - MODERATE RESISTANCE
     - STRONG DISLIKE
     - HARD TO RATE

6. Equipment in kit: □ None □ Satisfactory □ Too □ Too fragile □ Complicated to use
   - Day 1
   - Day 2
   - Day 3
   - Day 4
   - Day 5
   - Day 6

7. Equipment I got: □ None □ Easy □ Hard to get, but okay □ Hard to get, add to kit □ Unobtainable, add to kit
   - Day 1
   - Day 2
   - Day 3
   - Day 4
   - Day 5
   - Day 6

8. Materials used:
   - Worksheet
   - Game
   - Slides (show slide nos.)
   - Transparency
   - Card(s)
   - Tape(s)
   - Other

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<tr>
<th>Worthwhile as is</th>
<th>Revise slightly</th>
<th>Revise much</th>
<th>Worthless: omit</th>
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9. Maturity level is
   - □ just right
   - □ too childish
   - □ too mature

10. Vocabulary level is
    - □ just right
    - □ too easy
    - □ too difficult

11. Were teacher instructions clear enough to follow? □ Yes □ No - Pages and Problem:

12. Were clues to success and reviews of success helpful? □ Yes □ No - Why not?

13. Did the activity fulfill the purpose stated by the Guide? □ Yes □ No - Comment:

14. Were any parts of this activity omitted? □ No □ Yes - Explain:

15. Your rating of this activity:
    - □ Worthwhile
    - □ Of value - needs the □ Worth saving - make
    - □ Worthless
    - □ keep as is revision suggested
    - □ major changes described
    - □ drop it
6. Equipment in kit: None □ Satisfactory □ Too needed □ Too fragile □ Complicated to use
   Equipment I got: None □ Easy □ Hard to get, □ Hard to get, □ Unobtainable, needed to get, but okay add to kit, add to kit

8. Materials used:

<table>
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9. Maturity level is □ just right □ too childish □ too mature Explain:
10. Vocabulary level is □ just right □ too easy □ too difficult Explain:

11. Were teacher instructions clear enough to follow? □ Yes □ No - Pages and Problem:
12. Were clues to success and reviews of success helpful? □ Yes □ No - Why not?
13. Did the activity fulfill the purpose stated by the Guide? □ Yes □ No - Comment:
14. Were any parts of this activity omitted? □ No □ Yes - Explain:
15. Your rating of this activity:
   □ Worthwhile □ Of value--needs the □ Worth salvaging--make □ Worthless--keep as is □ revision suggested □ major changes described □ drop it

SPECIFIC CONCERNS ABOUT THIS ACTIVITY:

16. There are always parts of activities that are good and need not be changed.
   What parts of this activity should be retained when the curriculum is revised?
   Page(s) ____________________:

17. Did each student make an example of a cycle? □ Yes □ No: Who?
18. Was the second reading of The Long Journey helpful? □ Yes □ No: Comment.
19. Concern (or questions) about content:

20. Messages for staff (read immediately):

Have you answered each question, attached annotated Guide, your lessons, student work, etc.?
REPORT OF WHAT HAPPENED AND SUGGESTIONS FOR REVISION

1. Whenever practical write all over your second copy of the Guide. Tear out the activity and send the annotated Guide in with this form.
3. Tell us what you did. Think of what you needed, what you had to work out for yourself, how you presented something to make it go over.
4. Describe the revisions you said were needed in answering the questions on the other side of this form.
5. As a reminder of things that help in revision, read through the following list and check off things you want to be sure to note this time. (We know you can't tell about everything every time!)

THE LESSON

☐ how you organized materials or class.
☐ things added (a question, a picture, etc.).
☐ equipment, supplies, visual aids.
☐ things that went wrong, misunderstandings.
☐ what you would do differently or avoid next time.
☐ turmoil in the class caused by the activity, or disruptive students, or interruptions, and how you dealt with them.

THE STUDENTS

☐ who had problems and what they were.
☐ how someone "caught on" (or who never did).
☐ who was really "turned off" (or on).
☐ reactions of parents, teachers, students.
☐ special evidence of learning or applying ideas.
OBJECTIVE FOCUS FOR THIS ACTIVITY

UNIT GOALS:

1. Appreciate the cycling relationships of the materials and organisms in the environment through:
   a. Understanding of what a cycle is.
   b. Understanding of the role of decomposers.
   c. Recognition of examples of man's impact upon the environment.

CORE B OBJECTIVES:

2. Indicate how knowledge of decomposers can improve man's environment.

3. Conclude that microbes contribute to man's well-being as well as pose problems for man.

TEACHING STRATEGIES

Activity 4-20. Review Of Success

This review of success consists of four multiple choice questions. Use the questions to assess the success of your students since the last review.

Distribute Worksheet 4-9 and have each student put his name on it.

Project each question separately. Read the question and choices aloud to the students. Allow ample time for them to mark their worksheets. Repeat this procedure for the next three questions.

After all students have had the opportunity to answer all of the questions, collect the worksheets. Then project...
ICUS FOR THIS ACTIVITY

ALS:

Appreciate the cycling relationships of the materials and organisms in the environment through:

a. Understanding of what a cycle is.
b. Understanding of the role of decomposers.
d. Recognition of examples of man's impact upon the environment.

OBJECTIVES:

Indicate how knowledge of decomposers can improve man's environment.

Conclude that microbes contribute to man's well-being as well as pose problems for man.

TEACHING STRATEGIES

2. Review Of Success

If success consists of four multiple choice questions to assess the success of since the last review, worksheet 4-9 and have each student put his question separately. Read the question and to the students. Allow ample time for them worksheets. Repeat this procedure for the questions. Students have had the opportunity to answer all ons, collect the worksheets. Then project

UNIT IV. TRANSFER AND CYCLING OF MATERIALS IN MY ENVIRONMENT

CORE B. DECOMPOSERS IN MY ENVIRONMENT

ACTIVITY 4-20. REVIEW OF SUCCESS

ANTICIPATED STUDENT BEHAVIORS

At the end of this activity, each student should:
--have answered the four questions on his worksheet.
each slide and discuss the answers with them. Have them defend their choices. After class tally the students' answers on Tallysheet 4-7. Consider whether the whole class needs further review or if a few individuals need special attention.

Then proceed to the next core.
and discuss the answers with them. Have them choose. After class tally the students' tallysheet 4-7. Consider whether the whole class review or if a few individuals need special to the next core.
UNIT IV, CORE B
TALLY SHEET 4-7: Summary of Worksheet 4-9
Activity 4-20: "Review Of Success"

Circle each student's answers to Worksheet 4-9 on the tallysheet below. In the columns for totals, write down the number of students who circled each letter.

<table>
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<th>2 (BTB)</th>
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**TOTALS:**

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<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
</table>

Does this review give an accurate indication of student understanding?  □ Yes  □ No
If not, what other evidence do you have of student learning?
UNIT IV, CORE B
ACTIVITY 4-20: "Review Of Success"

Activity name suggested by class:__________________________  BSCS USE: __ Post ____ Tally ____ Rev ____

<table>
<thead>
<tr>
<th>Day</th>
<th>Date taught (month and date, e.g. 11/2)</th>
<th>Day 1</th>
<th>Day 2</th>
<th>Day 3</th>
<th>Day 4</th>
<th>Day 5</th>
<th>Day 6</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Minute of class time on science each day</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>2.</td>
<td>Minutes of preparation each day</td>
<td></td>
<td></td>
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<td></td>
<td></td>
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</tr>
<tr>
<td>3.</td>
<td>Students absent on each date</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Use ID Number)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

5. Interest of class as expressed by **apparent attention** to what is happening.
   Number of students responding with: ___________________ Name students you noted especially:
   (Number)

<table>
<thead>
<tr>
<th>Interest of class</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>HIGH INTEREST</td>
<td></td>
</tr>
<tr>
<td>MODERATE INTEREST</td>
<td></td>
</tr>
<tr>
<td>INDIFFERENCE</td>
<td></td>
</tr>
<tr>
<td>MODERATE RESISTANCE</td>
<td></td>
</tr>
<tr>
<td>STRONG DISLIKE</td>
<td></td>
</tr>
<tr>
<td>HARD TO RATE</td>
<td></td>
</tr>
</tbody>
</table>

6. Equipment in kit: □ None □ Satisfactory □ Too □ Too □ Difficult
   needed fragile complicated to use

7. Equipment I got: □ None □ Easy □ Hard to get, □ Hard to get, □ Unobtainable, needed to get, but okay, add to kit □ Unobtainable, add to kit

8. Materials used:
<table>
<thead>
<tr>
<th>Worksheet</th>
<th>Game</th>
<th>Slides (sh.: # slide nos.)</th>
<th>Transparency</th>
<th>Card(s)</th>
<th>Tape(s)</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>Worthwhile as is</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Revise slightly</td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
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<tr>
<td>Revise much</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Worthless: omit</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

9. Maturity level is □ just right □ too childish □ too mature
   Explain: ____________________________

10. Vocabulary level is □ just right □ too easy □ too difficult
    Explain: ____________________________

11. Were teacher instructions clear enough to follow? □ Yes □ No - Pages and Problem: ____________________________

12. Were clues to success and reviews of success helpful? □ Yes □ No - Why not? ____________________________

13. Did the activity fulfill the purpose stated by the Guide? □ Yes □ No - Comment: ____________________________

14. Were any parts of this activity omitted? □ No □ Yes - Explain: ____________________________

15. Your rating of this activity:
   □ Worthwhile □ Of value--needs the □ Worth salvaging--make □ Worthless
   --keep as is □ revision suggested □ major changes described □ drop it
   ____________________________


Equipment I got: □ None □ Easy □ Hard to get, □ Hard to get, □ Unobtainable, needed to get but okay □ add to kit □ add to kit

8. Materials used:

<table>
<thead>
<tr>
<th>Worksheet</th>
<th>Game</th>
<th>Slides (show slide nos.)</th>
<th>Transparency</th>
<th>Card(s)</th>
<th>Tape(s)</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>Worthwhile as is</td>
<td></td>
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<tr>
<td>Revise slightly</td>
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<tr>
<td>Revise much</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Worthless: omit</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

9. Maturity level is □ just right □ too childish □ too mature Explain:

10. Vocabulary level is □ just right □ too easy □ too difficult Explain:

11. Were teacher instructions clear enough to follow? □ Yes □ No - Pages and Problem:

12. Were clues to success and reviews of success helpful? □ Yes □ No - Why not?

13. Did the activity fulfill the purpose stated by the Guide? □ Yes □ No - Comment:

14. Were any parts of this activity omitted? □ No □ Yes - Explain:

15. Your rating of this activity:

□ Worthwhile □ Of value--needs the □ Worth salvaging--make □ Worthless

-keep as is revision suggested major changes described drop it

SPECIFIC CONCERNS ABOUT THIS ACTIVITY:

16. There are always parts of activities that are good and need not be changed. What parts of this activity should be retained when the curriculum is revised? Page(s) ____________________:

17. Did any student give away the answer to any question on Worksheet 4-9? □ No □ Yes: Comment.

18. Concern (or questions) about content:

19. Messages for staff (read immediately):

Have you answered each question, attached annotated Guide, your revisions, student work, etc.?
UNIT IV, CORE B
ACTIVITY 4-20: "Review Of Success"

Teacher __________________________

REPORT OF WHAT HAPPENED AND SUGGESTIONS FOR REVISION

1. Whenever practical write all over your second copy of the Guide. Tear out the activity and send the annotated Guide in with this form.


3. Tell us what you did. Think of what you needed, what you had to work out for yourself, how you presented something to make it go over.

4. Describe the revisions you said were needed in answering the questions on the other side of this form.

5. As a reminder of things that help in revision, read through the following list and check off things you want to be sure to note this time. (We know you can't tell about everything every time!)

THE LESSON

- how you organized materials or class.
- things added (a question, a picture, etc.).
- equipment, supplies, visual aids.
- things that went wrong, misunderstandings.
- what you would do differently or avoid next time.
- turmoil in the class caused by the activity, or disruptive students, or interruptions, and how you dealt with them.

THE STUDENTS

- who had problems and what they were.
- how someone "caught on" (or who never did).
- who was really "turned off" (or on).
- reactions of parents, teachers, students.
- special evidence of learning or applying ideas.


UNIT IV
REACTIONS TO CORE B

1. Was the background information for this core adequate? □ Yes □ No
Comment:

2. Was it clear to you why these particular activities were chosen and the direction they were leading? □ Yes □ No
Comment:

3. Did the activities fulfill the purposes stated in the Guide for this core? □ Yes □ No
Comment:

4. How would you increase the clarity of this core for students? (Help them understand why they are doing these activities.)

5. Is there a practical (take-home) value for your students in these activities? □ Yes □ No
6. If yes, what do you see as the "take-home" lesson? If no, what is needed?

7. In these materials, what things did your students find difficult to do?

8. Should there be more clues to success or reviews of success in this core? □ Yes □ No
Comment:

9. Was there too much reading and too many teacher directions? □ Yes □ No
Comment:

10. Did you make use of the Planning Guide? □ Yes □ No
Comment:
5. Is there a practical (take-home) value for your students in these activities? □ Yes □ No

6. If yes, what do you see as the "take-home" lesson? If no, what is needed?

7. In these materials, what things did your students find difficult to do?

8. Should there be more clues to success or reviews of success in this core? □ Yes □ No
   Comment:

9. Was there too much reading and too many teacher directions? □ Yes □ No
   Comment:

10. Did you make use of the Planning Guide? □ Yes □ No
    Comment:

11. If you could teach your way, rather than following the Guide, how would you do it?

12. Which of your students do you believe were unsuccessful in achieving the objectives of this core of activities? Explain.
### NEW STUDENTS ENTERING DURING THIS CORE

<table>
<thead>
<tr>
<th>Date Entered</th>
<th>Last Name</th>
<th>Name Used</th>
<th>Ethnic Group</th>
<th>Sex</th>
<th>Birthdate</th>
<th>Test date</th>
<th>Test</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
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<td>W B S O M F</td>
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<td></td>
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</tbody>
</table>

### STUDENTS DROPPED IN THIS PERIOD

<table>
<thead>
<tr>
<th>Date Dropped</th>
<th>Last Name</th>
<th>First</th>
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</thead>
<tbody>
<tr>
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</tbody>
</table>

W = white  
B = black  
S = Spanish-American  
O = other

W = WISC  
B = Binet  
O = other (name)

### ADDITIONAL INFORMATION ON NEW STUDENTS:
NEW STUDENTS ENTERING DURING THIS CORE GROUP

<table>
<thead>
<tr>
<th>Group</th>
<th>Sex</th>
<th>Birthday</th>
<th>Test date</th>
<th>Test</th>
<th>Total</th>
<th>Verbal</th>
<th>Performance</th>
<th>Previous Test Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>S</td>
<td>M</td>
<td>F</td>
<td></td>
<td>WBO</td>
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<tr>
<td>O</td>
<td>M</td>
<td>F</td>
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<td>WBO</td>
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<td>M</td>
<td>F</td>
<td>W</td>
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<td>F</td>
<td>M</td>
<td>B</td>
<td></td>
<td>WBO</td>
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</tr>
</tbody>
</table>

W = WISC
B = Binet
O = other
(name)
AIMS FOR ME AND MY ENVIRONMENT

1. DEVELOPMENT IN EACH CHILD OF A SENSE OF IDENTITY AS A PERSON WHO HAS SOME DEGREE OF CONTROL OVER AND CAN ACT ON HIS ENVIRONMENT. This will lead to a degree of self-determination based on a rational coping with situations rather than on a passive compliance or an impulsive response to problems.

2. DEVELOPMENT IN EACH CHILD OF A SUCCESS SYNDROME. More than anything else, each activity is intended to be a success experience for each child. It is the teacher's responsibility -- almost obligation -- to see that each child succeeds at a level that is challenging to his abilities and that preserves his self-respect. It is a further responsibility of the teacher to point out his achievement. The students as a group should help each individual fit what he has done into a pattern of accomplishment.

3. DEVELOPMENT IN EACH CHILD OF AN INTEREST THAT COULD BECOME A HOBBY OR AVOCATION OVER A LIFETIME (through an exposure to an array of experiences in science). It is hoped that many children will find some area -- perhaps growing plants, caring for animals, identifying flowers, collecting things, or simply enjoying outings into the country -- that they feel strongly about and can develop some competence or knowledge in. This would provide a means of self-expression, and (perhaps) allow some degree of sharing or involvement with others.

4. DEVELOPMENT IN EACH CHILD OF A SENSE OF RELATIONSHIP AND EMPATHY WITH OTHER LIVING THINGS. It is hoped that this will lead to a positive regard and caring about what affects them as individuals and as a group, because what affects them affects the community of man.

5. DEVELOPMENT IN EACH CHILD OF AN UNDERSTANDING OF ENVIRONMENTAL CONDITIONS that will lead to a sense of responsibility for the environment and actions that protect or improve it.
UNIT IV GOALS

1. Appreciate the cycling relationships of the materials and organisms in the environment through:
   a. Understanding of what a cycle is.
   b. Understanding of the role of decomposers.
   c. Realization that certain materials are in finite supply.
   d. Recognition of examples of man's impact upon the environment.

2. Comprehend the role of man as an integral part of nature, not apart from nature.

OBJECTIVES OF CORE C

1. Perceive that garbage (solid waste) is a man-made problem through his:
   a. Understanding of the concept of biodegradable and nonbiodegradable.
   b. Realization that satisfactory solid waste disposal is difficult.
   c. Description of daily garbage.

2. Accept the need for recycling materials through his:
   a. Recognition that certain materials are in finite supply.
   b. Identification of uses for various components of solid waste.
   c. Accomplishment of a recycling task.

3. Exhibit a positive attitude toward microbes that decompose garbage.
Attention is now focused on what the layman often considers to be the terminus of energy and material chains and cycles — garbage. In a practical and short-term sense, this is true for such discards as glass, metal, and plastics in whose compounds the energy and atoms of matter are locked as permanently as they are in the bedrock. To perceive the problem created by man’s use and disposal of materials, as well as to realize the necessity for quickly returning the materials to natural or man-made cycles, a study of garbage is germane.

Once there is an acknowledgment that a problem exists, a solution or accommodation to it can be tackled. It is in this final core of the unit that the student can be given the background and practical knowledge to exert some control over his immediate environment and to modify his behavior to alleviate rather than aggravate the problem. It is here, then, that the concepts of biodegradable, recycling, and composting can be used as a potential basis for behavior modification.

Activity 4-21: an exploration of garbage by daily accumulation for the population of your city. Inquiry is then directed to your teacher, but the results are presented by the home coalition to expedite the collection and recycling of all materials. The film Garbage is essential that this be viewed.

Groundwork for regaining control of garbage, Activity 4-25, is performed during the game, in the real sense, for many affairs where there is a natural follow-up. Activity 4-26 is that the biodegradable, recycling, and composting are used in gardening. The following reasons that...
IV. TRANSFER AND CYCLING OF MATERIALS IN MY ENVIRONMENT

C. GARBAGE AND MY ENVIRONMENT

often considers the cycles -- garbage, for such discards the energy and atoms in the bedrock. To posal of materials, returning the materials is germane.

em exists, a solution this final core of sound and practical environment and to solve the problem.able, recycling, or behavior

BACKGROUND INFORMATION FOR THE TEACHER

Activity 4-21 and 4-22 involve weighing and sorting one day’s accumulation of garbage by each student and using this data to suggest what a daily accumulation for the city might be. You will need to find out the population of your city. A note sent home to the parent asking cooperation for the home collection is recommended. A worksheet is included to expedite the collection of the data. In separating trash into categories, students will probably find that paper is the largest single component. Inquiring is then directed towards recycling some of these materials.

The film Garbage serves as the basis for Activity 4-23. IT IS ESSENTIAL THAT THIS BE ORDERED WELL IN ADVANCE AND THAT IT BE USED IN THE PROPER SEQUENCE OF ACTIVITIES. It is designed to have impact and presents the problem of trash with a depth seldom thought of. In a trip to a trash collection or disposal center, Activity 4-24 serves as a natural follow-up. It does require added planning on the part of the teacher, but the results should indicate that the time was well spent.

Groundwork for recycling has been laid. The Recycling Payoff game, Activity 4-25, is arbitrarily designed so that the person who recycles during the game wins. However true this may be someday in the real sense, fortunately we have not yet reached the crisis state of affairs where there is no alternative but to recycle at any cost.

Activity 4-26 is a completion of previous activities in the sense that the biodegradable elements of the compost are humus, or very close to it, and will be put to a practical use as a planting medium. The nonbiodegradable materials will have decomposed. A review of terms and components of the compost is included in the activity, along with a time chart to be constructed on the chalkboard. If there is not enough compost to fill up each peat pot, use some soil, pointing out to the students that mixing soil with compost is the way compost is usually used in gardening. The three plants used here were selected for the following reasons that you may decide to use for discussion: Marigolds
are generally relatively either as plants or seed plants for the garden, a juices which repel some unique ornamentals; the fully expand and recover are legume and will help should be familiar to man will produce a seed that enhance germination to s

Two activities, 4-2 in the more traditional these are very practical can demonstrate his unde

A final review of sec
BACKGROUND INFORMATION FOR THE TEACHER (continued)

are generally relatively easy to germinate and grow, easy to obtain either as plants or seeds if the student wants more, excellent border plants for the garden, and natural insecticides, i.e., they have natural juices which repel some insects; Sensitive plants are interesting and unique ornamentals; the leaves will fold up at the slightest touch, to fully expand and recover in fifteen to twenty minutes. The bean plants are legume and will help restore nitrogen to the soil; the fruit, a pod, should be familiar to many students, and if taken care of properly, will produce a seed that can be planted again. It will probably enhance germination to soak all the seeds overnight before planting.

Two activities, 4-27 and 4-28, provide the opportunity for recycling in the more traditional and concrete sense. Spend time on them, since these are very practical ways in which the student can become involved and can demonstrate his understanding.

A final review of success, Activity 4-29, can serve as an instruc-
tional assessment prior to the start of the next unit.
### PLANNING GUIDE

**NOTE:** Some activities (indicated in italics and an "*" in the margin) must be prepared several days or weeks in advance. Use this guide to develop a teaching and preparation schedule. All supplies needed for each activity must be available in the supply kit or provided by you. You must also provide the learning materials used in the activity.

#### Activity Number, Page, Tentative Teaching Date

<table>
<thead>
<tr>
<th>Activity Number, Page, Tentative Teaching Date</th>
<th>Check List of Supplies Needed</th>
<th>Materials in Supply Kit</th>
</tr>
</thead>
<tbody>
<tr>
<td>4-21. Garbage Weighers</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Page ___</td>
<td>Materials You Furnish</td>
<td>Materials in Supply Kit</td>
</tr>
<tr>
<td>Date planned ___</td>
<td>Bags of garbage</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Bag of garbage</td>
<td></td>
</tr>
<tr>
<td></td>
<td>String</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Plastic garbage bags or</td>
<td></td>
</tr>
<tr>
<td></td>
<td>recycled plastic bags</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Plastic or rubber gloves</td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4-22. Garbage Probe</td>
<td>Plastic or rubber gloves</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Newspaper</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Spoons</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Pails or plastic ice cream</td>
<td></td>
</tr>
<tr>
<td></td>
<td>buckets</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Compost</td>
<td></td>
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<tr>
<td></td>
<td>Packages with the term</td>
<td></td>
</tr>
<tr>
<td></td>
<td>biodegradable on them</td>
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</tr>
</tbody>
</table>
The activities (indicated in italics and an arrow in the margin) must be planned several days or weeks in advance. Use this summary as a teaching and preparation schedule. All supplies needed are listed.

<table>
<thead>
<tr>
<th>Note of Supplies Needed</th>
<th>Notes and Suggestions to Teacher (Italics and Arrow Indicate Advance Preparation Directions)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>One bag per student. Note the preplanning directions given in the Teacher Preparation section of Activity 4-21. You must prepare the students for the activity one week before the activity. Two days before the activity you must remind students of their responsibility. You must also contribute one bag of garbage and be a participant in the activity. Your bag can also be used by any students that may have forgotten their own. One ball (strong enough to suspend a 25 lb. weight)</td>
</tr>
<tr>
<td>[ ]</td>
<td>One per student. Ideally about two weeks before the activity have students start collecting large plastic bags to be used in this activity. One pair per student. Get a variety of sizes. One per class Garbage Amounts Worksheet 4-10</td>
</tr>
<tr>
<td>Spring balance</td>
<td></td>
</tr>
<tr>
<td>Worksheet 4-10</td>
<td></td>
</tr>
<tr>
<td>Slide 4-32</td>
<td></td>
</tr>
<tr>
<td></td>
<td>One pair per student. Get a variety of sizes. Large quantity to spread out around the room. Several per class</td>
</tr>
<tr>
<td>[ ]</td>
<td>Six per class One per class Started and used in Core B of Unit IV</td>
</tr>
<tr>
<td></td>
<td>Hunt for these several days in advance of your discussion in Activity 4-22. Previously filled in by students in Core B</td>
</tr>
<tr>
<td>Spring balance</td>
<td></td>
</tr>
<tr>
<td>Worksheet 4-4</td>
<td></td>
</tr>
</tbody>
</table>
### PLANNING GUIDE

**NOTE:** Some activities (indicated in italics and an asterisk in the column) must be prepared several days or weeks in advance. Use this as a teaching and preparation schedule. All supplies need to be ordered at least one month in advance. Order this film for $135.00. New orders will be supplied within 30 days. Read carefully and make arrangements in advance for the details.

<table>
<thead>
<tr>
<th>Activity Number, Page, Tentative Teaching Date</th>
<th>Materials You Furnish</th>
<th>Materials in Supply Kit</th>
<th>Italic and note</th>
</tr>
</thead>
<tbody>
<tr>
<td>4-23. Garbage</td>
<td>16mm Movie sound projector</td>
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<td></td>
</tr>
<tr>
<td>Page ____ Date planned ____</td>
<td>Screen</td>
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<td></td>
</tr>
<tr>
<td></td>
<td>Film, Garbage</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Media Department</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Holt, Rinehart and Winston, Inc.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>383 Madison Avenue</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>New York, New York 10017</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4-24. It's A Real Dump</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Page ____ Date planned ____</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4-25. The Recycling Pay Off</td>
<td>Game: The Recycling Pay Off</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Page ____ Date planned ____</td>
<td>One game set per class</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

[Image of students and teacher with globe]
**PLANNING GUIDE**

Some activities (indicated in italics and an in the margin) must be prepared several days or weeks in advance. Use this summary as a teaching and preparation schedule. All supplies needed are listed.

### List of Supplies Needed

<table>
<thead>
<tr>
<th>Film</th>
<th>Materials in Supply Kit</th>
</tr>
</thead>
<tbody>
<tr>
<td>10017</td>
<td></td>
</tr>
</tbody>
</table>

### Notes and Suggestions to Teacher

**Order this film,** produced by King Screen Productions, several months in advance to guarantee you have it at the appropriate time. It can be rented for about $15.00 or purchased for $135.00. Numerous other film libraries also have the film.

**Read carefully the Teacher Preparation section of this activity** for the details of the trip you must plan. Make the contacts and arrangements outlined at least one week in advance.

**Game: The Recycling Pay Off**

One game set per four or five students
### Check List of Supplies Needed

<table>
<thead>
<tr>
<th>Activity Number, Page, Tentative Teaching Date</th>
<th>Materials You Furnish</th>
<th>Materials in Supply Kit</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>4-26. Planting In Compost</td>
<td>Compost piles</td>
<td>Class compost pot</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Cleaned 1/2 pint milk cartons</td>
<td></td>
<td>Fifty per class</td>
</tr>
<tr>
<td></td>
<td>Popsicle sticks or masking tape</td>
<td></td>
<td>Fifty sticks per class used as an all school situation.</td>
</tr>
<tr>
<td>Page ____ Date planned ____</td>
<td>Marking pencils</td>
<td>Several for class</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Trowels</td>
<td>Fifty per class</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>One package per class</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
PLANNING GUIDE

The activities (indicated in italics and an * in the margin) must be prepared several days or weeks in advance. Use this summary as a teaching and preparation schedule. All supplies needed are listed.

### List of Supplies Needed

<table>
<thead>
<tr>
<th>Item</th>
<th>Materials in Supply Kit</th>
<th>Notes and Suggestions to Teacher [Italics and Arrow Indicate Advance Preparation Directions]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Peat pots</td>
<td></td>
<td>Class compost piles from Core B.</td>
</tr>
<tr>
<td>Seeds:</td>
<td></td>
<td>Fifty per class. Collect these from your school cafeteria.</td>
</tr>
<tr>
<td>Sensitive plant</td>
<td></td>
<td>Fifty sticks per class for labeling pots. Masking tape could be used as an alternate, but the sticks are more like a garden situation.</td>
</tr>
<tr>
<td>Marigold</td>
<td></td>
<td>Several for class use</td>
</tr>
<tr>
<td>Bean</td>
<td></td>
<td>Fifty per class</td>
</tr>
<tr>
<td></td>
<td></td>
<td>One package per class</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Make any community contacts needed to expedite the activities outlined.</td>
</tr>
</tbody>
</table>
### Check List of Supplies Needed

<table>
<thead>
<tr>
<th>Activity Number, Page, Tentative Teaching Date</th>
<th>Materials You Furnish</th>
<th>Materials in Supply Kit</th>
</tr>
</thead>
<tbody>
<tr>
<td>4-28. Me, Recycling, And Art</td>
<td>Art Supplies</td>
<td>Camera (Polaroid Square Shooter)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Film</td>
</tr>
<tr>
<td>4-29. Review Of Success</td>
<td>35mm Slide projector</td>
<td>Worksheet 4-11</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Slide 4-33</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Slide 4-34</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Slide 4-35</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Slide 4-36</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Worksheet 4-12</td>
</tr>
<tr>
<td>Date planned ___</td>
<td></td>
<td>Review Of Success</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Question 1 Re</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Question 2 Re</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Question 3 Re</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Question 4 Re</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Fate Of A New</td>
</tr>
</tbody>
</table>

**NOTE:** Some activities (indicated in italics and an * in the teaching and preparation schedule. All supplies needed are listed above. Some activities may need to be prepared several days or weeks in advance. Use the teaching and preparation schedule.
some activities (indicated in italics and an \[ \text{m} \] in the margin) must be prepared several days or weeks in advance. Use this summary as teaching and preparation schedule. All supplies needed are listed.

<table>
<thead>
<tr>
<th>List of Supplies Needed</th>
<th>Notes and Suggestions to Teacher</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><em>(Italics and Arrow Indicate Advance Preparation Directions)</em></td>
</tr>
<tr>
<td><strong>Materials in Supply Kit</strong></td>
<td>One</td>
</tr>
<tr>
<td>Camera (Polaroid Square Shooter)</td>
<td>One roll</td>
</tr>
<tr>
<td>Film</td>
<td>Provide art supplies only at a minimum where no substitute can be recycled.</td>
</tr>
<tr>
<td><strong>Worksheet 4-11</strong></td>
<td>Review Of Success</td>
</tr>
<tr>
<td><strong>Slide 4-33</strong></td>
<td>Question 1 Review Of Success</td>
</tr>
<tr>
<td><strong>Slide 4-34</strong></td>
<td>Question 2 Review Of Success</td>
</tr>
<tr>
<td><strong>Slide 4-35</strong></td>
<td>Question 3 Review Of Success</td>
</tr>
<tr>
<td><strong>Slide 4-36</strong></td>
<td>Question 4 Review Of Success</td>
</tr>
<tr>
<td><strong>Worksheet 4-12</strong></td>
<td>Fate Of A Newspaper</td>
</tr>
</tbody>
</table>
MATERIALS

*String (strong enough to suspend a 25-pound weight)
*Plastic garbage bags or recycled plastic bags
*Plastic or rubber gloves
*Pail (plastic ice cream bucket)
Spring balance
Slide 4-32
Worksheet 4-10

*Not furnished in materials kit

OBJECTIVE FOCUS FOR THIS ACTIVITY

UNIT GOALS:

1. Appreciate the cycling relationships of the materials and organisms in the environment through:
   
d. Recognition of examples of man's impact upon the environment.

CORE C OBJECTIVES:

1. Perceive that garbage (solid waste) is a man-made problem through his:
   
c. Description of daily garbage.

TEACHING STRATEGIES

Activity 4-21. Garbage Weighers

In this activity students will work with a bag containing a day's accumulation of household garbage. This serves as a basis for determining the quantity of garbage they and the rest of the community produce. The relation of this amount to the amount produced by the entire community is developed.

Teacher Preparation:

About a week before this activity, tell the students about it and prepare the following dittoed note to send home to their parents.
CUES FOR THIS ACTIVITY

OBJECTIVES:
Perceive that garbage (solid waste) is a man-made problem through his:

a. Description of daily garbage.

TEACHING STRATEGIES

6. Garbage Weighers

Activity 4-21. Garbage Weighers

UNIT IV.TRANSFER AND CYCLING OF MATERIALS IN MY ENVIRONMENT

CORE C. GARBAGE AND MY ENVIRONMENT

ANTICIPATED STUDENT BEHAVIORS

At the end of this activity, each student should:

--have collected and brought one day's accumulation of garbage from home.
--have weighed the garbage and recorded the weight on the chart.
--be able to relate his daily accumulation of garbage to the total daily amount produced by his community.
Dear Parent:

On (day) we would like to ask your help with a class project in our study of the environment. We will need a bag of all the trash and garbage that your family has accumulated the previous day. This project is being undertaken so the class can be made aware of the amounts of and specific things that make up garbage. Please help your child collect this garbage to bring to school on (day). Keep the wet garbage separate in a plastic bag. (Plastic bags will be sent home for this purpose.)

Thank you,

(Teacher's name)

If you decide that the above is impractical in your situation, save a couple of day's of your own trash accumulation and bring it in on the proper day.

Two days before the activity, remind students of their responsibility and send the plastic bags home. You should include a note that reminds the parents what the bags are for and remind them to save the garbage from the morning of the preceding day to the morning that the student leaves for school, 24 hours later. On the day of the activity, instruct students to tie a string around their bags of garbage so that they can weigh the bags by hooking the end of the spring balance under one of the strings. (They will weigh their garbage as you might weigh a fish.)

Say:

THIS IS A KIND OF SCALE USED TO WEIGH THINGS.
TO WEIGH THINGS ON THIS SCALE YOU HANG THE
**TEACHING STRATEGIES**

We would like to ask your help with a project in our study of the environment. Please bring a bag of all the trash and garbage that your family has accumulated the previous weekend. This project is being undertaken so that you can be made aware of the amounts of and types of things that make up garbage. Please ask your child to collect this garbage to bring it on [day]. Keep the wet garbage in a plastic bag. (Plastic bags will be provided for this purpose.)

Thank you,

(Teacher's name)

If you decide that the above is impractical for your situation, save a couple of day's your own trash accumulation and bring it on the proper day.

After the activity, remind students of their findings and send the plastic bags home. You should also remind the parents what the bags are for and save the garbage from the morning day to the morning that the student will weigh it, 24 hours later. On the day of the activity, instruct students to tie a string around their trash so that they can weigh the bags by hooking a spring balance under one of the strings. (They might weigh a fish.)

**KIND OF SCALE USED TO WEIGH THINGS.**

**THINGS ON THIS SCALE YOU HANG THE**
ITEM FROM THE HOOK ON THE BOTTOM AND SEE HOW FAR THE NEEDLE ON THE SCALE GOES DOWN.

Demonstrate the use of the spring balance by weighing one of the bags of garbage. (See Diagram 4-8.) Make certain that the string is looped several times so that it will not break when the garbage is suspended. If the quantity of garbage is large it would be best to divide it into two separate bags.

Say:

WE WILL HANG OUR GARBAGE BAGS ON THE SCALE HOOK AND WEIGH THEM NOW.

Help students with this process, demonstrating how to tie the strings and read the balance. On the day of the weighing activity ask the janitor to have at least three garbage cans in your room. Distribute Worksheet 4-10 and project Slide 4-32. Discuss how to complete the worksheet. Have each student weigh his garbage and then fill in his chart as well as the one projected on the board. Have the students who did not bring any garbage for one reason or another work with someone else. As an alternative you may...
ACTIVITY 4-21

TEACHING STRATEGIES

From the hook on the bottom and see how the needle on the scale goes down.

Demonstrate the use of the spring balance by weighing one of garbage. (See Diagram 4-8.) Make certain the ring is looped several times so that it will then the garbage is suspended. If the quantity is large it would be best to divide it into bags.

Hang our garbage bags on the scale hook. Iigh them now.

Help students as necessary with this process, demonstrating how to tie and read the balance. On the day of the activity ask the janitor to have at least three bags in your room. Distribute Worksheet 4-10 and 4-32. Discuss how to complete the worksheet. Student weigh his garbage and then fill in his bill as the one projected on the board. Have those who did not bring any garbage for one reason or ex with someone else. As an alternative you may
wish to make up the extra collections from your own garbage. After each student has weighed his garbage, contributed to the class chart, and completed his chart, ask:

**WE JUST WEIGHED OUR BAGS OF GARBAGE. YOU FOUND OUT HOW MUCH YOUR BAG WEIGHED. IF WE PUT ALL THE GARBAGE BAGS IN THE ROOM TOGETHER, HOW MUCH DO YOU THINK THEY WOULD WEIGH?**

**HOW COULD WE FIND OUT?**

- If students do not suggest adding the figures, say:
  - WOULD OUR SCALE BE BIG ENOUGH TO HOLD ALL THE BAGS?
  - HOW COULD WE USE SOME OF OUR MATH TO FIGURE THIS OUT?

Point out the advantage of adding the weights listed in the second column of Worksheet 4-10 and not having to reweigh all of the garbage. This will be a good arithmetic exercise for students. You may need to help students with their addition, especially in converting ounces to pounds.

**EACH OF YOU RECORDED HOW MANY PEOPLE IN YOUR FAMILY HELPED MAKE YOUR BAG OF GARBAGE. HOW COULD WE FIND OUT HOW MANY PEOPLE MADE ALL THIS (point) GARBAGE?**

Lead students to suggest addition of column 3 on their chart.
Anticipated Student Behaviors

Students:

--respond, "I don't know."

--suggest adding column 2 in the chart, weighing all of them together.

--respond, "No."

--respond, "Add," "I don't know."

--add the third column of the chart and respond, "X number."
WE HAVE ___ (number) OF PEOPLE AND ___ POUNDS OF GARBAGE.  WE WANT TO SPLIT THIS PILE OF GARBAGE INTO AN EQUAL PILE FOR EACH PERSON TO SEE HOW MUCH GARBAGE EACH PERSON WOULD MAKE.  DOES ANYONE KNOW HOW WE COULD DO THIS?

If no one suggests division, use a package of candy, toothpicks, or corns to put across the idea of equal division of quantity of something to each member of the class.  Ask for ways in which you can be certain that each member gets an equal amount.

In any event, continue by saying:

ONE WAY WE CAN FIGURE THIS OUT IS TO USE MATH AND DIVIDE.  WATCH WHILE I DO THE DIVISION.  HOW MANY PEOPLE DO WE HAVE?

Write the number on the chalkboard.

HOW MANY POUNDS OF GARBAGE DO WE HAVE?

Write the number of pounds to the left of the number of people.  Divide while verbally saying what you are doing.  When you get an answer, ask:

HOW MANY POUNDS OF GARBAGE DID EACH PERSON MAKE?

Leave the garbage per person figure on the chalkboard.
TEACHING STRATEGIES

E ____(number) OF PEOPLE AND ___ POUNDS
BAGE. WE WANT TO SPLIT THIS PILE OF
E INTO AN EQUAL PILE FOR EACH PERSON
HOW MUCH GARBAGE EACH PERSON WOULD
DOES ANYONE KNOW HOW WE COULD DO THIS?

If no one suggests division, use a package
of candy, toothpicks, or corns to put
cross the idea of equal division of
quantity of something to each member of
the class. Ask for ways in which you
can be certain that each member gets
an equal amount.

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Y WE CAN FIGURE THIS OUT IS TO USE MATH
VIDE. WATCH WHILE I DO THE DIVISION.
Y PEOPLE DO WE HAVE?

mber on the chalkboard.

Y POUNDS OF GARBAGE DO WE HAVE?

mber of pounds to the left of the number of
vide while verbally saying what you are doing.
t an answer, ask:

Y POUNDS OF GARBAGE DID EACH PERSON MAKE?

bage per person figure on the chalkboard.

ANTICIPATED STUDENT BEHAVIORS

ACTIVITY 4-21

Students:

--will suggest such things as: "Give one item to
each person at a time," "Separate into piles and
count out each pile," "Divide the number of
people into the number of items."

--respond with the number of people in class.

--respond with the number of pounds of garbage
the class has.
Continue by asking:

- **HOW LONG DID IT TAKE YOUR FAMILY TO MAKE THE BAGS OF GARBAGE?**

- **HOW MANY PEOPLE ARE IN YOUR FAMILY, (student's name)?**

- **HOW MANY PEOPLE ARE IN YOUR FAMILY, (student's name)?**

- **WHO MADE MORE POUNDS OF GARBAGE?**

- **WHY?**

- **WHAT ARE SOME OTHER REASONS? WHY MIGHT A FAMILY OF THREE SOMETIMES HAVE MORE GARBAGE THAN A FAMILY OF FOUR OR FIVE?**

**WE HAVE SEEN HOW MUCH GARBAGE EACH FAMILY MAKES AND HOW MUCH ALL THE FAMILIES IN OUR CLASS MAKE: NOW LET'S SEE HOW MUCH GARBAGE OUR (city, town, village) MAKES.**

If students do not know the population of your city, (which they probably do not), provide the figure for them.

Then ask:

- **HOW MANY POUNDS OF GARBAGE DO THE PEOPLE IN OUR CITY PRODUCE IN ONE DAY?**

- **WE FOUND OUT HOW MANY POUNDS OF GARBAGE A PERSON MAKES. HOW COULD WE FIGURE IT OUT?**
<table>
<thead>
<tr>
<th>TEACHING STRATEGIES</th>
<th>ANTIMICATED STUDENT BEHAVIORS</th>
</tr>
</thead>
<tbody>
<tr>
<td>asking:</td>
<td>Students:</td>
</tr>
<tr>
<td>HOW DID IT TAKE YOUR FAMILY TO MAKE THE GARBAGE?</td>
<td>--respond, &quot;One day.&quot;</td>
</tr>
<tr>
<td>How many people are in your family, (student's)</td>
<td>--respond with the number of people in his family.</td>
</tr>
<tr>
<td>How many pounds of garbage?</td>
<td>--respond with the number of people in his family.</td>
</tr>
<tr>
<td>Is there something other reasons? Why might a family sometimes have more garbage than a family of four or five?</td>
<td>--respond, &quot;The family that had more people.&quot;</td>
</tr>
<tr>
<td>We saw how much garbage each family makes.</td>
<td>--respond, &quot;Because they had more people in their family.&quot;</td>
</tr>
<tr>
<td>do not know the population of your city, (which we do not), provide the figure for them.</td>
<td>--suggest that some people are more wasteful, that some families have more things than others, or that some people can afford to discard more items than others can.</td>
</tr>
<tr>
<td>How many pounds of garbage do the people in your produce in one day?</td>
<td>--respond, &quot;I don't know.&quot;</td>
</tr>
<tr>
<td>How could we figure it out?</td>
<td>--some may respond, &quot;Multiply by the number of people in our city.&quot;</td>
</tr>
</tbody>
</table>
### Materials

<table>
<thead>
<tr>
<th>TEACHING STRATEGIES</th>
</tr>
</thead>
</table>

If they don't respond, suggest multiplying. If possible allow a more able student to compute it.

**NOTE:** Formula to follow is:

\[
\text{pounds of garbage per person (which you have already computed)} \\
\times \text{number of people in the city} \\
= \text{pounds of garbage for all people in the city}
\]

**HOW MUCH GARBAGE DOES OUR CITY PRODUCE?**

**IS THAT VERY MUCH GARBAGE?**

In order to make the amount concrete, determine how many truckloads that would fill. This is all the more impressive when one considers that the rubbish is compressed in the truck. Use an average of 40,000 pounds (20 tons) per truck to figure this out. Do the computation yourself.

**THIS AMOUNT OF GARBAGE IS ENOUGH TO FILL _____ GARBAGE TRUCKS.**

**THUS, OUR CITY MAKES ENOUGH GARBAGE, TRASH, AND RUBBISH TO FILL _____ TRUCKS IN ONE DAY.**

**IS THAT VERY MUCH GARBAGE?**

At this point students should be somewhat impressed with the large numbers and the large amounts of garbage. In
TEACHING STRATEGIES

't respond, suggest multiplying. If possible, ask the able student to compute it.

A formula to follow is:

\[
\text{ds of garbage per person (which you already computed)} 
\times \text{number of people in the city} 
\times \text{ds of garbage for all people in the city} 
\]

This formula can be used to determine how much garbage is produced by the city. Use an average of 40,000 pounds (20 tons) to figure this out. Do the computation yourself.

GARBAGE DOES OUR CITY PRODUCE?

How much garbage do we produce? Make the amount concrete, determine how many garbage trucks would fill it. This is all the more impressive when you consider that the rubbish is compressed in trash cans.

Use an average of 40,000 pounds (20 tons) to figure this out. Do the computation yourself.

MOUNT OF GARBAGE IS ENOUGH TO FILL GARBAGE TRUCKS. THUS, OUR CITY PRODUCES ENOUGH GARBAGE, TRASH, AND RUBBISH TO FILL ___ TRUCKS IN ONE DAY.

GARBAGE PRODUCE?

How much garbage do we produce? Make the amount concrete, determine how many garbage trucks would fill it. This is all the more impressive when you consider that the rubbish is compressed in trash cans.

Use an average of 40,000 pounds (20 tons) to figure this out. Do the computation yourself.

MOUNT OF GARBAGE IS ENOUGH TO FILL GARBAGE TRUCKS. THUS, OUR CITY PRODUCES ENOUGH GARBAGE, TRASH, AND RUBBISH TO FILL ___ TRUCKS IN ONE DAY.

ANTICIPATED STUDENT BEHAVIORS

Students:

--look at the computation just completed and repeat the answer.

--will probably indicate that it is a large amount.

--will be somewhat impressed with the numbers and the large amounts of garbage. In
<table>
<thead>
<tr>
<th>MATERIALS</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>TEACHING STRATEGIES</th>
</tr>
</thead>
</table>

the next activity, students will have more sensory contact with their garbage. The film in Activity 4-23 will further magnify the garbage problem.

In Activity 4-22, students will separate their bags of garbage into categories based on the materials making up the garbage.
<table>
<thead>
<tr>
<th>TEACHING STRATEGIES</th>
<th>ANTICIPATED STUDENT BEHAVIORS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Activity, students will have more sensory with their garbage. The film in Activity 4-23 will magnify the garbage problem.</td>
<td></td>
</tr>
<tr>
<td>4-22, students will separate their bags into categories based on the materials the garbage.</td>
<td></td>
</tr>
</tbody>
</table>
UNIT IV, CORE C
ACTIVITY 4-21: "Garbage Weighers"

Activity name suggested by class: [Teacher]

<table>
<thead>
<tr>
<th>BSCS USE:</th>
<th>Post</th>
<th>Tally</th>
<th>Rev</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Day 1**

1. Date taught (month and date, e.g., 11/2) [ ]
2. Minutes of class time on science each day [ ]
3. Minutes of preparation each day [ ]
4. Students absent on each date (Use ID Number) [ ]

**Day 2**

<table>
<thead>
<tr>
<th></th>
<th>Day 3</th>
<th>Day 4</th>
<th>Day 5</th>
<th>Day 6</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

5. Interest of class as expressed by apparent attention to what is happening.

Number of students responding with: Name students you noted especially:

<table>
<thead>
<tr>
<th>Interest of class</th>
<th>(Number)</th>
</tr>
</thead>
<tbody>
<tr>
<td>HIGH INTEREST</td>
<td></td>
</tr>
<tr>
<td>MODERATE INTEREST</td>
<td></td>
</tr>
<tr>
<td>INDIFFERENCE</td>
<td></td>
</tr>
<tr>
<td>MODERATE RESISTANCE</td>
<td></td>
</tr>
<tr>
<td>STRONG DISLIKE</td>
<td></td>
</tr>
<tr>
<td>HARD TO RATE</td>
<td></td>
</tr>
</tbody>
</table>

6. Equipment in kit: □ None □ Satisfactory □ Too □ Too fragile □ Too complicated to use

7. Equipment I got: □ None □ Easy □ Hard to get, □ Hard to get, □ Unobtainable, needed to get □ okay □ add to kit □ add to kit

8. Materials used:

<table>
<thead>
<tr>
<th>Materials used</th>
<th>Worksheet</th>
<th>Game</th>
<th>Slides (show slide nos.)</th>
<th>Transparency</th>
<th>Card(s)</th>
<th>Tape(s)</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>Worksheet 1</td>
<td>#</td>
<td>#</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Worksheet 2</td>
<td>#</td>
<td>#</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Worksheet 3</td>
<td>#</td>
<td>#</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Game</td>
<td>#</td>
<td></td>
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<td></td>
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<td></td>
</tr>
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<td>Slides</td>
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</tbody>
</table>

9. Maturity level is □ just right □ too childish □ too mature Explain:

10. Vocabulary level is □ just right □ too easy □ too difficult Explain:

11. Were teacher instructions clear enough to follow? □ Yes □ No - Pages and Problem:

12. Were clues to success and reviews of success helpful? □ Yes □ No - Why not?

13. Did the activity fulfill the purpose stated by the Guide? □ Yes □ No - Comment:

14. Were any parts of this activity omitted? □ No □ Yes - Explain:

15. Your rating of this activity:

□ Worthwhile □ Of value--needs the □ Worth salvaging--make revision suggested □ Worthless--keep as is □ Worthless --major changes--describe □ Worthless -- minimal changes--describe
Equipment in kit:  □ None  □ Satisfactory  □ Too needed  □ Too fragile  □ Complicated to use
Equipment I got:  □ None  □ Easy  □ Hard to get, □ Hard to get, □ Unobtainable, needed to get  □ but okay  □ add to kit  □ add to kit

Materials used:

<table>
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<tr>
<th></th>
<th>Worksheet</th>
<th>Game</th>
<th>Slides (show slide nos.)</th>
<th>Transparency</th>
<th>Card(s)</th>
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<td>Worthless: omit</td>
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Maturity level is  □ just right  □ too childish  □ too mature  Explain:
Vocabulary level is  □ just right  □ too easy  □ too difficult  Explain:

Were teacher instructions clear enough to follow?  □ Yes  □ No - Pages and Problem:
Were clues to success and reviews of success helpful?  □ Yes  □ No - Why not?
Did the activity fulfill the purpose stated by the Guide?  □ Yes  □ No - Comment:

Were any parts of this activity omitted?  □ No  □ Yes - Explain:

Your rating of this activity:  □ Worthwhile  □ Of value--needs the □ Worth salvaging--make revision suggested  □ Worthless keep as is -- major changes described -- drop it

SPECIFIC CONCERNS ABOUT THIS ACTIVITY:

There are always parts of activities that are good and need not be changed. What parts of this activity should be retained when the curriculum is revised? Page(s) ____________

How many students understood the numbers in weight of garbage comparisons?  □ None  □ 1/4  □ 1/2  □ 3/4  □ All: Comment.

Were there indications that the activity brought about unpleasantness or embarrassment to the student or his family?  □ No  □ Yes: Comment.

Concern (or questions) about content:

Messages for staff (read immediately):

Have you answered each question, attached annotated Guide, your revisions, student work, etc.?
REPORT OF WHAT HAPPENED AND SUGGESTIONS FOR REVISION

1. Whenever practical write all over your second copy of the Guide. Tear out the activity and send the annotated Guide in with this form.
3. Tell us what you did. Think of what you needed, what you had to work out for yourself, how you presented something to make it go over.
4. Describe the revisions you said were needed in answering the questions on the other side of this form.
5. As a reminder of things that help in revision, read through the following list and check off things you want to be sure to note this time. (We know you can't tell about everything every time!)

THE LESSON
- how you organized materials or class.
- things added (a question, a picture, etc.).
- equipment, supplies, visual aids.
- things that went wrong, misunderstandings.
- what you would do differently or avoid next time.
- turmoil in the class caused by the activity, or disruptive students, or interruptions, and how you dealt with them.

THE STUDENTS
- who had problems and what they were.
- how someone "caught on" (or who never did).
- who was really "turned off" (or on).
- reactions of parents, teachers, students.
- special evidence of learning or applying ideas.
OBJECTIVE FOCUS FOR THIS ACTIVITY

UNIT GOALS:

1. Appreciate the cycling relationships of the materials and organisms in the environment through:
   a. Understanding of the role of decomposers.
   b. Recognition of examples of man's impact upon the environment.

CORE C OBJECTIVES:

1. Perceive that garbage (solid waste) is a man-made problem through his:
   a. Understanding of the concept of biodegradable and nonbiodegradable.
   b. Realization that satisfactory solid waste disposal is difficult.
   c. Description of daily garbage.

3. Exhibit a positive attitude towards microbes that decompose garbage.

TEACHING STRATEGIES

Activity 4-22. Garbage Probe

First analyzing what's in garbage and then relating that to its ability to be decomposed will be used in defining biodegradable and nonbiodegradable. From this background some of the impact that garbage has on us can be understood.
FOCUS FOR THIS ACTIVITY

OBJECTIVES:

- Appreciate the cycling relationships of the materials and organisms in the environment through:
  
  b. Understanding of the role of decomposers.
  
  d. Recognition of examples of man's impact upon the environment.

- Perceive that garbage (solid waste) is a man-made problem through his:
  
  a. Understanding of the concept of biodegradable and nonbiodegradable.
  
  b. Realization that satisfactory solid waste disposal is difficult.
  
  c. Description of daily garbage.
  
  Exhibit a positive attitude towards microbes that decompose garbage.

TEACHING STRATEGIES

22. Garbage Probe

Examining what's in garbage and then relating that activity to be decomposed will be used in defining biodegradable and nonbiodegradable. From this background impact that garbage has on us can be

ANTICIPATED STUDENT BEHAVIORS

At the end of this activity, each student should:

-- have separated his garbage collection into various categories.
-- have inspected his compost and concluded that certain things do not decompose as readily as others.
-- be able to define biodegradable and nonbiodegradable.
ACTIVITY 4-22

MATERIALS

*Spoons
*Newspapers
*Plastic or rubber gloves
*Pail (plastic ice cream bucket)
*Spring balance
*Compost (started and used in Core B)
*Packages with the term biodegradable on it
*Worksheet 4-4

*Not furnished in materials kit

TEACHING STRATEGIES

Give each student plenty of newspapers to spread on his work table. Have students use plastic or rubber gloves to cover their hands when handling the garbage. Ask them why they are using the gloves. They should relate this to harmful microbes and easily tell you why. Some of the garbage may smell, but this is part of the effect! (Open your windows or work outside, weather permitting.)

Allow students to create their own categories for separating the garbage before starting to sort. List the categories on the chalkboard. The following categories will probably be suggested:

- Plastic and rubber
- Metal
- Paper, wood, and cloth
- Glass
- Food (in plastic bag)
- Other (questionable and rare products)

Have a spot for the various kinds of materials. Have them separate their garbage into piles based on these categories. Locate a central collection spot. After separating their garbage, have them deliver their products to the central place. Make sure they include the bag the garbage came in and the newspapers they just used.

When all the garbage has been separated and the room is back in order, delegate certain students to weigh each category of material. Do this by placing the items in a bucket (previously weighed) and weighing with the spring balance. Remind the students the weight will include the weight of the bucket. Subtract the bucket's weight from
TEACHING STRATEGIES

Have students use plastic or rubber gloves to
hands when handling the garbage. Ask them
e using the gloves. They should relate this
molecules and easily tell you why. Some of
may smell, but this is part of the effect!
windows or work outside, weather permitting.)
te to create their own categories for separa-
bage before starting to sort; list the
on the chalkboard. The following categories
be suggested:
- Concrete and rubber
- Wood, and cloth
- In plastic bag)
(questionable and rare products)

for the various kinds of materials. Have them
their garbage into piles based on these cate-
gate a central collection spot. After
their garbage, have them deliver their products
al place. Make sure they include the bag the
in and the newspapers they just used.

The garbage has been separated and the room is
ner, delegate certain students to weigh each
material. Do this by placing the items in a
(weighed) and weighing with the spring
mind the students the weight will include the
bucket. Subtract the bucket's weight from

ANTICIPATED STUDENT BEHAVIORS

At the end of this activity, each student should:
--have identified items which could be recycled.
--have suggested alternate materials to be used for
throw away items which do decompose.

--recall previous grouping activities and arrive at
useful groups.

--separate garbage and put in appropriate place.
the total to determine the weight of the garbage. Have each student get involved with weighing at least one category. Record the weights on the chalkboard alongside the category name. Instruct the students to take garbage (in the same bundles as when weighed) to the school disposal unit. When complete, ask:

WHAT MATERIALS DO WE HAVE THE MOST OF IN OUR GARBAGE?

WHERE DO WE GET THIS MATERIAL FROM?

The most common category will probably be paper. The categories students are most likely not to know will be plastics (petroleum products) and glass (sand). Trace with your students the source of all the categories.

For example:

```
    Milk carton
     
    Newspaper
     
    Paper
     
    Tissue
     
    Letters
     
    Cardboard
     
    Wood
```

Then ask:
### Teaching Strategies

To determine the weight of the garbage. Have students get involved with weighing at least one type of garbage. Record the weights on the chalkboard alongside the student's name. Instruct the students to take garbage bundles as when weighed) to the school's recycling station. When complete, ask:

**Materials do we have the most of in our garbage?**

**Do we get this material from?**

---

### Anticipated Student Behaviors

**Students:**

- Examine the weights measured and identify the most common material in their garbage.
- Trace the source of the most common category.

---

#### Common category will probably be paper. The students are most likely not to know will be petroleum products) and glass (sand). Trace the students the source of all the categories.

- Milk carton
- Newspaper
- Tissue
- Wood
- Letters
- Cardboard
ACTIVITY 4-22

MATERIALS

Worksheet 4-4

TEACHING STRATEGIES

IF ALL PEOPLE IN THE UNITED STATES USE ___ POUNDS OF (most common category - paper) IN A DAY, WHAT WILL HAPPEN EVENTUALLY?

IF WE KEEP USING THIS MUCH (paper) EVERY DAY, WHAT WILL HAPPEN TO OUR PAPER SUPPLY?

WHAT CAN WE DO SO THIS WILL NOT HAPPEN?

CAN ANY OF THESE THINGS (point to the list of categories) BE USED AGAIN?

WHICH ONES WOULD BE THE EASIEST TO USE OVER?

IF WE THROW OUR GARBAGE OUT, WHERE DOES IT GO? Point to the list on the chalkboard.

WHAT WILL HAPPEN TO THESE MATERIALS IN THE DUMP?

LET'S LOOK AT OUR COMPOST ONCE AGAIN.

At this point take out the compost boxes that were set up and inspected in Core B and distribute the student copies of Worksheet 4-4 that were filled in by the students in Core B.

SORT THROUGH THE COMPOST. WHAT THINGS HAVE NOT CHANGED IN APPEARANCE?
TEACHING STRATEGIES

1. People in the United States use pounds of [most common category -]. In a day, what will happen eventually?

2. Keep using this much [paper] every day. What will happen to our paper supply?

3. Can we do so this will not happen?

4. Of these things (point to the list of items) be used again?

5. Ones would be the easiest to use over?

6. Throw our garbage out, where does it go?

7. List on the chalkboard.

8. Will happen to these materials in the future?

9. Look at our compost once again.

10. Intake out the compost boxes that were set up in Core B and distribute the student copies at 4-4 that were filled in by the students in Core A.

11. Look at our compost once again.

12. Through the compost. What things have changed in appearance?

13. Anticipated student behaviors

Students:

- respond, "Garbage will build up."

- infer that we will run out of that material.

- respond, "Use less," "Use it over again."

- respond, "Yes."

- identify things such as bottles, bags, and cans that can be used again.

- respond, "To the dump," "Garbage truck."

- predict the fate of each material.

- sort through and inspect the compost. They will state that the piece of glass, metal bottle cap, and piece of plastic remained unchanged when compared with the rest of the material.
Point to the list on the chalkboard.

HOW ARE THESE MATERIALS LIKE THE ONES WE BURIED IN OUR COMPOST?

EVENTUALLY, WHAT WILL HAPPEN TO SOME OF THE MATERIALS IN THE DUMP?

WHAT CAUSED SOME OF OUR COMPOST MATERIALS TO BREAK DOWN?

Then say:

WE HAVE A SPECIAL NAME FOR THOSE THINGS THAT ARE BROKEN DOWN BY DECOMPOSERS. THE WORD IS BIODEGRADABLE.

Write the term on the chalkboard. It literally means (bio = life, degrade = decompose) easily broken down by living organisms, in this case, microbes. Perhaps you have seen this word on some of the things you have bought in the grocery store. Pass around any packages that have this term on it.

WHAT DOES THIS MEAN ABOUT THIS PACKAGE OR ITS CONTENTS?
TEACHING STRATEGIES

Place the list on the chalkboard.

Are these materials like the ones we have in our compost?

Finally, what will happen to some of the materials in the dump?

A special name for those things that are broken down by decomposers. The word is biodegradable.

On the chalkboard. It literally means degrade in this case, microbes. Perhaps you have some of the things you have in your grocery store. Pass around any packages with this term on it.

Does this mean about this package or its contents?

ANTICIPATED STUDENT BEHAVIORS

Students:

--identify similar materials.

--on the basis of their experience with the compost, will predict that some will decompose and others will not.

Give several students a chance to respond.

--recall that microbes, scavengers, and decomposers break down certain materials.

--indicate their understanding of the word by responding, "It will be broken down by decomposers."
ACTIVITY 4-22

MATERIALS

TEACHING STRATEGIES

LET'S LIST SOME BIODEGRADABLE THINGS. MATERIALS THAT ARE NOT BROKEN DOWN BY DECOMPOSERS ARE CALLED NONBIODEGRADABLE.

Write the term on the chalkboard.

WHAT ARE SOME NONBIODEGRADABLE THINGS?

SINCE SOME THINGS IN GARBAGE DO NOT DECOMPOSE VERY FAST, WHAT COULD BE DONE TO KEEP THEM OUT OF THE GARBAGE?

WHAT MATERIALS IN OUR GARBAGE COULD BE REUSED?

WHAT BIODEGRADABLE THINGS COULD BE USED IN PLACE OF THE NONBIODEGRADABLE ITEMS THROWN AWAY IN OUR GARBAGE?

The questions at the end of this activity are by no means exhaustive or complete. They are merely introductory to
TEACHING STRATEGIES

- List some biodegradable things. Materials that are not broken down by decomposers are labeled nonbiodegradable.

- Write term on the chalkboard.

- Are some nonbiodegradable things?

- Are some things in garbage do not decompose fast, what could be done to keep them out of the garbage?

- Materials in our garbage could be reused?

- Biodegradable things could be used in place of nonbiodegradable items thrown away in our age?

- Give students time to think.

- Ask for other ideas.

ANTICIPATED STUDENT BEHAVIORS

Students:

- Will suggest things such as paper, food wastes, leaves, grass, etc.

- Relate the meaning of the word to actual materials by answering: glass, plastic, bottle caps, metal, etc.

- Suggest using only biodegradable things or reusing things that are nonbiodegradable.

- Identify such things as plastic bags, bottles, etc.

- Suggest the use of paper instead of plastics or glass, etc.

- Suggestions at the end of this activity are by no means complete. They are merely introductory to
<table>
<thead>
<tr>
<th>MATERIALS</th>
<th>TEACHING STRATEGIES</th>
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<tr>
<td></td>
<td>Activity 4-23, which will shed more light on the garbage problem.</td>
</tr>
<tr>
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<td>TOMORROW WE'LL SEE A FILM ON GARBAGE THAT MIGHT ANSWER SOME OF THESE QUESTIONS OR HELP US TO ASK MORE.</td>
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3, which will shed more light on the garbage

We'll see a film on garbage that might
some of these questions or help us to
### ACTIVITY 4-22: "Garbage Probe"

**Teacher**

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<th>Date taught (month and date, e.g. 11/2)</th>
<th>Day 1</th>
<th>Day 2</th>
<th>Day 3</th>
<th>Day 4</th>
<th>Day 5</th>
<th>Day 6</th>
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<td>Minutes of class time on science each day</td>
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<td>Minutes of preparation each day</td>
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<td>Students absent on each date (Use ID Number)</td>
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**BSCS USE:** Post Tally Rev

**Day 1**

**Day 2**

**Day 3**

**Day 4**

**Day 5**

**Day 6**

1. Date taught (month and date, e.g. 11/2)

2. Minutes of class time on science each day

3. Minutes of preparation each day

4. Students absent on each date (Use ID Number)

5. Interest of class as expressed by **apparent attention** to what is happening.

   Number of students responding with:

   - HIGH INTEREST
   - MODERATE INTEREST
   - INDIFFERENCE
   - MODERATE RESISTANCE
   - STRONG DISLIKE
   - HARD TO RATE

6. Equipment in kit: □ None □ Satisfactory □ Too □ Too □ Difficult

   - needed
   - fragile
   - complicated
to use

7. Equipment I rot: □ None □ Easy □ Hard to get, □ Hard to get, □ Unobtainable,

   - needed
   - to get
   - but okay
   - add to kit
   - add to kit

8. Materials used:

   - Worksheet
   - Game
   - Slides (show slide nos.)
   - Transparency
   - Card(s)
   - Tape(s)
   - Other

   - Worthwhile as is
   - Revise slightly
   - Revise much
   - Worthless: omit

9. Maturity level is □ just right □ too childish □ too mature

10. Vocabulary level is □ just right □ too easy □ too difficult

11. Were teacher instructions clear enough to follow? □ Yes □ No - Pages and Problem:

12. Were clues to success and reviews of success helpful? □ Yes □ No - Why not?

13. Did the activity fulfill the purpose stated by the Guide? □ Yes □ No - Comment:

14. Were any parts of this activity omitted? □ No □ Yes - Explain:

15. Your rating of this activity:

   - Worthwhile
   - Of value--needs the
   - Worth salvaging--make
   - Worthless
   - Needs to be
   - Worthless
Equipment in kit:  □ None   □ Satisfactory   □ Too   □ Too   □ Difficult
needed    fragile   complicated to use
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8. Materials used:

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12. Were any parts of this activity omitted?  □ No   □ Yes - Explain:

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--keep as is   --revision suggested   --major changes described   --drop it

SPECIFIC CONCERNS ABOUT THIS ACTIVITY:

16. There are always parts of activities that are good and need not be changed.
What parts of this activity should be retained when the curriculum is revised?
Page(s) ____________________________:

17. List sources of garbage categories which you or your students were unable to trace.

18. Were the students able to distinguish between biodegradable and nonbiodegradable materials?  □ Yes   □ No: Comment.

19. Concern (or questions) about content:

20. Messages for staff (read immediately):

Have you answered each question, attached annotated Guide, your revisions, student work, etc.?
UNIT IV, CORE C
ACTIVITY 4-22: "Garbage Probe"

Teacher ________________

REPORT OF WHAT HAPPENED AND SUGGESTIONS FOR REVISION

1. Whenever practical write all over your second copy of the Guide. Tear out the activity and send the annotated Guide in with this form.
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THE LESSON
☐ how you organized materials or class.
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☐ turmoil in the class caused by the activity, or disruptive students, or interruptions, and how you dealt with them.

THE STUDENTS
☐ who had problems and what they were.
☐ how someone "caught on" (or who never did).
☐ who was really "turned off" (or on).
☐ reactions of parents, teachers, students.
☐ special evidence of learning or applying ideas.
OBJECTIVE FOCUS FOR THIS ACTIVITY

UNIT GOALS:

1. Appreciate the cycling relationships of the materials and organisms in the environment through:
   d. Recognition of examples of man's impact upon the environment.

2. Comprehend the role of man as an integral part of nature, not apart from nature.

CORE C OBJECTIVES:

1. Perceive that garbage (solid waste) is a man-made problem through his:
   a. Understanding of the concept of biodegradable and nonbiodegradable.
   b. Realization that satisfactory solid waste disposal is difficult.

3. Exhibit a positive attitude towards microbes that decompose garbage.

TEACHING STRATEGIES

Activity 4-23. Garbage

A film, Garbage, follows the route trash takes when discarded. It is designed to instill in the viewer a feeling of being inundated in garbage.
FOCUS FOR THIS ACTIVITY

OBJECTIVES:

1. Appreciate the cycling relationships of the materials and organisms in the environment through:
   d. Recognition of examples of man's impact upon the environment.

2. Comprehend the role of man as an integral part of nature, not apart from nature.

TEACHING STRATEGIES

23. Garbage

Garbage, follows the route trash takes when it is designed to instill in the viewer a being inundated in garbage.

UNIT IV. TRANSFER AND CYCLING OF MATERIALS IN MY ENVIRONMENT

CORE C. GARBAGE AND MY ENVIRONMENT

ACTIVITY 4-23. GARBAGE

ANTICIPATED STUDENT BEHAVIORS

At the end of this activity, each student should:

--have viewed the film Garbage.
--have participated in a discussion of the film.
--have made predictions about the appearance of the community refuse disposal site.
--have listed scavengers that might be at the dump.
<table>
<thead>
<tr>
<th>ACTIVITY 4-23</th>
<th>MATERIALS</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>*Film, *Garbage (King Screen Productions)</td>
</tr>
<tr>
<td></td>
<td>*16mm Movie sound projector</td>
</tr>
<tr>
<td></td>
<td>*Screen</td>
</tr>
</tbody>
</table>

|               | *Not furnished in materials kit |

<table>
<thead>
<tr>
<th>TEACHING STRATEGIES</th>
</tr>
</thead>
<tbody>
<tr>
<td>To add visual impact to the previous two activities you should now show the 11-minute film <em>Garbage</em> to the class. It documents one of the routines trash can take when discarded and follows the context of this core well. Holt, Rinehart and Winston, Inc., Media Department, 383 Madison Avenue, New York, New York, 10017, is the source for purchase of the film at $135.00. It can be rented for about $15.00 from the producers or numerous film libraries.</td>
</tr>
</tbody>
</table>

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<thead>
<tr>
<th>Begin the class period by saying:</th>
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<tbody>
<tr>
<td>LET'S WATCH THIS FILM. SEE HOW LONG IT TAKES YOU TO FIGURE OUT WHAT IT IS ABOUT.</td>
</tr>
</tbody>
</table>

| The film has no dialogue. Do not give an explanation of what is occurring. This will allow the students to give unbiased impressions once the projection is completed. |

<table>
<thead>
<tr>
<th>When the film is over, ask:</th>
</tr>
</thead>
<tbody>
<tr>
<td>WHAT DID YOU THINK ABOUT AS YOU WATCHED THE FILM?</td>
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</tbody>
</table>

| DO YOU THINK THE FILM IS WELL NAMED? |
| WHAT DID THE FILM SHOW YOU? |
TEACHING STRATEGIES

A dual impact to the previous two activities you show the 11-minute film Garbage to the class. One of the routines trash can take when discarded follows the context of this core well. Holt, Rinehart and Winston, Inc., Media Department, 383 Madison Avenue, New York, New York, 10017, is the source for the film at $135.00. It can be rented for $00 from the producers or numerous film libraries.

Class period by saying:

WATCH THIS FILM. SEE HOW LONG IT TAKES TO FIGURE OUT WHAT IT IS ABOUT.

As no dialogue. Do not give an explanation of currying. This will allow the students to give impressions once the projection is completed.

Film is over, ask:

DID YOU THINK ABOUT AS YOU WATCHED THE

THINK THE FILM IS WELL NAMED?

DID THE FILM SHOW YOU?

GIVE SEVERAL STUDENTS A CHANCE TO RESPOND

ANTICIPATED STUDENT BEHAVIORS

Students:

--should recall their own impressions and thoughts.

--will indicate that all it showed was garbage, so that's a good name for it.

--respond, "What happens to garbage," "How much garbage people have," "Garbage collection is a big business," "Garbage is handled by lots of people before it goes to the dump (landfill)," "There's more to garbage collecting than I thought there was," etc.
Continue probing until the students have nothing more to say. Then continue by asking:

WHAT ARE SOME OF THE DIFFERENT JOBS PEOPLE HAVE IN WORKING WITH GARBAGE?

List responses on the chalkboard.

(Student's name), HOW MANY MEN DO YOU THINK OUR CITY HIRES TO HANDLE GARBAGE?

Ask many students their opinions. Put the responses on the chalkboard and keep a record of the answers.

(Student's name), HOW MUCH MONEY DO YOU THINK OUR CITY SPENDS EACH YEAR TO HANDLE GARBAGE?

Ask many students what their guess is.

Put these figures on the chalkboard, too, and keep a record of these answers.

Say to the class:

SOME CITIES IN THE UNITED STATES SPEND MORE MONEY EACH YEAR GETTING RID OF GARBAGE THAN THEY SPEND FOR BOTH FIRE AND POLICE PROTECTION. THE MONEY IS SPENT TO PAY ALL THE PEOPLE WHO PICK UP THE GARBAGE, DRIVE THE TRUCKS, WORK AT THE DUMP, AND ALSO TO PAY FOR EQUIPMENT,
TEACHING STRATEGIES

Bring until the students have nothing more to continue by asking:

WHAT ARE SOME OF THE DIFFERENT JOBS PEOPLE WORKING WITH GARBAGE?

Write down the responses on the chalkboard.

Students, how many men do you think the city hires to handle garbage?

Students will make a variety of guesses.

Anticipated Student Behaviors

Students:


--will make a variety of guesses.

--will again make a variety of guesses.

ACTIVITY 4-23

Students in the United States spend more each year getting rid of garbage than on both fire and police protection. Money is spent to pay all the people who handle the garbage, drive the trucks, work the equipment, and also to pay for equipment,
TEACHING STRATEGIES

GASOLINE, AND FIXING THE EQUIPMENT. SOMETIMES THE DUMP MAY BE AS FAR AS FIFTY MILES FROM WHERE THE GARBAGE IS PICKED UP.

WHAT WAS THE MAN DRIVING THE TRACTOR WEARING ON HIS FACE?

If the students did not notice the mask, tell them that he was wearing a mask and then ask:

WHY WAS HE WEARING A MASK?

WHY DO DUMPS STINK?

WHAT IS CAUSING THE GARBAGE TO ROT OR DECOMPOSE?

WHAT IS A MICROBE?

ARE THE MICROBES IN A DUMP HARMFUL?

Ask the students to defend their answers.

WHAT ELSE WOULD YOU SEE BREAKING DOWN OR EATING THE GARBAGE AT THE DUMP?
TEACHING STRATEGIES

INE, AND FIXING THE EQUIPMENT. SOMETIMES
UMP MAY BE AS FAR AS FIFTY MILES FROM
THE GARBAGE IS PICKED UP.

WAS THE MAN DRIVING THE TRACTOR WEARING ON
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A MICROBE?

E MICROBES IN A DUMP HARMFUL?

ents to defend their answers.

LSE WOULD YOU SEE BREAKING DOWN OR
THE GARBAGE AT THE DUMP?

ANTICIPATED STUDENT BEHAVIORS

Students:

--respond, "Mask," "Don't know," "Can't remember."

--respond, "Dump stinks," "There are microbes in the
air," "Keep microbes out of his mouth and nose."

--respond, "The garbage is rotting or decomposing."

--respond, "Microbes," "Rotten stuff," "Bugs."

--recall experiences in Core A of Unit II and Core B
of Unit IV and give statements such as: "Small
living things too small to see without a magnifier," "Living things that decompose biodegradable
substances," "We call some of them germs."

--can give two opposing answers, depending upon their
point of view. Those who have the disease concept
foremost in mind will probably answer, "Yes"; those
who have the decomposition concept in mind will
probably say, "No."

--respond, "Rats," "Mice," "Cockroaches."
WHAT DO WE CALL ALL THESE ANIMALS?

If the words scavenger and pest do not come up, remind the students of the slides on scavengers and the pill bugs. Then ask:

WHY DO WE SOMETIMES CALL THESE ANIMALS PESTS?

Ask for pests the students might expect to find around garbage and list them on the chalkboard. Point out that these pests might be anywhere there is garbage which includes: the home, street, etc.

IN WHAT WAY ARE THESE "PESTS" HELPFUL?

Then say:

BECAUSE THESE PARTICULAR SCAVENGERS ARE GENERALLY CONSIDERED UNPLEASANT, MAN USUALLY TRIES TO CONTROL THEM. HOW CAN WE CONTROL THESE PESTS?

You may have to explain what the meaning of control is in this sense.

Say:

LET'S LOOK AT THE FILM AGAIN AND THIS TIME LOOK FOR TWO THINGS: FIRST, WATCH FOR WAYS TO CONTROL, AND SECOND, LOOK FOR THE KINDS OF THINGS THAT GARBAGE IS MADE UP OF.
TEACHING STRATEGIES

WE CALL ALL THESE ANIMALS?

The words scavenger and pest do not
up, remind the students of the slides
scavengers and the pill bugs. Then

WE SOMETIMES CALL THESE ANIMALS PESTS?

The students might expect to find around
list them on the chalkboard. Point out that
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THESE PESTS?

to explain what the meaning of control is

OK AT THE FILM AGAIN AND THIS TIME
TWO THINGS: FIRST, WATCH FOR WAYS
OL, AND SECOND, LOOK FOR THE KINDS OF
HAT GARBAGE IS MADE UP OF.

ANTICIPATED STUDENT BEHAVIORS

Students:

--respond, "Scavengers," "Pests," or possibly
"Decomposers."

--respond, "Something we don't like," "Things
that are harmful," "Animals that carry disease."

--relate the scavenger and decomposing habits of
certain pests to the breakdown of biodegradable
substances and to the ultimate recycling of
materials back into the environment.

--respond, "Kill them," "Shoot them," "Spray them."
Show the film again.

**WHAT ARE SOME WAYS GARBAGE PESTS CAN BE CONTROLLED OR GOTTEN RID OF?**

If these responses do not come up, suggest them and point out that each of these is a way of changing the habitat of the pests so he cannot feed on the garbage as easily.

Then ask:

**WHAT ARE SOME OF THE THINGS YOU SAW BEING UNLOADED AT THE GARBAGE DUMP?**

**WHICH THINGS THAT YOU SAW WILL ROT OR DECOMPOSE EASILY?**

List on the chalkboard.

**WHAT DO WE CALL THESE THINGS THAT ARE DECOMPOSED EASILY?**

On chalkboard title list *Biodegradable*.

**WHICH THINGS THAT YOU SAW WILL NOT ROT OR DECOMPOSE EASILY?**
Teaching Strategies

Film again.

Are some ways garbage pests can be rolled or gotten rid of?

Responses do not come up, suggest them and point each of these is a way of changing the habitat so he cannot feed on the garbage as easily.

Are some of the things you saw being ded at the garbage dump?

Things that you saw will rot or pose easily?

Write these names on the chalkboard.

Do we call these things that are posed easily?

And title list biodegradable.

Things that you saw will not rot or pose easily?

Anticipated Student Behaviors

Students:


--respond, "Food," "Clothes," "Toys."

--List those things which will rot easily: plant materials such as lettuce, cabbage, grass clippings, etc.; animal matter such as meat scraps, bones, hair, etc.

--Recall the word biodegradable.

--List those things which will not rot easily, such as metal, rubber, plastic, paper, etc.
List the Nonbiodegradable.

WHAT WILL HAPPEN TO THE THINGS THAT DON'T ROT OR DECOMPOSE EASILY?

WHICH THINGS THAT YOU SAW DO WE HAVE BURIED IN OUR COMPOST?

List on the chalkboard.

Conclude the activity by saying:

TOMORROW WE ARE GOING TO VISIT A (dump, school trash site, city incinerator, central collection point) TO SEE HOW OUR (city, school) GETS RID OF ITS GARBAGE. WHAT WOULD IT BE BEST FOR US TO WEAR?

WHY?

WHAT WILL WE SEE AT THE (dump, school trash site, city incinerator, central collection point)?

As the students suggest items, write them on the chalkboard. Keep the list until after students have been to the dump, and then make any deletions or additions.

Review school field trip policies with students if necessary.
chalkboard.

**TEACHING STRATEGIES**

WE CALL THESE THINGS THAT ARE NOT DECOMPOSE EASILY?

chalkboard title list Nonbiodegradable.

WILL HAPPEN TO THE THINGS THAT DON'T DECOMPOSE EASILY?

things that you saw do we have in our compost?

chalkboard.

activity by saying:

WE ARE GOING TO VISIT A (dump, trash site, city incinerator, collection point) TO SEE HOW OUR SCHOOL GETS RID OF ITS GARBAGE. SHOULD IT BE BEST FOR US TO WEAR?

activity: "Old clothes," "Dirty clothes," "Get masks."

suggest items that they predict they will see.

---

**ANTICIPATED STUDENT BEHAVIORS**

Students:

--recall the word nonbiodegradable.

--respond, "Make a mess," "Stay there."

--list items they have buried.

--respond, "Old clothes," "Dirty clothes," "Get masks."

--respond, "It's dirty there."

--suggest items that they predict they will see.
UNIT IV, CORE C
ACTIVITY 4-23: "Garbage"

**Teacher**

**Activity name suggested by class:**

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<th>BSCS USE: Post</th>
<th>Tally</th>
<th>Rev</th>
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| 2. Minutes of class time on science each day |  |  |  |  |  |
| 3. Minutes of preparation each day |  |  |  |  |  |
| 4. Students absent on each date (Use ID Number) |  |  |  |  |  |

5. Interest of class as expressed by apparent attention to what is happening.

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<td>Name students you noted especially:</td>
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6. Equipment in kit: □ None □ Satisfactory □ Too □ Too □ Difficult

7. Equipment I got: □ None □ Easy □ Hard to get, □ Hard to get, □ Unobtainable, needed to get but okay □ add to kit □ add to kit

8. Materials used:

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Worthwhile as is □ Revise slightly □ Revise much □ Worthless, omit

9. Maturity level is □ just right □ too childish □ too mature

10. Vocabulary level is □ just right □ too easy □ too difficult

11. Were teacher instructions clear enough to follow? □ Yes □ No - Pages and Problem:

12. Were clues to success and reviews of success helpful? □ Yes □ No - Why not?

13. Did the activity fulfill the purpose stated by the Guide? □ Yes □ No - Comment:

14. Were any parts of this activity omitted? □ No □ Yes - Explain:

15. Your rating of this activity:

□ Worthwhile □ Of value--needs the □ Worth salvaging--make □ Worthless

--keep as is □ revision suggested □ major changes described □ drop it
6. Equipment in kit: □ None □ Satisfactory □ Too needed □ Too fragile □ Difficult complicated to use
   Equipment I got: □ None □ Easy □ Hard to get, □ Hard to get, □ Unobtainable, needed to get but okay, add to kit, add to kit

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15. Your rating of this activity:
   □ Worthwhile □ Of value—needs the □ Worth salvaging—make revision suggested □ Worthless—keep as is □ major changes described—drop it

SPECIFIC CONCERNS ABOUT THIS ACTIVITY:

16. There are always parts of activities that are good and need not be changed. What parts of this activity should be retained when the curriculum is revised? Page(s) ____________:

17. Did pupils seem confused at the opposing points of view as to whether microbes are harmful? □ No □ Yes: Comment.

18. Did you find it necessary to give an explanation of controlling pests? □ No □ Yes: If yes, what explanation did you give?

19. Concern (or questions) about content:

20. Messages for staff (read immediately):

Have you answered each question, attached annotated Guide, your revisions, student work, etc.?
REPORT OF WHAT HAPPENED AND SUGGESTIONS FOR REVISION

1. Whenever practical write all over your second copy of the Guide. Tear out the activity and send the annotated Guide in with this form.


3. Tell us what you did. Think of what you needed, what you had to work out for yourself, how you presented something to make it go over.

4. Describe the revisions you said were needed in answering the questions on the other side of this form.

5. As a reminder of things that help in revision, read through the following list and check off things you want to be sure to note this time. (We know you can't tell about everything every time!)

THE LESSON
- how you organized materials or class.
- equipment, supplies, visual aids.
- things that went wrong, misunderstandings.
- what you would do differently or avoid next time.
- turmoil in the class caused by the activity, or disruptive students, or interruptions, and how you dealt with them.

THE STUDENTS
- who had problems and what they were.
- who was really "turned off" (or on).
- reactions of parents, teachers, students.
- special evidence of learning or applying ideas.
OBJECTIVE FOCUS FOR THIS ACTIVITY

UNIT GOALS:

1. Appreciate the cycling relationships of the materials and organisms in the environment through:
   b. Understanding of the role of decomposers.
   d. Recognition of examples of man's impact upon the environment.

CORE C OBJECTIVES:

1. Perceive that garbage (solid waste) is a man-made problem through his:
   a. Understanding of the concept of biodegradable and nonbiodegradable.
   b. Realization that satisfactory solid waste disposal is difficult.
   c. Description of daily garbage.

2. Accept the need for recycling materials through his:
   b. Identification of uses for various components of solid waste.

3. Exhibit a positive attitude towards microbes that decompose garbage.
UNIT IV. TRANSFER AND CYCLING OF MATERIALS IN MY ENVIRONMENT

CORE C. GARBAGE AND MY ENVIRONMENT

ACTIVITY 4-24. IT'S A REAL DUMP

OBJECTIVES:

Perceive that garbage (solid waste) is a man-made problem through his:

a. Understanding of the concept of biodegradable and nonbiodegradable.

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COS FOR THIS ACTIVITY

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UNIT IV.

TRANSFER AND CYCLING OF MATERIALS IN MY ENVIRONMENT

CORE C.

GARBAGE AND MY ENVIRONMENT

ACTIVITY 4-24.

IT'S A REAL DUMP
Activity 4-24.  It's A Real Dump

In this activity students will visit their community's garbage dump, central trash collection site, incinerator, or school trash area. They will gain knowledge of how trash is disposed of in their immediate environment. The value of this experience is that the students are able to see the disposal of garbage, first-hand and begin to understand the problems of disposing of nonbiodegradable materials.

Teacher Preparation:

Contact the manager of the city dump, incinerator, collection site, or school trash area at least a week before the planned visit. You might wish to have him be present and explain the city operation of garbage disposal either in the classroom before or after the visit or at the dump the day of the visit. Set a mutually satisfactory date and time for the visit, with an alternate date in case of inclement weather. Call again the day before the visit to be sure everything is still all right. If your community has a landfill, the city administration may prefer to use the words sanitary landfill instead of dump to describe it.

While on the visit students should look for the following kinds of things:

1. The different kinds of garbage brought to the dump.
2. Is the garbage separated and dumped in different areas or not? Why?
3. Is any garbage burned?
4. Is all the garbage burned?
5. What jobs are necessary? What are the responsibilities of each of these jobs?
### TEACHING STRATEGIES

**24. It's A Real Dump**

- Activity: Students will visit their community's p, central trash collection site, incinerator, trash area. They will gain knowledge of how disposed of in their immediate environment. The is experience is that the students are able to posal of garbage, first-hand and begin to the problem of disposing of nonbiodegradable

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- If the community has a landfill, the city administration to use the words sanitary landfill instead of cribe it.

- Visit students should look for the following ings:
  - Different kinds of garbage brought to the
  - Garbage separated and dumped in different or not? Why?
  - Garbage burned?
  - The garbage burned?
  - Obs are necessary? What are the respons- ties of each of these jobs?

### ANTICIPATED STUDENT BEHAVIORS

At the end of this activity, each student should:
- Have visited the community garbage dump.
- Have participated in a discussion of the experience at the dump.
- Have inferred the impact of nonbiodegradable materials on the environment.
<table>
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<tr>
<th>MATERIALS</th>
<th>TEACHING STRATEGIES</th>
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6. Where is the dump located in relationship to the community? Is it close to the city or far away from it? Why?

7. Are there any animals and insects living at the dump? What are they?

8. How does the dump look?

9. How does the dump smell? Why?

10. How is our dump like and unlike the one in the film?

11. How much land is a part of the dump?

12. How much land has already been covered or filled at the dump?

13. What land, if any, is available for new garbage dumps?

14. What is done with the garbage that will rot?

15. What is done with the garbage that will not rot?

16. What things did you see that could have been used again rather than thrown away?

Have the list of questions dittoed so that the students can refer to them while on the trip. You may wish to have teams assigned to certain questions or have a contest to see who can answer the most questions.

The day after the students have been to the dump go over the list on the chalkboard, i.e., garbage jobs, etc., and discuss. Also discuss their experiences, bringing out the items suggested above, stressing the fact that many items that are disposed of do not decompose.
TEACHING STRATEGIES

Where is the dump located in relationship to the city? Is it close to the city or far away? Why?

Are any animals and insects living at the dump? What are they?

Does the dump look nice? Why?

Does the dump smell? Why?

Is our dump like and unlike the one in the film?

How much land is a part of the dump?

How much land has already been covered or filled in the dump?

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Is done with the garbage that will rot?

Is done with the garbage that will not rot?

Things did you see that could have been used rather than thrown away?

First of questions dittoed so that the students can copy them while on the trip. You may wish to assign to certain questions or have a contest where the students have been to the dump go over the chalkboard, i.e., garbage jobs, etc., and also discuss their experiences, bringing out the stated above, stressing the fact that many items disposed of do not decompose.

ANTICIPATED STUDENT BEHAVIORS

Students:

---infer the impact of nonbiodegradable materials on the environment.
UNIT IV, CORE C

ACTIVITY 4-24: "It’s A Real Dump"

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(Use ID Number)

5. Interest of class as expressed by *apparent attention* to what is happening.

Number of students responding with: Name students you noted especially:

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<td>Revise slightly</td>
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<tr>
<td>Revise much</td>
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<tr>
<td>Worthless: omit</td>
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</tbody>
</table>

9. Maturity level is □ just right □ too childish □ too mature Explain:

10. Vocabulary level is □ just right □ too easy □ too difficult Explain:

11. Were teacher instructions clear enough to follow? □ Yes □ No - Pages and Problem:

12. Were clues to success and reviews of success helpful? □ Yes □ No - Why not?

13. Did the activity fulfill the purpose stated by the Guide? □ Yes □ No - Comment:

14. Were any parts of this activity omitted? □ No □ Yes - Explain:

15. Your rating of this activity:

□ Worthwhile □ Of value-needs the □ Worth salvaging--make □ Worthless

--keep as is □ revision suggested □ major changes described □ keep it
needed   fragile   complicated   to use
Equipment I got:  □ None  □ Easy  □ Hard to get, □ Hard to get, □ Unobtainable, needed to get but okay  add to kit  add to kit

8. Materials used:

<table>
<thead>
<tr>
<th>Worksheet #</th>
<th>Game #</th>
<th>Slides (show slide nos.)</th>
<th>Transparency #</th>
<th>Card(s) #</th>
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9. Maturity level is  □ just right  □ too childish  □ too mature  Explain:

10. Vocabulary level is  □ just right  □ too easy  □ too difficult  Explain:

11. Were teacher instructions clear enough to follow?  □ Yes  □ No - Pages and Problem:

12. Were clues to success and reviews of success helpful?  □ Yes  □ No - Why not?

13. Did the activity fulfill the purpose stated by the Guide?  □ Yes  □ No - Comment:

14. Were any parts of this activity omitted?  □ No  □ Yes - Explain:

15. Your rating of this activity:
   □ Worthwhile  □ Of value--needs the  □ Worth salvaging--make  □ Worthless
   --keep as is -- revision suggested major changes described --drop it

SPECIFIC CONCERNS ABOUT THIS ACTIVITY:

16. There are always parts of activities that are good and need not be changed.
What parts of this activity should be retained when the curriculum is revised?
Page(s) __________________:

17. Were students reluctant to take the "dump" trip?  □ No  □ Yes: Comment.

18. Did you encounter any problems arranging or conducting the dump trip?  □ No  □ Yes: Comment.

19. Concern (or questions) about content:

20. Messages for staff (read immediately):

Have you answered each question, attached annotated Guide, your revisions, student work, etc.? 
SIDE A
REPORT OF WHAT HAPPENED AND SUGGESTIONS FOR REVISION

1. Whenever practical write all over your second copy of the Guide. Tear out the activity and send the annotated Guide in with this form.


3. Tell us what you did. Think of what you needed, what you had to work out for yourself, how you presented something to make it go over.

4. Describe the revisions you said were needed in answering the questions on the other side of this form.

5. As a reminder of things that help in revision, read through the following list and check off things you want to be sure to note this time. (We know you can't tell about everything every time!)

THE LESSON

☐ how you organized materials or class.
☐ things added (a question, a picture, etc.).
☐ equipment, supplies, visual aids.
☐ things that went wrong, misunderstandings.
☐ what you would do differently or avoid next time.
☐ turmoil in the class caused by the activity, or disruptive students, or interruptions, and how you dealt with them.

THE STUDENTS

☐ who had problems and what they were.
☐ how someone "caught on" (or who never did).
☐ who was really "turned off" (or on).
☐ reactions of parents, teachers, students.
☐ special evidence of learning or applying ideas.
OBJECTIVE FOCUS FOR THIS ACTIVITY

UNIT GOALS:

1. Appreciate the cycling relationships of the materials and organisms in the environment through:
   c. Realization that certain materials are in finite supply.
   d. Recognition of examples of man's impact upon the environment.

2. Comprehend the role of man as an integral part of nature, not apart from nature.

CORE C OBJECTIVES:

2. Accept the need for recycling materials through his:
   a. Recognition that certain materials are in finite supply.
   c. Accomplishment of a recycling task.

TEACHING STRATEGIES

Activity 4-25. The Recycling Payoff

This activity introduces a rather difficult concept -- recycling. To obtain a working definition of recycling and an appreciation of its good aspects are the main purposes of the activity. Other subtle aspects of recycling may or may not be realized, depending on the readiness and background of your class. Increased understandings that could result from playing the game presented in this activity are as follows:
US FOR THIS ACTIVITY

IS:

Appreciate the cycling relationships of the materials and organisms in the environment through:

c. Realization that certain materials are in finite supply.
d. Recognition of examples of man's impact upon the environment.

Comprehend the role of man as an integral part of nature, not apart from nature.

OBJECTIVES:

Accept the need for recycling materials through his:

a. Recognition that certain materials are in finite supply.
b. Accomplishment of a recycling task.

t
teaching strategies

The Recycling Payoff

introduces a rather difficult concept -- obtain a working definition of recycling, but its good aspects are the main activity. Other subtle aspects may not be realized, depending on and background of your class. Increased that could result from playing the game his activity are as follows:

UNIT IV. TRANSFER AND CYCLING OF MATERIALS IN MY ENVIRONMENT

CORE C. GARBAGE AND MY ENVIRONMENT

ACTIVITY 4-25. THE RECYCLING PAYOFF

ANTICIPATED STUDENT BEHAVIORS

At the end of this activity, each student should:

--have participated in the Recycling Payoff game.
--have developed an understanding of the rules of the game and used them in making wise choices in the game.
--have managed his artificial money successfully and stayed in the game as long as possible.
--have developed a working definition of recycling.
--have developed such other concepts related to recycling as may be appropriate to the background of the class.
### ACTIVITY 4-25

#### MATERIALS

*Game: Recycling Payoff (one game set per four students)*

#### TEACHING STRATEGIES

1. An understanding and a working definition of recycling.

2. A realization that some things are in finite supply and that we may exhaust that supply, perhaps because of circumstances we cannot control.

3. An understanding of why recycling is frustrating: a) it may be the obvious thing to do, yet may not be possible at certain times and with certain things; b) it costs money and long-range benefits may not be obvious.

4. A realization that there is an element of chance in finding new resource supplies and, therefore, man must continually search for new resource locations. The possible resource sites are also finite and therefore, recycling will ultimately be essential.

5. A realization that at times money, land and other possessions are worthless if freedom is lost or if they can not be used to secure desired ends.

The rules of this game are not as complex as they may first appear. To explain them to the class, it will be necessary to use a group of students as an example on day number one. Then the game should be played several times on day two and day three. The game should also be played at later times as requested by the students and/or as seems appropriate to you.

Before the game is started, create interest by allowing students to drill just for fun on the game board. The game board has wooden blocks inside that should be placed in different locations each time the game is played. To accomplish this, the board should be shaken by the banker,
### Teaching Strategies

| Knowledge and a working definition of recycling. |
| Realization that some things are in finite supply and that we may exhaust that supply, perhaps because of circumstances we cannot control. |
| Realization that there is an element of chance in finding new resource supplies and, therefore, man must continually search for new resource locations. The possible resource sites are also finite and therefore, recycling will ultimately be essential. |
| Realization that at times money, land and other possessions are worthless if freedom is lost or if they can not be used to secure desired ends. |

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Game is started, create interest by allowing a drill just for fun on the game board. The has wooden blocks inside that should be placed at locations each time the game is played. To this, the board should be shaken by the banker.

### Anticipated Student Behaviors

| Knowledge and a working definition of recycling. |
| Realization that some things are in finite supply and that we may exhaust that supply, perhaps because of circumstances we cannot control. |
| Realization that there is an element of chance in finding new resource supplies and, therefore, man must continually search for new resource locations. The possible resource sites are also finite and therefore, recycling will ultimately be essential. |
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If this game are not as complex as they may first be explain them to the class, it will be necessary group of students as an example on day number one. Game should be played several times on day two see. The game should also be played at later requested by the students and/or as seems appro- you.

Game is started, create interest by allowing a drill just for fun on the game board. The has wooden blocks inside that should be placed at locations each time the game is played. To this, the board should be shaken by the banker.
placed in the middle of four players, and then not moved again until the game is over.

Rules of the Recycling Payoff Game

1. The game can be played by two, three, or four players and a banker.

2. At the start of the game each player receives $500.00 and two drilling rigs.

3. Any method can be used to determine who goes first. After that the player sequence is in a clockwise direction.

4. The banker handles all the money.

5. During the first round of play each player will have to buy land; player can not drill until they own land.

6. At any given turn after the first round a player has three options -- buy land, drill, or recycle -- as outlined below:

I. Buy Land

   A. Costs $200.00 per plot

   B. Draw card from led card pile after paying banker $200.00. The number on the card corresponds to the plot purchased by the player.

II. Drill

   A. A player can drill during his turn if he owns a piece of land to drill on and has an available drilling rig with which to drill.
the middle of four players, and then not
until the game is over.

The Recycling Payoff Game

The game can be played by two, three, or four
players and a banker.

At the start of the game each player receives
100 and two drilling rigs.

A method can be used to determine who goes
first. After that the player sequence is in
clockwise direction.

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In every given turn after the first round a player
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outlined below:

Buy Land

- Costs $200.00 per plot
- Draw card from land card pile after
  paying banker $200.00. The number on
  the card corresponds to the plot pur-
  chased by the player.

Drill

- A player can drill during his turn if he
  owns a piece of land to drill on and has
  an available drilling rig with which to
  drill.
B. Drill by placing the derrick over one of the 60 drilling holes on the game board and forcing the derrick stick into the hole. If the stick goes all the way down, a miss results; if it goes only partially down, a strike results.

C. After drilling, follow one of two courses of action.

1. If a strike occurs, (see Diagram 4-9) the player should DRAW A CARD from the strike pile and collect the payoff, as described on the card, from the banker. His turn is then over and the rig is left on the property until a later turn.

2. If the drilling was a miss (see Diagram 4-9) the player can either RECYCLE his rig or SELL his rig to the banker. If he recycles the rig:

   a. The player pays $100.00 to the banker, gets one piece of land, and a chance to drill again during this same turn. If a strike occurs on a recycling drill, the player can again collect by drawing a card from the strike card pile. After recycling once the turn is over.

   b. If the player elects to sell instead of recycle, he turns in his rig to the banker and receives $500.00.

NOTE: There is no way to repurchase a rig in the game once it has been sold to the bank. This is the item in the game that is in finite supply. When you run out (either by choice or force, you can not buy a new one.)
Drill by placing the derrick over one of the 60 drilling holes on the game board and forcing the derrick stick into the hole. If the stick goes all the way down, a miss results; if it goes only partially down, a strike results.

After drilling, follow one of two courses of action.

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As no way to repurchase a rig in the game has been sold to the bank. This is the game that is in finite supply. When it is out (either by choice or force, you can get one.)
III. Recycling

A. A player may use his turn by recycling if he has a rig out in the field that is tied up from a previous strike or recycling miss. On a recycling turn, the player must pay $100.00 to recycle his rig. In addition he gets one piece of property that he can then drill on during that same turn. Once he has recycled during a turn, however, a player may not recycle again during the same time! He must wait for a future time.

7. Playing the game continues until one out of three or two out of four players are out of the game. You are out of the game when you have no drilling rigs to drill with. This will happen when the player has been forced to sell his rigs in order to get money to stay in the game.

8. When two players are out of the game, the banker will pay the players still in the game $1000.00 for each of their remaining rigs and $100.00 for each piece of property not drilled on.

9. The winner will then be determined according to who has the most money.

By design the person who has recycled rigs most often will be the winner. This may not be obvious to students at first, and it may take several playings to bring this out. They will soon catch on to what it takes to stay in the game (i.e., recycle every time you can), and this should be the time that you point out to the students the advantages of recycling materials.

After playing the game several times you might try these questions:
TEACHING STRATEGIES

Recycling

A. A player may use his turn by recycling if he has a rig out in the field that is tied up from a previous strike or recycling miss. On a recycling turn, the player must pay $100.00 to recycle his rig. In addition he gets one piece of property that he can then drill on during that same turn. Once he has recycled during a turn, however, a player may not recycle again during the same time! He must wait for a future time.

When the game continues until one out of three or out of four players are out of the game. You are out of the game when you have no drilling rigs left with. This will happen when the player is been forced to sell his rigs in order to get to stay in the game.

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The person will then be determined according to who has the most money.

The person who has recycled rigs most often will win. This may not be obvious to students at it may take several playings to bring this out. Soon catch on to what it takes to stay in the game (recycle every time you can), and this should that you point out to the students the advancing recycling materials.

During the game several times you might try these recycling materials.
<table>
<thead>
<tr>
<th>TEACHING STRATEGIES</th>
</tr>
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<tbody>
<tr>
<td>WHAT IS THE BEST WAY TO PLAY IN ORDER TO WIN THIS GAME?</td>
</tr>
<tr>
<td>WHAT DOES RECYCLE MEAN IN THIS GAME?</td>
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<tr>
<td>WHAT DOES IT MEAN TO RECYCLE?</td>
</tr>
<tr>
<td>WHAT ARE SOME THINGS PEOPLE TRY TO RECYCLE?</td>
</tr>
<tr>
<td>WHY DO THEY DO THIS?</td>
</tr>
<tr>
<td>HOW DO PEOPLE BENEFIT FROM RECYCLING THINGS?</td>
</tr>
<tr>
<td>DOES IT COST MONEY LIKE IT DID IN THE GAME?</td>
</tr>
<tr>
<td>THEN WHY DO THEY DO IT?</td>
</tr>
</tbody>
</table>

Then conclude with this statement:

AS A MATTER OF FACT THERE ARE MANY THINGS THAT ARE IN DANGER OF BEING USED UP BECAUSE THERE IS JUST A CERTAIN AMOUNT OF IT. ONCE THAT AMOUNT IS USED THERE WILL BE NO MORE. FOR THOSE MATERIALS, WHAT MUST BE DONE?

THUS THERE ARE THREE REASONS FOR RECYCLING. WHAT ARE THEY?

Complete Tallysheet 4-8.
TEACHING STRATEGIES

IS THE BEST WAY TO PLAY IN ORDER TO WIN GAME?

DOES RECYCLE MEAN IN THIS GAME?

DOES IT MEAN TO RECYCLE?

ARE SOME THINGS PEOPLE TRY TO RECYCLE?

DO THEY DO THIS?

DO PEOPLE BENEFIT FROM RECYCLING THINGS?

IT COST MONEY LIKE IT DID IN THE GAME?

WHY DO THEY DO IT?

Begin with this statement:

MATTER OF FACT THERE ARE MANY THINGS THAT ARE IN DANGER OF BEING USED UP BECAUSE THERE IS JUST A SMALL AMOUNT OF IT. ONCE THAT AMOUNT IS USED UP, THERE WILL BE NO MORE. FOR THOSE MATERIALS, WHAT MUST BE DONE?

HERE ARE THREE REASONS FOR RECYCLING. ARE THEY?

ANTICIPATED STUDENT BEHAVIORS

Students:

--respond, "Recycle a lot," "Don't sell your drillers," "Don't cheat."

--respond, "Reusing my drillers."

--respond, "To reuse something."

--respond, "Bottles," "Cans."

--respond, "Because we will run out," "For money."

--respond, "Have materials to use over again."

--respond, "Yes," "No," "May make money."

--infer, "Might be necessary," "No other place to get materials."

--indicate that such finite materials must be recycled if the use of them is to continue.

--indicate an understanding of the rationale for recycling by making statements that mean:

- some materials are in finite supply.
- it is wise long-term economics to recycle.
- it helps alleviate the solid waste disposal problem.

llysheet 4-8.
Possible understandings which could result from playing the Recycling Game are listed on pages 1 and 2 of the activity and also below. Make a check in the box indicating the number of your students who attained an understanding. List other understandings which you feel they attained as a result of this activity.

1. An understanding of a working definition of recycling.
   None  1/4  1/2  3/4  All  
   Comment:

2. A realization that some things are in finite supply.
   None  1/4  1/2  3/4  All  
   Comment:

3. A realization that we may totally use up our supply of some things.
   None  1/4  1/2  3/4  All  
   Comment:

4. An understanding of why recycling is frustrating:
   (a) it may be the obvious thing to do yet may not be possible at certain times and with certain things
   None  1/4  1/2  3/4  All  
   Comment:

   (b) it costs money and long-range benefits may not be obvious.
   None  1/4  1/2  3/4  All  
   Comment:

5. A realization that there is an element of chance in finding new resource supplies which man continually searches for.
   None  1/4  1/2  3/4  All  
   Comment:
A realization that some things are in finite supply.

3. A realization that we may totally use up our supply of some things.

4. An understanding of why recycling is frustrating:
   (a) it may be the obvious thing to do yet may not be possible at certain times and with certain things

5. A realization that there is an element of chance in finding new resource supplies which man continually searches for.

6. A realization that at times money, land, and other possessions are worthless if they can not be used to secure desired ends.
UNIT IV, CORE C
ACTIVITY 4-25: "The Recycling Payoff"

Teacher

Activity name suggested by class: BSCS USE: Post Tally Rev

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<th>Day 1</th>
<th>Day 2</th>
<th>Day 3</th>
<th>Day 4</th>
<th>Day 5</th>
<th>Day 6</th>
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<td>2. Minutes of class time on science each day</td>
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<td>3. Minutes of preparation each day</td>
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<td>4. Students absent on each date</td>
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(Use ID Number)

5. Interest of class as expressed by apparent attention to what is happening.

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<th>Number of students responding with:</th>
<th>Name students you noted especially:</th>
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<td>MODERATE INTEREST</td>
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<td>INDIFFERENCE</td>
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<tr>
<td>MODERATE RESISTANCE</td>
<td></td>
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<td>STRONG DISLIKE</td>
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<tr>
<td>HARD TO RATE</td>
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</table>

6. Equipment in kit:

- None
- Satisfactory
- Too fragile
- Too complicated to use
- Difficult needed

7. Equipment I got:

- None
- Easy
- Hard to get, hard to get
- Unobtainable, add to kit
- Too fragile
- Too complicated
- Difficult needed

8. Materials used:

- Worksheet
- Game
- Slides (show slide nos.)
- Transparency
- Card(s)
- Tape(s)
- Other:

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9. Maturity level is

- just right
- too childish
- too mature

Explain:

10. Vocabulary level is

- just right
- too easy
- too difficult

Explain:

11. Were teacher instructions clear enough to follow?

- Yes
- No - Pages and Problem:

12. Were clues to success and reviews of success helpful?

- Yes
- No - Why not?

13. Did the activity fulfill the purpose stated by the Guide?

- Yes
- No - Comment:

14. Were any parts of this activity omitted?

- No
- Yes - Explain:

15. Your rating of this activity:

- Worthwhile
- Of value--needs the --keep as is
- Worth salvaging--make revision suggested
- Worthless major changes described
- Hard to rate
Equipment in kit: □ None □ Satisfactory □ Too □ Too □ Difficult needed fragile complicated to use

Equipment I got: □ None □ Easy □ Hard to get, □ Hard to get, □ Unobtainable, needed to get but okay. □ add to kit

Materials used:

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Maturity level is □ just right □ too childish □ too mature Explain:
Vocabulary level is □ just right □ too easy □ too difficult Explain:

Were teacher instructions clear enough to follow? □ Yes □ No - Pages and Problem:
Were clues to success and reviews of success helpful? □ Yes □ No - Why not?
Did the activity fulfill the purpose stated by the Guide? □ Yes □ No - Comment:
Were any parts of this activity omitted? □ No □ Yes - Explain:

Your rating of this activity:
□ Worthwhile □ Of value--needs the □ Worth salvaging--make □ Worthless--keep as is □ revision suggested □ major changes described □ drop it

SPECIFIC CONCERNS ABOUT THIS ACTIVITY:

There are always parts of activities that are good and need not be changed.
What parts of this activity should be retained when the curriculum is revised?
P. 'e(s) ___________________________

What portion of the class realized that to be a winner requires recycling the rig most often? (Circle one) None 1/4 1/2 3/4 all: Comment:

How many class periods were necessary for students to catch on to the game?
□ 1 period □ 2 periods □ 3 periods □ More

Concern (or questions) about content:

Messages for staff (read immediately):

Have you answered each question, attached annotated Guide, your revisions, student work, etc.?
UNIT IV, CORE C
ACTIVITY 4-25: "The Recycling Payoff"

Teacher

REPORT OF WHAT HAPPENED AND SUGGESTIONS FOR REVISION

1. Whenever practical, write all over your second copy of the Guide. Tear out the activity and send the annotated Guide in with this form.


3. Tell us what you did. Think of what you needed, what you had to work out for yourself, how you presented something to make it go over.

4. Describe the revisions you said were needed in answering the questions on the other side of this form.

5. As a reminder of things that help in revision, read through the following list and check off things you want to be sure to note this time. (We know you can't tell about everything every time!)

THE LESSON

☐ how you organized materials or class.
☐ things added (a question, a picture, etc.).
☐ equipment, supplies, visual aids.
☐ things that went wrong, misunderstandings.
☐ what you would do differently or avoid next time.
☐ turmoil in the class caused by the activity, or disruptive students, or interruptions, and how you dealt with them.

THE STUDENTS

☐ who had problems and what they were.
☐ how someone "caught on" (or who never did).
☐ who was really "turned off" (or on).
☐ reactions of parents, teachers, students.
☐ special evidence of learning or applying ideas.
OBJECTIVE FOCUS FOR THIS ACTIVITY

UNIT GOALS:

1. Appreciate the cycling relationships of the materials and organisms in the environment through:
   a. Understanding of what a cycle is.
   b. Understanding of the role of decomposers.
   d. Recognition of examples of man's impact upon the environment.

2. Comprehend the role of man as an integral part of nature, not apart from nature.

CORE C OBJECTIVES:

2. Accept the need for recycling materials through his:
   c. Accomplishment of a recycling task.

3. Exhibit a positive attitude toward microbes that decompose garbage.

TEACHING STRATEGIES

Activity 4-26. Planting In Compost

This is the first of three actual recycling tasks the student will be asked to perform. In this case the biodegradable materials used in building the class compost will now be used to grow some plants, an illustration of natural recycling. In so doing, the student will further develop the concepts of composting, decomposing, and garbage and gain related knowledge that he may apply to improve his own well-being.
FOCUS FOR THIS ACTIVITY

GOALS:
1. Appreciate the cycling relationships of the materials and organisms in the environment through:
   a. Understanding of what a cycle is.
   b. Understanding of the role of decomposers.
   d. Recognition of examples of man's impact upon the environment.

2. Comprehend the role of man as an integral part of nature, not apart from nature.

OBJECTIVES:
2. Accept the need for recycling materials through his:
   c. Accomplishment of a recycling task.

3. Exhibit a positive attitude toward microbes that decompose garbage.

TEACHING STRATEGIES

26. Planting In Compost

At the end of this activity, each student should:

--have reviewed his concept of composting, decomposition, garbage, landfill, biodegradable.

--relate decomposition and composting to cycling by planting some seeds and watching plants grow in compost.
## ACTIVITY 4-26

### MATERIALS

<table>
<thead>
<tr>
<th>Item</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compost piles</td>
<td></td>
</tr>
<tr>
<td>Commercial planting soil</td>
<td></td>
</tr>
<tr>
<td>50 Peat pots</td>
<td></td>
</tr>
<tr>
<td>50 Cleaned 1/2 pint milk cartons</td>
<td></td>
</tr>
<tr>
<td>50 Popsicle sticks or pieces of masking tape</td>
<td></td>
</tr>
<tr>
<td>3 Marking pencils</td>
<td></td>
</tr>
<tr>
<td>Seeds, 1 package each of:</td>
<td></td>
</tr>
<tr>
<td>Sensitive plants</td>
<td></td>
</tr>
<tr>
<td>Marigolds</td>
<td></td>
</tr>
<tr>
<td>Beans</td>
<td></td>
</tr>
<tr>
<td>Trowels (several)</td>
<td></td>
</tr>
</tbody>
</table>

### TEACHING STRATEGIES

**Teacher Preparation:**

This activity is one of three designed to end Unit IV. It begins with a review of the setting up of the compost pile and what was initially included in the compost. It continues by recalling the observations made and comparing the scavenger and microbe activities related to decomposition and concludes with an activity which practically utilizes the concept of recycling.

Begin by asking:

**WHAT IS COMPOST?** SEVERAL WEEKS AGO WE SET UP A COMPOST PILE. WHAT DID WE INCLUDE IN THAT PILE?

List the materials on the chalkboard.

Then ask:

**LET'S TAKE ANOTHER LOOK AT THE PILE TO SEE WHAT HAS HAPPENED.**

Return Worksheet 4-4 to the students and ask them to look at it.
TEACHING STRATEGIES

Preparation:

It is one of three designed to end Unit IV. It is a review of the setting up of the compost pile initially included in the compost. It involves recalling the observations made and comparing earthworm and microbe activities related to decomposition and concludes with an activity which practically demonstrates a concept of recycling.

King:

WHAT COMPOST? SEVERAL WEEKS AGO WE SET UP A PILE. WHAT DID WE INCLUDE IN THAT PILE?

Materials on the chalkboard.

TAKE ANOTHER LOOK AT THE PILE TO SEE WHAT HAS HAPPENED.

ASSIGNMENT:

Sheet 4-4 to the students and ask them to look at the board and write down what they think that might have happened to it.

ANTICIPATED STUDENT BEHAVIORS

Students:

--recall the work done in Activities 4-8 and 4-22 and describe it as biodegradable material that is being decomposed in a pile.

--respond, "Biodegradable things," "Plant stuff," "Lettuce," as well as the nonbiodegradable things: glass, plates, bottle caps, etc.
WHAT THINGS HAVE DECOMPOSED OR ARE DECOMPOSING?

Write the word on the chalkboard, and break it down thus:

Bio = life        degrad = breakdown

Biodegradable = life that is able to break down easily.

WHAT KIND OF LIFE OR LIVING THINGS BREAK DOWN THE BIODEGRADABLE MATERIALS?

ANYTHING ELSE?

THEN WHAT DO SCAVENGERS EAT?

ALL GARBAGE?

WHAT THINGS STILL HAVEN'T DECOMPOSED?

RIGHT, THESE ARE THINGS WHICH THE MICROBES AND SCAVENGERS CANNOT EAT. THESE ARE CALLED NONBIODEGRADABLE AND ARE ___?

NOW LET'S LOOK AT OUR COMPOST PILE AGAIN.

WHAT DOES IT LOOK LIKE?
### TEACHING STRATEGIES

**Things Have Decomposed or Are Decomposing?**

Was the word we used to describe things decompose in a short period of time?

Word on the chalkboard, and break it down thus:

- degrad = breakdown
- dable = life that is able to break down easily.

**Kind of Life or Living Things Break Down Biodegradable Materials?**

**What Do Scavengers Eat?**

**Garbage?**

Things Still Haven't Decomposed?

These are things which the microbes; scavengers cannot eat. These are called degradable and are _____?

**It's Look at Our Compost Pile Again.**

Does it look like?

### ANTICIPATED STUDENT BEHAVIORS

**Activity 4-26**

**Students:**

--after inspecting their worksheets and the pile, indicate those things that are undergoing decomposition.

**Have You Involved All Students?**

--respond, "Biodegradable."

--respond, "Microbes."

--respond, "Scavengers."

--respond, "Garbage."

--respond, "No, only the biodegradable part of the garbage."

--after inspecting their worksheets and the pile indicate, "Plastic," "Glass," "Metal," etc.

--respond, "Metal, rubber, paper, and glass."

ACTIVITY 4-26

TEACHING STRATEGIES

WHY DID WE SAY COMPOST PILES WERE BUILT?

NOW WE ARE GOING TO MAKE A MINI OR TINY GARDEN WITH OUR COMPOST.

Note to the Teacher:

It is suggested that each student plant three different kinds of seeds; two seeds of one kind in each peat pot. Each student will then have three pots and three different kinds of plants. If there is compost left over, the rest of the seeds can be planted in the leftover compost. Pass out three peat pots and three cleaned recycled 1/2-pint milk cartons to each student. Have each student fill each pot at least three-fourths full with compost. Use commercial planting soil if there is not enough compost to go around. Then place one pot in each milk carton. As the pot itself decomposes the entire planting will conform to the carton. The carton will also catch any excess water used in keeping the seedlings moist. Also give each student three popsicle sticks or pieces of masking tape to use as labels. It would be best to have at least some compost in each pot supplemented with soil for the rest.

After the pots are filled, the student should carefully plant two seeds of one kind in each pot.

TAKE A POPSICLE STICK OR PENCIL AND MAKE TWO HOLES

ABOUT (according to the instructions printed on the seed packets) DEEP IN THE COMPOST IN EACH POT.

TEACHING STRATEGIES

ID WE SAY COMPOST PILES WERE BUILT?
ARE GOING TO MAKE A MINI OR TINY GARDEN
OUR COMPOST.

- Teacher:

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POPSICLE STICK OR PENCIL AND MAKE TWO HOLES
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U PUSH THE SEEDS INTO THE HOLES AND PACK
MPOST LOOSELY OVER THE SEEDS. WATER
OTS THOROUGHLY WHEN FINISHED. POUR AWAY
TER THAT HAS SOAKED THROUGH THE POT INTO
K CARTON. MAR: A POPSICLE STICK OR
G TAPE WITH YOUR NAME AND THE NAME OF THE
IN THAT POT.

ANTICIPATED STUDENT BEHAVIORS

St: dents:

--respond, "To get rid of garbage," "For gardens."
<table>
<thead>
<tr>
<th>MATERIALS</th>
<th>TEACHING STRATEGIES</th>
</tr>
</thead>
</table>

Then refer back to the earlier activities (Activity 4-2 and 4-19) that deal with cycling and develop and write a line of questioning that will indicate that the student understands that the molecules in the compost are now being recycled. Discuss the use of garbage as a fertilizer.

**NOTE:** On the blank pages following this activity make a copy of the strategy questions you use and the behaviors you observed. Mail this in at the same time as you return the feedback form for this activity.

**Note To The Teacher.**

Write the names of the plants on the chalkboard:

- Marigold
- Sensitive plant
- Bean

Give the students the option of taking their plants home to keep them or keeping them in the classroom. Be sure to instruct the students to keep the soil moist to the touch. (Make sure that a few are left in the classroom.)

One advantage to the peat pots used in this activity is that the student can put the whole pot including the plant in the soil and will not have to transplant the plant. If the student does not plan on planting the pot in his yard, it should be eventually planted in a larger clay pot.

The plants planted in the remaining class compost will need to be replanted later.
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planted in the remaining class compost will
replanted later.
### Activity 4-26: "Planting In Compost"

#### Activity name suggested by class:

<table>
<thead>
<tr>
<th>Date taught (month and date, e.g. 11/2)</th>
<th>Day 1</th>
<th>Day 2</th>
<th>Day 3</th>
<th>Day 4</th>
<th>Day 5</th>
<th>Day 6</th>
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<tbody>
<tr>
<td>Minutes of class time on science each day</td>
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<td></td>
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<td>Minutes of preparation each day</td>
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<tr>
<td>Students absent on each date</td>
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<tr>
<td>(Use ID Number)</td>
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</table>

#### Interests of class as expressed by apparent attention to what is happening.

<table>
<thead>
<tr>
<th>Number of students responding with:</th>
<th>Name students you noted especially:</th>
</tr>
</thead>
<tbody>
<tr>
<td>HIGH INTEREST</td>
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<tr>
<td>MODERATE INTEREST</td>
<td></td>
</tr>
<tr>
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<td></td>
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<td>MODERATE RESISTANCE</td>
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</tr>
<tr>
<td>STRONG DISLIKE</td>
<td></td>
</tr>
<tr>
<td>HARD TO RATE</td>
<td></td>
</tr>
</tbody>
</table>

#### Equipment in kit:

- [ ] None
- [ ] Satisfactory
- [ ] Too needed
- [ ] Too fragile
- [ ] Too complicated
- [ ] Difficult
to use

#### Equipment I got:

- [ ] None
- [ ] Easy
- [ ] Hard to get
- [ ] Hard to get, okay
- [ ] Unobtainable
- [ ] Needed to get
- [ ] Add to kit
- [ ] Add to kit

#### Materials used:

<table>
<thead>
<tr>
<th>Materials used</th>
<th>Worksheet</th>
<th>Game</th>
<th>Slides (show slide nos.)</th>
<th>Transparency</th>
<th>Card(s)</th>
<th>Tape(s)</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Worthwhile as is</td>
<td>Revise slightly</td>
<td>Revise much</td>
<td>Worthless: omit</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Maturity level is

- [ ] Just right
- [ ] Too childish
- [ ] Too mature

#### Vocabulary level is

- [ ] Just right
- [ ] Too easy
- [ ] Too difficult

#### Were teacher instructions clear enough to follow?

- [ ] Yes
- [ ] No - Pages and Problem:

#### Were clues to success and reviews of success helpful?

- [ ] Yes
- [ ] No - Why not?

#### Did the activity fulfill the purpose stated by the Guide?

- [ ] Yes
- [ ] No - Comment:

#### Were any parts of this activity omitted?

- [ ] No
- [ ] Yes - Explain:

#### Your rating of this activity:

- [ ] Worthwhile
- [ ] Of value - needs the
- [ ] Worth salvaging - make
- [ ] Worthless
8. Equipment in kit: □ None □ Satisfactory □ Too needed □ Too fragile □ Complicated to use
   Equipment I got: □ None □ Easy □ Hard to get, □ Hard to get, □ Unobtainable, needed to get □ but okay □ add to kit □ add to kit

8. Materials used:

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</table>

9. Maturity level is □ just right □ too childish □ too mature □ Explain:

10. Vocabulary level is □ just right □ too easy □ too difficult □ Explain:

11. Were teacher instructions clear enough to follow? □ Yes □ No - Pages and Problem:

12. Were clues to success and reviews of success helpful? □ Yes □ No - Why not?

13. Did the activity fulfill the purpose stated by the Guide? □ Yes □ No - Comment:

14. Were any parts of this activity omitted? □ No □ Yes - Explain:

15. Your rating of this activity:
   □ Worthwhile □ Of value--needs the □ Worth salvaging--make □ Worthless
   ____________ revision suggested ____________ major changes described ____________ - drop it

SPECIFIC CONCERNS ABOUT THIS ACTIVITY:

16. There are always parts of activities that are good and need not be changed.
   What parts of this activity should be retained when the curriculum is revised?
   Page(s) ____________________________:

17. Were any difficulties encountered in planting the seeds?
   □ No □ Yes - Comment:

18. Concern (or questions) about content:

19. Messages for staff (read immediately):

Have you answered each question, attached annotated Guide, your revisions, student work, etc.?
UNIT IV, CORE C
ACTIVITY 4-26: "Planting In Compost"

Teacher ________________________

REPORT OF WHAT HAPPENED AND SUGGESTIONS FOR REVISION

1. Whenever practical write all over your second copy of the Guide. Tear out the activity and send the annotated Guide in with this form.
3. Tell us what you did. Think of what you needed, what you had to work out for yourself, how you presented something to make it go over.
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THE LESSON
- how you organized materials or class.
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- turmoil in the class caused by the activity, or disruptive students, or interruptions, and how you dealt with them.

THE STUDENTS
- who had problems and what they were.
- how someone "caught on" (or who never did).
- who was really "turned off" (or on).
- reactions of parents, teachers, students.
- special evidence of learning or applying ideas.
OBJECTIVE FOCUS FOR THIS ACTIVITY

UNIT GOALS:

1. Appreciate the cycling relationships of the materials and organisms in the environment through:
   d. Recognition of examples of man's impact upon the environment.

2. Comprehend the role of man as an integral part of nature, not apart from nature.

CORE C OBJECTIVES:

2. Accept the need for recycling materials through his:
   b. Identification of uses for various components of solid waste.
   c. Accomplishment of a recycling task.

TEACHING STRATEGIES

Activity 4-27. A Recycling Scavenger Hunt Or Cleanup

Now that students are aware of the problems of garbage disposal, and specifically the problems brought about by nonbiodegradable materials, it would be desirable to involve them in a cleanup and recycling project of their own.

The interest of your students and your ability to stimulate this interest will promote the success of the project.

There are many specific projects from which to select. Some of these, such as collecting cans and bottles, can be used as money-making projects.
FOCUS FOR THIS ACTIVITY

OBJECTIVES:
- Appreciate the cycling relationships of the materials and organisms in the environment through:
  d. Recognition of examples of man's impact upon the environment.
- Comprehend the role of man as an integral part of nature, not apart from nature.

TEACHING STRATEGIES

UNIT IV. TRANSFER AND CYCLING OF MATERIALS IN MY ENVIRONMENT

CORE C. GARBAGE AND MY ENVIRONMENT

ACTIVITY 4-27. A RECYCLING SCAVENGER HUNT OR CLEANUP

ANTICIPATED STUDENT BEHAVIORS

At the end of this activity, each student should:

--have participated in a class or individual recycling project.
The project you select should be conducted periodically for the remainder of the year. If it is a money-making project, students should be allowed to decide how the money will be used.

You are the key factor in generating and keeping interest in the project, so be enthusiastic.

Once students have started on a project, you might ask why the word scavenger was used when you named the project "A Recycling Scavenger Hunt."

Following are suggested activities. Feel free to participate in any activities you may know of whether or not they are listed. Students may also have suggestions. You may find it expeditious to work in cooperation with any civic groups that already have initiated such projects. Groups that have been involved in the past are the YMCA, Kiwanis, J.C.'s, as well as local environmental groups.

Suggested Projects

1. Collecting aluminum cans.
2. Collecting glass bottles.
3. Collecting scrap metal.
4. Collecting newspapers.
5. Cleaning up the school grounds.
6. Cleaning up vacant yards.
7. Cleaning public grounds and parks.
8. Cleaning water shorelines.
9. Keeping a stretch of roadway or hiking trails litter free through a periodic patrol.

Be creative and enthusiastic!

Keep a record of the amounts of things collected and continue to stress the benefits of such endeavors, especially since they directly influence the student as a creature in his natural environment.
TEACHING STRATEGIES

Select a project that you select should be conducted periodically for the rest of the year. If it is a money-making project, students should be allowed to decide how the money will be spent. To keep the key factor in generating and keeping interest in the project, so be enthusiastic.

If the students have started on a project, you might ask, "What was the scavenger was used when you named the project Scavenger Hunt?" There are suggested activities. Feel free to participate in activities you may know of whether or not they are suggested. Students may also have suggestions. You may wish to work in cooperation with any civic group already have initiated such projects. Groups have been involved in the past are the YMCA, Kiwanis, and local environmental groups.

Projects:
- Collecting aluminum cans.
- Collecting glass bottles.
- Collecting scrap metal.
- Collecting newspapers.
- Cleaning up the school grounds.
- Cleaning up vacant yards.
- Cleaning public grounds and parks.
- Cleaning water shorelines.
- Keeping a stretch of roadway or hiking trails litter free through a periodic patrol.

Be and enthusiastic!

Order of the amounts of things collected and stress the benefits of such endeavors, since they directly influence the student as in his natural environment.

ANTICIPATED STUDENT BEHAVIORS
**ACTIVITY 4-27: "A Recycling Scavenger Hunt Or Cleanup"**

**Teacher**

**Activity name suggested by class:**

<table>
<thead>
<tr>
<th>BSCS USE: Post</th>
<th>Tally</th>
<th>Rev</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Day 1</th>
<th>Day 2</th>
<th>Day 3</th>
<th>Day 4</th>
<th>Day 5</th>
<th>Day 6</th>
</tr>
</thead>
</table>

1. **Date taught (month and date, e.g. 11/2)**
2. **Minutes of class time on science each day**
3. **Minutes of preparation each day**
4. **Students absent on each date (Use ID Number)**

5. **Interest of class as expressed by apparent attention to what is happening.**
   - Number of students responding with: Name students you noted especially:
     - HIGH INTEREST
     - MODERATE INTEREST
     - INDIFFERENCE
     - MODERATE RESISTANCE
     - STRONG DISLIKE
     - HARD TO RATE

6. **Equipment in kit:**
   - □ None
   - □ Satisfactory
   - □ Too needed
   - □ Too fragile
   - □ Too complicated to use

7. **Equipment I go:**
   - □ None
   - □ Easy
   - □ Hard to get
   - □ Hard to get, but okay
   - □ Unobtainable, needed
   - □ Unobtainable, add to kit
   - □ Difficult
   - □ Too complicated
   - □ Unobtainable, add to kit

8. **Materials used:**
   - Worksheet
   - Game #
   - Slides (show slide nos.)
   - Transparency #
   - Card(s)
   - Tape(s)
   - Other

<table>
<thead>
<tr>
<th>Worthwhile as is</th>
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<th>Revise much</th>
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9. **Maturity level is**
   - □ just right
   - □ too childish
   - □ too mature
   - Explain:

10. **Vocabulary level is**
    - □ just right
    - □ too easy
    - □ too difficult
    - Explain:

11. **Were teacher instructions clear enough to follow?**
    - □ Yes
    - □ No - Pages and Problem:

12. **Were clues to success and reviews of success helpful?**
    - □ Yes
    - □ No - Why not?

13. **Did the activity fulfill the purpose stated by the Guide?**
    - □ Yes
    - □ No - Comment:

14. **Were any parts of this activity omitted?**
    - □ No
    - □ Yes - Explain:

15. **Your rating of this activity:**
    - □ Worthwhile
    - □ Of value--needs the
    - □ Worth salvaging--make
    - □ Worthless
    - □ Of value--keep as is
    - □ Revision suggested
    - □ Major changes described
    - □ Drop it
8. Equipment I got: □ None □ Easy □ Hard to get, □ Unobtainable, needed to get but okay □ add to kit □ add to kit

Materials used:

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<td>Revise slightly</td>
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<td>Revise much</td>
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<td>Worthless: omit</td>
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</table>

9. Maturity level is □ just right □ too childish □ too mature Explain:
10. Vocabulary level is □ just right □ too easy □ too difficult Explain:

11. Were teacher instructions clear enough to follow? □ Yes □ No - Pages and Problem:

12. Were clues to success and reviews of success helpful? □ Yes □ No - Why not?

13. Did the activity fulfill the purpose stated by the Guide? □ Yes □ No - Comment:

14. Were any parts of this activity omitted? □ No □ Yes - Explain:

15. Your rating of this activity:
   □ Worthwhile □ Of value--needs the □ Worth salvaging--make revision suggested □ Worthless--keep as is □ Worthless--drop it--major changes described

16. SPECIFIC CONCERNS ABOUT THIS ACTIVITY:
   There are always parts of activities that are good and need not be changed.
   What parts of this activity should be retained when the curriculum is revised?
   Page(s) ____________________:

17. What factors led to the success or failure of the project?

18. Did each student participate in the recycling project?
   □ Yes □ No: If not, which ones and why not?

19. Concern (or questions) about content:

20. Messages for staff (read immediately):

   Have you answered each question, attached annotated Guide, your revisions, student work, etc.?
UNIT IV, CORE C
ACTIVITY 4-27: "A Recycling Scavenger Hunt Or Cleanup"

Teacher

REPORT OF WHAT HAPPENED AND SUGGESTIONS FOR REVISION

1. Whenever practical write all over your second copy of the Guide. Tear out the activity and send the annotated Guide in with this form.
3. Tell us what you did. Think of what you needed, what you had to work out for yourself, how you presented something to make it go over.
4. Describe the revisions you said were needed in answering the questions on the other side of this form.
5. As a reminder of things that help in revision, read through the following list and check off things you want to be sure to note this time. (We know you can't tell about everything every time!)

THE LESSON
☐ how you organized materials or class.
☐ things added (a question, a picture, etc.).
☐ equipment, supplies, visual aids.
☐ things that went wrong, misunderstandings.
☐ what you would do differently or avoid next time.
☐ turmoil in the class caused by the activity, or disruptive students, or interruptions, and how you dealt with them.

THE STUDENTS
☐ who had problems and what they were.
☐ how someone "caught on" (or who never did).
☐ who was really "turned off" (or on).
☐ reactions of parents, teachers, students.
☐ special evidence of learning or applying ideas.
UNIT GOALS:

1. Appreciate the cycling relationships of the materials and organisms in the environment through:
   d. Recognition of examples of man's impact upon the environment.

CORE C OBJECTIVES:

2. Accept the need for recycling materials through his:
   b. Identification of uses for various components of solid waste.
   c. Accomplishment of a recycling task.

TEACHING STRATEGIES

Activity 4-28. Me, Recycling, And Art

This last of three recycling activities should allow students the opportunity to create something useful or artistic from recycled materials. It is a very practical and concrete way of ending the unit.

Tell the students that they may now make something of their choice from recycled materials. The only limits are that they must provide the recycled materials themselves and that the materials must be truly recycled. You will provide as many of the tools and working materials as possible, but encourage students to bring in their own tools to work with also. Contact the art, industrial arts, and home economics instructors for ideas and assistance if need be.
FOCUS FOR THIS ACTIVITY

GOALS:
1. Appreciate the cycling relationships of the materials and organisms in the environment through:
   - d. Recognition of examples of man's impact upon the environment.

OBJECTIVES:
1. Accept the need for recycling materials through his:
   - b. Identification of uses for various components of solid waste.
   - c. Accomplishment of a recycling task.

TEACHING STRATEGIES

ACTIVITY 4-28. ME, RECYCLING, AND ART

3. Me, Recycling, And Art

Three recycling activities should allow students the opportunity to create something useful from recycled materials. It is a very concrete way of ending the unit.

It is a very concrete way of ending the unit.

At the end of this activity, each student should:

--have collected recycled materials of his choice for incorporation into an artistic or useful object.
--have completed the construction of his recycled art or utilitarian form.
Allow the students as much freedom as possible, and provide assistance only when necessary or requested. Remember the success your students had in constructing space ships from styrofoam cups.

Following are some projects suggested by your colleagues.

1. Christmas tree decorations made from old light bulbs, popsicle sticks, tin can covers, gum wrapper or newspaper chains.
2. Ash trays or coasters from tin cans.
3. Waste baskets from circular cardboard or metal drums.
4. Terrariums from old bottles.
5. Swings from old tires.
6. Pencil holders from old tin cans.
7. Window decorations or grouted hot pads from tumbled bits of colored glass.
8. Doll furniture from lumber scraps.

Have students take pictures of their creations. If you have plenty of film, each student could be photographed with his work. It may be necessary, however, for students to photograph several objects at a time to conserve film. Identify each object and who made it on the back of each picture. Also identify who took the picture.
**TEACHING STRATEGIES**

- Allow students as much freedom as possible, and
  provide assistance only when necessary or requested.

- Reflect on the success your students had in constructing items from styrofoam cups.

Some projects suggested by your colleagues:

- Christmas tree decorations made from old light sources, popsicle sticks, tin can covers, gum or newspaper chains.
- Trays or coasters from tin cans.
- Baskets from circular cardboard or metal strips.
- Aquariums from old bottles.
- Signs from old tires.
- Pen holders from old tin cans.
- Bow decorations or grouted hot pads from old bits of colored glass.
- Furniture from lumber scraps.

- Encourage students to take pictures of their creations. If you plan to use film, each student could be photographed separately. It may be necessary, however, for students to take several objects at a time to conserve film. Label each object and who made it on the back of each picture to also identify who took the picture.

**ANTICIPATED STUDENT BEHAVIORS**
<table>
<thead>
<tr>
<th>Tag</th>
<th>Description</th>
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<tbody>
<tr>
<td>1.</td>
<td>Date taught (month and date, e.g. 11/2)</td>
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<tr>
<td>2.</td>
<td>Minutes of class time on science each day</td>
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<td>3.</td>
<td>Minutes of preparation each day</td>
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<tr>
<td>4.</td>
<td>Students absent on each date (Use ID Number)</td>
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</table>

5. Interest of class as expressed by apparent attention to what is happening.
   Number of students responding with: Name students you noted especially:

   - HIGH INTEREST
   - MODERATE INTEREST
   - INDIFFERENCE
   - MODERATE RESISTANCE
   - STRONG DISLIKE
   - HARD TO RATE

6. Equipment in kit:  
   - None
   - Satisfactory
   - Too fragile
   - Too complicated
   - Difficult to use

7. Equipment I got:  
   - None
   - Easy
   - Hard to get, but okay
   - Hard to get, add to kit
   - Unobtainable, add to kit

8. Materials used:  
   - Worksheet
   - Game
   - Slides (show slide nos.)
   - Transparency
   - Card(s)
   - Tape(s)
   - Other

   - Worthwhile as is
   - Revise slightly
   - Revise much
   - Worthless: omit

9. Maturity level is  
   - just right
   - too childish
   - too mature
   - Explain:

10. Vocabulary level is  
    - just right
    - too easy
    - too difficult
    - Explain:

11. Were teacher instructions clear enough to follow?  
    - Yes
    - No

12. Were clues to success and reviews of success helpful?  
    - Yes
    - No

13. Did the activity fulfill the purpose stated by the Guide?  
    - Yes
    - No

14. Were any parts of this activity omitted?  
    - No
    - Yes

15. Your rating of this activity:  
    - Worthwhile
    - Of value—needs the
    - Worth salvaging—make major changes described
    - Worthless—keep as is
    - Of value—needs
    - Worthless—keep as is: revision suggested
    - Of value—needs major changes described
    - Worthless—keep as is
    - Of value—needs
    - Worthless—keep as is: revision suggested
    - Of value—needs major changes described
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    - Worthless—keep as is: revision suggested
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<td>□ No - Comment:</td>
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<td>□ Yes - Explain:</td>
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15. Your rating of this activity:  
   □ Worthwhile  □ Of value—needs the  □ Worth salvaging—make  □ Worthless  
   ______ keep as is ______ revision suggested ______ major changes described ______ drop it

SPECIFIC CONCERNS ABOUT THIS ACTIVITY:

16. There are always parts of activities that are good and need not be changed.  
    What parts of this activity should be retained when the curriculum is revised?  
    Page(s)  

17. Was there much variety in the items brought for recycling?  
   □ Yes  □ No: Comment.  

18. How much supervision did students require during construction of the art form?  
   □ Little  □ Moderate  □ Much: Comment.  

19. Concern (or questions) about content:  

20. Messages for staff (read immediately):  

Have you answered each question, attached annotated Guide, your revisions, student work, etc.?  

SIDE A
REPORT OF WHAT HAPPENED AND SUGGESTIONS FOR REVISION

1. Whenever practical write all over your second copy of the Guide. Tear out the activity and send the annotated Guide in with this form.
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- what you would do differently or avoid next time.
- turmoil in the class caused by the activity, or disruptive students, or interruptions, and how you dealt with them.

THE STUDENTS
- who had problems and what they were.
- how someone "caught on" (or who never did).
- who was really "turned off" (or on).
- reactions of parents, teachers, students.
- special evidence of learning or applying ideas.
OBJECTIVE FOCUS FOR THIS ACTIVITY

UNIT GOALS:

1. Appreciate the cycling relationships of the materials and organisms in the environment through:

   a. Understanding of what a cycle is.
   b. Understanding of the role of decomposers.
   c. Realization that certain materials are in finite supply.
   d. Recognition of examples of man's impact upon the environment.

2. Comprehend the role of man as an integral part of nature, not apart from nature.

CORE C OBJECTIVES:

1. Perceive that garbage (solid waste) is a man-made problem through his:

   a. Understanding of the concept of biodegradable and nonbiodegradable.
   b. Realization that satisfactory solid waste disposal is difficult.
   c. Description of daily garbage.

2. Accept the need for recycling materials through his:

   a. Recognition that certain materials are in finite supply.
   b. Identification of uses for various components of solid waste.
   c. Accomplishment of a recycling task.
FOCUS FOR THIS ACTIVITY

GOALS:
1. Appreciate the cycling relationships of the materials and organisms in the environment through:
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UNIT IV. TRANSFER AND CYCLING OF MATERIALS IN MY ENVIRONMENT

CORE C. GARBAGE AND MY ENVIRONMENT

ACTIVITY 4-29. REVIEW OF SUCCESS
CORE C OBJECTIVES (continued):

3. Exhibit a positive attitude towards microbes that decompose garbage.

TEACHING STRATEGIES

Activity 4-29. Review Of Success

In this activity the students are given the opportunity to express their attitudes about recycling and garbage. Two worksheets and four slides serve as a stimulus for discussion.

Part I.

Distribute Worksheet 4-11 and have each student write his name on it.

Project each question, Slides 4-33 through 4-36, separately. Read question one and answer choices aloud to the students. Allow ample time for them to mark their worksheets. Repeat this procedure for the next three questions.
C OBJECTIVES (continued):

3. Exhibit a positive attitude towards microbes that decompose garbage.

UNIT IV. TRANSFER AND CYCLING OF MATERIALS IN MY ENVIRONMENT

CORE C. GARBAGE AND MY ENVIRONMENT

ACTIVITY 4-29. REVIEW OF SUCCESS

TEACHING STRATEGIES

4-29. Review Of Success

Activity the students are given the opportunity to review their attitudes about recycling and garbage. Notes and four slides serve as a stimulus for:

DISTRIBUTE MATERIALS

Worksheet 4-11 and have each student write his or her question, Slides 4-33 through 4-36, separated question one and answer choices aloud to the class. Allow ample time for them to mark their answers. Repeat this procedure for the next three.

ANTICIPATED STUDENT BEHAVIORS

At the end of this activity, each student should:

-- have expressed his attitudes towards garbage and recycling by completing Worksheets 4-11 and 4-12.
-- be able to defend his answers to the tasks assigned in Worksheets 4-11 and 4-12.

-- should recognize the moccasin as the only biodegradable material and mark picture C with an X.
-- should recognize that all the choices contribute to the garbage problem and so mark.
After all students have had the opportunity to answer all of the questions, collect the worksheets. Then project each slide and discuss the answers with them. Have them defend their choices. Since questions 2, 3, and 4 assess attitude as much as anything else, the student should be given due credit for defending his answer in a logical manner. Allow them to challenge one another. The discussion will give you insight as to which points still need to be stressed.

After the class tally the students' answers on Tallysheet 4-9. Consider whether the whole class needs further review or if a few individuals need special attention.
### TEACHING STRATEGIES

- Students have had the opportunity to answer all questions, collect the worksheets. Then project and discuss the answers with them. Have them choose their choices. Since questions 2, 3, and 4 assess as much as anything else, the student should be credited for defending his answer in a logical manner and allowing them to challenge one another. This will give you insight as to which points still need to be stressed.

### ANTICIPATED STUDENT BEHAVIORS

**Students:**

--- should have modified their initial attitude of "dirty" and "dangerous" when applied to decomposer microbes. An indication of this attitude change is the student's marking of choice B, helpful.

--- most likely will choose either A or B. Whereas throwing a bottle into the trash is far more suitable than tossing it out of a car or smashing it against rocks, the preferred response is recycling. Hence, choice B is the best thing for the environment.

**Activity 4-29**

**Involve your slowest students**

Class tally the students' answers on Tallysheet and consider whether the whole class needs further help or if a few individuals need special attention.
Part II.

Distribute Worksheet 4-12 and have each student write his name and the date on it. Read the question and explain what is to be done. Let the students interpret the four pictures themselves, however.

Give the students a choice of how they wish to complete the story on their own. Have both a tape recorder and a camera available for those students who wish to use those mediums.

Fill in Tallysheet 4-10 applying to Worksheet 4-12. Send in both tallysheets.

Select the cleverest or most interesting student Worksheet 4-12 stories and send in with their ending.
**TEACHING STRATEGIES**

Worksheet 4-12 and have each student write his date on it. Read the question and explain it be done. Let the students interpret the four themselves, however.

Students a choice of how they wish to complete their own. Have both a tape recorder and a able for those students who wish to use those sheets.

Worksheet 4-10 applying to Worksheet 4-12. tallysheets.

everest or most interesting student 12 stories and send in with their ending.

**ANTICIPATED STUDENT BEHAVIORS**

Students:

--may complete the story with any number of intermediate steps, but the final one should indicate a recycling use such as: returning it to a recycling center, using it to make papier-mâché, shredding it for packing materials, etc.
TALLY SHEET 4-9: Summary of Worksheet 4-11
ACTIVITY 4-29: "Review Of Success"

Circle each student's answers to Worksheet 4-11 on the tallysheet below. In the columns for totals, write down the number of students who circled each letter.

<table>
<thead>
<tr>
<th>KEY:</th>
<th>1 (Moccasin)</th>
<th>2 (Garbage Problem)</th>
<th>3 (Microbes)</th>
<th>4 (Recycling)</th>
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<td>A  B  C  D</td>
<td>A  B  C  D</td>
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<td>C</td>
<td>D</td>
</tr>
</tbody>
</table>

**TOTALS:**

Does this review give an accurate indication of student understanding? □ Yes □ No
If not, what other evidence do you have of student learning?
UNIT I', CORE C
TALLYSHEET 4-10: Summary of Worksheet 4-12
ACTIVITY 4-29: "Review Of Success"

**Category 1.** For each student circle the appropriate word to indicate whether the student's story included a recycling use.

**Category 2.** For each student check Finished if he finished the task of story completion or Inc. if his work is not completed.

**Category 3.** For each student check the appropriate column or columns to indicate the medium used to complete the story. Write in other ways students expressed their stories under "Other."

<table>
<thead>
<tr>
<th>Category 1: Recycling Use</th>
<th>Category 2: Finished</th>
<th>Inc.</th>
<th>Category 3: Medium Used</th>
<th>Other (explain)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Attach ID 01</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Yes</td>
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<tr>
<td>Yes</td>
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</tbody>
</table>

List here.
<table>
<thead>
<tr>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>No</td>
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<tr>
<td>Yes</td>
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<td>Yes</td>
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<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Yes</td>
<td>No</td>
</tr>
</tbody>
</table>

What is your opinion of the value and difficulty of this task for your students?
### Activity 4-29: "Review Of Success"

**Teacher**

**Activity name suggested by class:**

<table>
<thead>
<tr>
<th>Date taught (month and date, e.g. 11/2)</th>
<th>Day 1</th>
<th>Day 2</th>
<th>Day 3</th>
<th>Day 4</th>
<th>Day 5</th>
<th>Day 6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minutes of class time on science each day</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Minutes of preparation each day</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Students absent on each date (Use ID Number)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

5. **Interest of class as expressed by apparent attention to what is happening.**

Number of students responding with: Name students you noted especially:

<table>
<thead>
<tr>
<th>HIGH INTEREST</th>
<th>MODERATE INTEREST</th>
<th>INDIFFERENCE</th>
<th>MODERATE RESISTANCE</th>
<th>STRONG DISLIKE</th>
<th>HARD TO RATE</th>
</tr>
</thead>
<tbody>
<tr>
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</tr>
</tbody>
</table>

6. **Equipment in kit:** None Satisfactory Too Too Difficult

7. **Equipment I got:** None Easy Hard to get, Hard to get, Unobtainable, add to kit add to kit

8. **Materials used:**

<table>
<thead>
<tr>
<th>Worksheet</th>
<th>Game</th>
<th>Slides (show slide nos.)</th>
<th>Transparency</th>
<th>Card(s)</th>
<th>Tape(s)</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>Worthwhile as is</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Revise slightly</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Revise much</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Worthless: omit</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

9. **Maturity level is** just right too childish too mature

10. **Vocabulary level is** just right too easy too difficult

11. **Were teacher instructions clear enough to follow?** Yes No - Pages and Problem:

12. **Were clues to success and reviews of success helpful?** Yes No - Why not?

13. **Did the activity fulfill the purpose stated by the Guide?** Yes No - Comment:

14. **Were any parts of this activity omitted?** No Yes - Explain:

15. **Your rating of this activity:**

<table>
<thead>
<tr>
<th>Worthwhile</th>
<th>Worth of value--needs the</th>
<th>Worth salvaging--make</th>
<th>Worthless</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>of value</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Equipment in kit: □ None □ Satisfactory □ Too needed □ Too fragile □ Too complicated to use
Equipment I got: □ None □ Easy □ Hard to get, □ Hard to get, □ Unobtainable, needed □ to get but okay □ add to kit □ add to kit

Materials used:

<table>
<thead>
<tr>
<th>Worthwhile as is</th>
<th>Worksheet</th>
<th>Game</th>
<th>Slides (show slide nos.)</th>
<th>Transparency</th>
<th>Card(s)</th>
<th>Tape(s)</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>Revise slightly</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Revise much</td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Worthless: omit</td>
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</tr>
</tbody>
</table>

Maturity level is □ just right □ too childish □ too mature □ Explain:
Vocabulary level is □ just right □ too easy □ too difficult □ Explain:

1. Were teacher instructions clear enough to follow? □ Yes □ No - Pages and Problem:
2. Were clues to success and reviews of success helpful? □ Yes □ No - Why not?
3. Did the activity fulfill the purpose stated by the Guide? □ Yes □ No - Comment:
4. Were any parts of this activity omitted? □ No □ Yes - Explain:
5. Your rating of this activity:
   □ Worthwhile □ Of value--needs the □ Worth salvaging--make □ Worthless--keep as is □ revision suggested □ major changes described □ drop it

Specific Concerns about this Activity:

6. There are always parts of activities that are good and need not be changed. What parts of this activity should be retained when the curriculum is revised?
Page(s) ________________:
7. Did any student give away any answers to Worksheet 4-11?
   □ No □ Yes: Comment.
8. Were any students unable to complete Worksheet 4-12?
   □ No □ Yes: Who and why?
9. Concern (or questions) about content:
10. Messages for staff (read immediately):

Have you answered each question, attached annotated Guide, your revisions, student work, etc.?
UNIT IV, CORE C
ACTIVITY 4-29: "Review Of Success"

Teacher ________________

REPORT OF WHAT HAPPENED AND SUGGESTIONS FOR REVISION

1. Whenever practical write all over your second copy of the Guide. Tear out the activity and send the annotated Guide in with this form.


3. Tell us what you did. Think of what you needed, what you had to work out for yourself, how you presented something to make it go over.

4. Describe the revisions you said were needed in answering the questions on the other side of this form.

5. As a reminder of things that help in revision, read through the following list and check off things you want to be sure to note this time. (We know you can't tell about everything every time!)

THE LESSON

☐ how you organized materials or class.
☐ things added (a question, a picture, etc.).
☐ equipment, supplies, visual aids.
☐ things that went wrong, misunderstandings.
☐ what you would do differently or avoid next time.
☐ turmoil in the class caused by the activity, or disruptive students, or interruptions, and how you dealt with them.

THE STUDENTS

☐ who had problems and what they were.
☐ how someone "caught on" (or who never did).
☐ who was really "turned off" (or on).
☐ reactions of parents, teachers, students.
☐ special evidence of learning or applying ideas.
UNIT IV
REACTIONS TO CORE C

1. Was the background information for this core adequate? □ Yes □ No
   Comment:

2. Was it clear to you why these particular activities were chosen and the direction
   they were leading? □ Yes □ No
   Comment:

3. Did the activities fulfill the purposes stated in the Guide for this core? □ Yes □ No
   Comment:

4. How would you increase the clarity of this core for students? (Help them understand why they are doing these activities.)

5. Is there a practical (take-home) value for your students in these activities? □ Yes □ No

6. If yes, what do you see as the "take-home" lesson? If no, what is needed?

7. In these materials, what things did your students find difficult to do?

8. Should there be more clues to success or reviews of success in this core? □ Yes □ No
   Comment:

9. Was there too much reading and too many teacher directions? □ Yes □ No
   Comment:

10. Did you make use of the Planning Guide? □ Yes □ No
    Comment:
5. Is there a practical (take-home) value for your students in these activities? □ Yes □ No
If yes, what do you see as the "take-home" lesson? If no, what is needed?

6. If yes, what do you see as the "take-home" lesson? If no, what is needed?

7. In these materials, what things did your students find difficult to do?

8. Should there be more clues to success or reviews of success in this core? □ Yes □ No
Comment:

9. Was there too much reading and too many teacher directions? □ Yes □ No
Comment:

10. Did you make use of the Planning Guide? □ Yes □ No
Comment:

11. If you could teach your way, rather than following the Guide, how would you do it?

12. Which of your students do you believe were unsuccessful in achieving the objectives of this core of activities? Explain.
NEW STUDENTS ENTERING DURING THIS CORE

<table>
<thead>
<tr>
<th>Date Entered</th>
<th>Last Name</th>
<th>Name Used</th>
<th>Ethnic Group</th>
<th>Sex</th>
<th>Birthdate</th>
<th>Test date</th>
<th>Test</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>W B S O M F</td>
<td></td>
<td></td>
<td></td>
<td>WBO</td>
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<td>W B S O M F</td>
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<td>W B S O M F</td>
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<td>W B S O M F</td>
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<td>WBO</td>
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</tr>
</tbody>
</table>

STUDENTS DROPPED IN THIS PERIOD

- W = white
- B = black
- S = Spanish-American
- O = other

W = WISC
B = Binet
O = other (name)

ADDITIONAL INFORMATION ON NEW STUDENTS:
NEW STUDENTS ENTERING DURING THIS CORE

<table>
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<tr>
<th>Name</th>
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<th>Performance</th>
<th>Previous Test Score</th>
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<tbody>
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<td>WBO</td>
<td>WBO</td>
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<tr>
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<td>F</td>
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</tr>
</tbody>
</table>

W = WISC
B = Binet
O = other
(name)