Grades or Ages: Grades 4-6. Subject Matter: Physical health and nutrition. 

Organization and Physical Appearance: The guide is divided into five sections: factors determining what people eat, the role of food in growth and development, the uses of nutrients in food, selection of foods to meet bodily needs, and food in the history of man. The publication format of four columns gives the outline of content, the major understanding and fundamental concepts, suggested teaching aids and learning activities, and supplementary information for teachers. The pupil objectives are presented in the introduction. The guide is soft-covered. Objectives and Activities: Each subsection contains questions and topics for discussion. The supplementary information provides teachers with further discussion material. A list of vocabulary words follows each major section.

Instructional Materials: A bibliography of books, leaflets, and filmstrips is presented along with a selected bibliography for teachers. Student Assessment: No provision is made. Options: The guide suggests incorporation of subject matter into a social studies curriculum. (BRB)
NUTRITION

STRAND 1, PHYSICAL HEALTH

Grades 4, 5, 6

HEALTH CURRICULUM MATERIALS
OPTIMAL HEALTH

KNOWLEDGE
- Concepts
- Generalizations
- Understandings
- Facts

ATTITUDE
- Values
- Appreciation

BEHAVIOR
- Basic Skills
- Decision Making

Strand I
PHYSICAL HEALTH
- Health Status
- Nutrition
- Sensory Perception
- Dental Health
- Disease Prevention and Control

Strand II
SOCIOLICAL HEALTH PROBLEMS
- Smoking and Health
- Alcohol Education
- Drugs and Narcotic Education

Strand III
MENTAL HEALTH
- Personality Development
- Sexuality
- Family Life Education

Strand IV
ENVIRONMENTAL AND COMMUNITY HEALTH
- Environmental and Public Health
- World Health
- Ecology and Epidemiology of Health
- Consumer Health

Strand V
EDUCATION FOR SURVIVAL
- Safety
- First-Aid and Survival Education
The nutrition curriculum for the intermediate grades is directed toward helping the student to discover in some detail how food is related to health and growth, and to understand the role of criteria for selecting food. It also provides opportunity for the student to develop a concept of the food people eat as an integral part of the physical and sociocultural environment.

Grade levels are suggested for each teaching unit in order to form a logical progression and to take advantage of the interests and abilities of students at given grade levels. For example, Teaching Unit V (Food in the history of man) is suggested for grade 6, by which time students have sufficient social studies background to integrate the material meaningfully. However, it is realized that there will be instances in which the grade levels suggested are not appropriate for a particular situation.

At the end of each teaching unit a summary of key vocabulary is included. This may be used in many ways, as a device for a pretest to assess students' knowledge at the beginning of the unit, or as a summarizing device for review, or simply for teacher reference.

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<th>PHYSICAL HEALTH</th>
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<tr>
<td>OVERVIEW</td>
<td>Nutrition</td>
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STRAND I
PHYSICAL HEALTH

Nutrition
Grades 4, 5, 6

OUTCOMES

Pupils in grades 4-6 should:

Realize the relationships between general well-being and principles of food selection

Base their food selection practices on acceptable nutritional criteria

Recognize the psycho-social factors that influence nutritional behavior

Be cognizant of the consequences of poor eating patterns and unwise food selection

Develop those nutritional practices that enable them to experience satisfactory patterns of growth and development
MANY FACTORS DETERMINE WHAT FOODS PEOPLE EAT.

A. THE FOOD PATTERNS OF A COUNTRY OR REGION HAVE EVOLVED FROM A COMPLEX OF DEMOGRAPHIC, SOCIAL, ECONOMIC, AND CULTURAL FACTORS.

1. People usually do not think very much about what kind of food they eat. Eating is a habit -- we become used eating certain foods. But other people in other parts of the world are used to eating other foods. These differences come about for many reasons:

   - Availability of food. For example, a Chinese child eats rice because it is on the table at every meal, and everyone else eats it.
   - Customs and beliefs. People think a food is only for certain people. For instance, we think of coffee as a food only for adults.
   - Cultural factors. This can be part of the social way of life of the country.
   - Social, economic, and complex of demographic factors. A country or region have evolved from a major understanding of food patterns of A.

I. MANY FACTORS DETERMINE WHAT FOODS PEOPLE EAT.
### OUTLINE OF CONTENT

**MAJOR UNDERSTANDINGS AND FUNDAMENTAL CONCEPTS**

- is only consumed by children. (But in this country children and adults all drink milk.) Sometimes religious beliefs prohibit eating a certain food.

**SUGGESTED TEACHING AIDS AND LEARNING ACTIVITIES**

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<tr>
<td>List the foods eaten in the United States which the Indians ate prior to the coming of the Europeans.</td>
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<tr>
<td>List some of the foods which are eaten in the United States which were brought from other countries.</td>
</tr>
<tr>
<td>Discuss: Do all Americans eat the same foods? Why not? What differences</td>
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### SUPPLEMENTARY INFORMATION FOR TEACHERS

(Such a list would include corn, turkey, fish, squash, pumpkin, berries, venison, quail, pheasant.)

See Chapter 3 in *Food and Man.* (Lowenberg et al)
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<tr>
<td>B. MANY DIFFERENT FOOD PATTERNS SUPPLY THE SAME ESSENTIAL NUTRIENTS: WHEREVER MEN HAVE MANAGED TO SURVIVE, THEY HAVE FOUND FOOD WHICH WOULD SUPPLY AT LEAST THE MINIMUM NUTRIENTS NECESSARY FOR SURVIVAL.</td>
<td>exist among Americans in the foods they eat? Are there any foods you think <strong>all</strong> Americans eat? Find out about special kinds of American foods. (Examples: Boston vs. Manhattan clam chowders Soul food Mexican food Oriental food Italian food Spoon bread) Students in small groups can find out about a particular food, through library research and through resource persons. Simple foods may be prepared by the students themselves, in order to taste them. If more elaborate dishes are used, perhaps mothers will cooperate.</td>
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<td></td>
<td>All people must have enough food for energy,</td>
<td>Write on the blackboard four headings:</td>
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<td></td>
<td>and foods which supply protein, vitamins, and minerals. Many people in the world do not have all the foods they need for good health. But there are many different combinations of foods eaten which do supply all the nutrients people need.</td>
<td>1) Meat, fish, poultry, eggs, beans</td>
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<td></td>
<td></td>
<td>2) Cereal or bread</td>
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<tr>
<td></td>
<td></td>
<td>3) Fruits and vegetables</td>
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FUNDAMENTAL CONCEPTS AND LEARNING ACTIVITIES FOR TEACHERS

C. FAMILY AND INDIVIDUAL EATING PATTERNS ARE THE RESULTS OF A COMPLEX OF PERSONAL AND SOCIO-CULTURAL FACTORS.

1. People select foods which are available or convenient or economical in the area in which they live. Important factors include the climate and their diet. It is in their interest to make the best use of products that are available.

b. Compare with his peers.
   a. Compare with others in his community or a different community or a different part of the United States.
   b. Compare with his own eating pattern and with the eating pattern of his family.

FAMILY AND INDIVIDUAL FACTORS

AND SOCIO-CULTURAL COMPLEX OF PERSONAL THE RESULTS OF A EATING PATTERNS ARE

C. FAMILY AND INDIVIDUAL

FOR TEACHERS

SUPPLEMENTARY INFORMATION

SUGGESTED TEACHING AIDS

OUTLINE OF CONTENT

If he were to open a food store, pose the problem: what part of the United States is a diet of the specified family of a different country or a different part of the United States? Assign each student a role in the problem. Then think of other protein sources which could be used, and indicate the country or area in which they are used.

Study foods in several months. Then in the winter months in the summer months, which are more available and/or less expensive in the United States? Identify foods that are.

People select foods which are available.

b. Compare with his peers.
   a. Compare with others in his community or a different community or a different part of the United States.
   b. Compare with his own eating pattern and with the eating pattern of his family.

FAMILY AND INDIVIDUAL FACTORS

AND SOCIO-CULTURAL COMPLEX OF PERSONAL THE RESULTS OF A EATING PATTERNS ARE

C. FAMILY AND INDIVIDUAL

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SUPPLEMENTARY INFORMATION

SUGGESTED TEACHING AIDS

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<td>store in that area, what would he sell? Have each student research his own problem and report to the class. (A student might say that he would not open a store in a given area because the people all grow their own food.)</td>
<td>Use Dairy Council booklet Animals that Give People Milk to find out one way in which availability affects the kind of food that people eat in different parts of the world.</td>
<td>This activity uses a hypothetical shopping trip to avoid directly talking about families' differing economic resources, which might prove embarrassing to some students.</td>
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<td>2. People can select foods from those they can afford to buy.</td>
<td>Divide the class into several groups. Give each group several newspaper grocery ads and a specified amount of pretend money. Each group should have a different amount of money. Each group is to &quot;shop&quot; with their money for one day's food for a family of four, or some other specified number of people. Each group is to report to the class on what they &quot;bought.&quot;</td>
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<td>3. People select foods that fit into the pattern of what they like and are used to -- their food habits.</td>
<td>Study a fictional family, devised by the teacher with the needs of the students and the nature of the community in mind.</td>
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</table>
Food habits operate on several levels: individual, family, regional, cultural. In a class where several ethnic backgrounds are represented, study several families to bring out similarities and differences. Another country exists. In a class, find out what people in one country eat and compare this with what people in another country eat. Talk about family meals. Talk about what each family member eats and why. Research what people eat in other countries, and why. Talk about cultural, individual, family meals. Plan lunch menus and research what people eat.
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<tr>
<td>b. Our food habits change as we grow older and the relative influence of other forces on our behavior changes.</td>
<td>Discuss the influence of school lunch on students' food habits. Do students now eat any foods that they did not before meeting them in school lunch? Do they eat foods at school that they don't eat at home? Students can search for food advertisements on television, in magazines, and in newspapers. Keep track of how many advertised products the students actually eat. Do they think the ads influence them? Do the ads influence their mothers? What do the food ads really tell you? How do they try to influence you?</td>
<td>Discuss the effect on a family's food habits of moving from one part of the country to another. Perhaps some members of the class will have first-hand experiences to relate.</td>
<td></td>
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<td>4. Man has developed beliefs about food and its power to influence life.</td>
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</table>
OUTLINE OF CONTENT

MAJOR UNDERSTANDINGS AND FUNDAMENTAL CONCEPTS

a. Many religions incorporate food or rules about eating into their rituals and doctrine.

b. People in all parts of the world have beliefs or superstitions about foods.

SUGGESTED TEACHING AIDS AND LEARNING ACTIVITIES

Small groups or individual students choose a religion and report on how it uses food in its rituals or how its rules affect the food intake of its adherents.

Almost all religions have a prayer or ritual for giving thanks for food. Collect such prayers from different religions, and make a bulletin board, a display, or a series of posters from them.

Show the film Science and Superstition. This 10 minute film provides an introduction to distinguishing, by scientific methods, between facts and superstitions about foods.

SUPPLEMENTARY INFORMATION FOR TEACHERS

Examples:

Hinduism - Cow is sacred; killing a cow a great sin; caste system in which highest caste is Brahman, lowest caste is scheduled Hindu; cow is sacred; students choose a religion, incorporate food into their diet and report on how it uses rituals and doctrine.

Islam - Eating pork is forbidden.

Christianity - Role of bread and wine in the Mass and Communion. Catholicism - Lenten fasts.

Judaism - Prohibition of pork, shellfish; meat and milk together, Kosher; Seder, foods in the Seder service.

See Chapter 5 in Food and Man (Lownberg et al.).
superstition and fact. The methods shown in the film can be used in testing beliefs and superstitions about food.

Students can find beliefs and superstitions about food in their own environment. Elderly relatives may be a good source. In class, evaluate the beliefs. Are they true? Do they have some remote basis in fact? Do they do any harm? How do you suppose they got started? Common examples:

- Fish is brain food.
- Orange juice and milk should not be eaten together.
- Garlic will make your blood pure.
- Tomatoes cause cancer.
- Honey will cure diseases.
- Wheat germ gives vigor and vitality.
- Grapefruit burns fat.

Vocabulary Summary:

Availability
Beliefs
Customs
Energy
I. OUR BODIES USE NUTRIENTS FROM FOOD FOR ENERGY, GROWTH, AND MAINTENANCE.

II. MAJOR UNDERSTANDINGS AND FUNDAMENTAL CONCEPTS

A. EACH CELL OF THE BODY HAS A NEED FOR SPECIFIC NUTRIENTS

1. All living things are made up of cells. Each cell has several parts, and each part has a function. Each cell has a nucleus.

SUGGESTED TEACHING AIDS AND LEARNING ACTIVITIES

Use an informal pretest to assess students' understanding of cells. Show film *The Cell: Structural Unit of Life.* A ten-minute overview of the nature of cells, including food getting, growth, and reproduction, and photomicrograph of several types of cells. Shows onion cells specifically, so is a good introduction to the next activity. Look at cells through a microscope.

- Place one drop of iodine on the slide. Place another drop of water on a glass slide and place it on a piece of tissue paper. Pull off a small piece of the outer skin of an onion. Place the layer you will find on a peal off an intact onion layer. Cut an onion in half. Place on the slide one drop of iodine. Look at cells through a microscope.

MATERIALS NEEDED: Onion, toothpicks, cover glasses, eye dropper, microscope, glass slides, knife. MATERIALS NEEDED: Onion, toothpicks, cover glasses, eye dropper, microscope, glass slides, knife. MATERIALS NEEDED: Onion, toothpicks, cover glasses, eye dropper, microscope, glass slides, knife.

SUPPLEMENTARY INFORMATION FOR THE TEACHER

HABITS, MINERALS, VITAMINS, PROTEIN, CULTURAL SUPERSTITION, THIS UNIT SHOULD BE INTEGRATED WITH SCIENCE WHENEVER POSSIBLE.

AND MAINTENANCE, FOR ENERGY, GROWTH, NUTRIENTS FROM FOOD, EACH CELL OF THE BODY USE AN INFORMAL PRETEST TO ASSESS STUDENTS' UNDERSTANDING. USE AN INFORMAL PRETEST TO ASSESS STUDENTS' UNDERSTANDING.

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<tr>
<td>2. There are many different kinds of cells.</td>
<td>- Animal and plant</td>
<td>Flatten the tissue out and cover with a cover glass. Look at the cells through the low-power lens. The cells will be seen fitting together like bricks in a wall. Each brick is one cell.</td>
<td>some should show up however.</td>
</tr>
<tr>
<td>- The nucleus directs the activities of the cell. When a cell divides, or uses food, the nucleus controls what happens.</td>
<td>Now look through the high-power lens. You will see that each cell contains a dark spot inside it. This is the nucleus.</td>
<td>What do you think would happen if the nucleus were removed? (The cell would die.)</td>
<td>Unless enough microscopes are available for each student to use one, it may be more effective to use a micro-projector so that all can see at the same time. Micro-projectors may be available through school audio visual sources.</td>
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<tr>
<td>- The cell membrane lets in food substances and keeps out harmful substances.</td>
<td></td>
<td>Each cell also has two thin lines around the outside. The inner line is the cell membrane. All cells have cell membranes. The outer line is the cell wall.</td>
<td></td>
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<tr>
<td>- The cell wall protects the cell and gives it shape.</td>
<td></td>
<td>What do you think the iodine did to the cells?</td>
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</table>

2. There are many different kinds of cells.

- Animal and plant

Now gently scrape the inside of your cheek or lip with a toothpick. Then with a knife, scrape some of the white material on
MAJOR UNDERSTANDINGS AND FUNDAMENTAL CONCEPTS

Cells are different from one another.

- All cells have a nucleus and a cell membrane.
  Only plant cells have a cell wall.
  Animal cells have no cell wall.

Cells in different parts of the body are different. They look different, they do different jobs, and they need different food substances to do their jobs.

Each cell in the body needs nutrients from foods.

SUGGESTED TEACHING AIDS AND LEARNING ACTIVITIES

- Examine a toothpick from foods. How would you determine whether hair is made of cells from your cheek?
- Examine a drop of toothpaste. Describe the cells you see. Do you think cells from your body would look different?
- Examine a drop of cornstarch. Examine the material under the low power and the high power lenses of the microscope. What do you see?
- Examine the material under the microscope. Only plant cells have a cell wall. Animal cells have a cell membrane. A cell without a nucleus.
- Cell walls are different from one another.

FOR TEACHERS

SUGGESTED TEACHING AIDS

FUNDAMENTAL CONCEPTS AND MAJOR UNDERSTANDINGS

SUPPLEMENTARY INFORMATION FOR TEACHERS

Need for calories depends on size, growth rate, metabolic rate, and physical activity. There is a great deal of people who has food energy used in the body, measured in calories. Food energy is measured in calories. Food energy measured in calories.

### OUTLINE OF CONTENT

#### MAJOR UNDERSTANDINGS AND FUNDAMENTAL CONCEPTS

- **All cells need energy.** Energy comes from all foods.
- **All cells need protein.** Cells are made up of protein. Good sources of protein are meat, fish, poultry, beans, nuts (including peanut butter) and dairy products.
- **Some cells need particular minerals.** Bones and teeth need calcium and phosphorous. Milk and food made from milk (cheese, ice cream) are good sources of these minerals.

### SUGGESTED TEACHING AIDS AND LEARNING ACTIVITIES

- need more or less food energy than others?
- List the foods that two or three students ate yesterday. Identify the good protein sources in the foods they ate.
- Discover what calcium does in bones. Take a clean chicken bone and cover it with vinegar. Leave it for several days, examine it at intervals. After a few days, the bone will become pliable and will bend easily. Ask the question:
  - What did the vinegar (acid) remove from the bone? (calcium)
  - What does the calcium do for the bone? (makes it hard, keeps it from bending).
  - Why didn't the entire bone dissolve? (It must contain other things besides calcium.) The bone contains protein, which did not dissolve.
  - Do you think there is more than one kind of cell in bone? When possible, students can

### SUPPLEMENTARY INFORMATION FOR TEACHERS

- variation in caloric requirement.
- Clean chicken bone, vinegar or dilute hydrochloric acid, jar.

Note: It may be wise to explain that vinegar we eat, as in salad dressing, etc., does not have this same effect on the bones in our body. Our bones do not soak in what we eat.
OUTLINE OF CONTENT

MAJOR UNDERSTANDINGS AND FUNDAMENTAL CONCEPTS

Blood cells need iron.
We get iron from enriched and whole breads and cereals, from meats, greens, dry beans, dried fruits - like raisins, and eggs.

The cells of the thyroid gland (a gland in your neck) need iodine.
We get iodine from using iodized salt.

SUGGESTED TEACHING AIDS AND LEARNING ACTIVITIES

do this project individually at home, each bringing in his chicken bone when he thinks it has changed.
Discuss: Calcium is accumulated in bones as we grow older.
Who do you think needs the most calcium?
Who needs the least?

Discuss: What is meant by "enriched breads and cereals"? (Students might be assigned to find out on their own.)
Collect labels from bread and cereal products the students find at home.
Make a list of the kinds of bread and cereal products that state "enriched" and those that don't.
Have each student check the box of salt he has at home.
Does it say "iodized" on it?

SUPPLEMENTARY INFORMATION FOR TEACHERS

Enrichment refers to the addition of iron and the B vitamins thiamine, niacin, and riboflavin to bread and cereal products. Enrichment restores nutrients lost in the milling process.

In New York State, white flour and all white bread and rolls except sweet rolls must be enriched. Products which may or may not be enriched are spaghetti, macaroni, grits, rice.

Sweet rolls, crackers, doughnuts, cakes, donuts, and cookies are almost always not enriched.

Nutrition Information and Learning Activities

Suggested Teaching Aids

Major Understandings and Fundamentals

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<td>The cells of bones and teeth need fluoride. We get fluoride from the water in cities which add it to their water or which have fluoride naturally in the water. In other places, the dentist may apply it to children's teeth.</td>
<td>are using iodized salt at home and how many are not.</td>
<td>Goiter (enlarged thyroid from iodine deficiency) is far from being extinct in the United States. It could be eliminated if every family used iodized salt.</td>
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<tr>
<td>Some cells need certain vitamins from foods.</td>
<td>Invite a dentist to come and speak about nutrition and dental health. Ask him to include an explanation of how fluoride helps in prevention of dental cavities.</td>
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<tr>
<td>Skin and eyes need vitamin A. We get vitamin A from yellow and green leafy vegetables—carrots, pumpkin, squash, spinach, greens, broccoli. We also get some vitamin A from milk, butter and margarine.</td>
<td>Use booklet &quot;The Great Vitamin Mystery&quot; (Dairy Council). Tells the story of the discovery of each of the major vitamins. The stories also explain the deficiency diseases which result from the lack of each vitamin.</td>
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<tr>
<td>All cells need the B vitamins, which help the cells to use energy from foods. The B vitamins include thiamine, riboflavin, and niacin. We get riboflavin from milk; thiamine from pork; and all three from enriched</td>
<td>Students can bring in boxes or wrappers from bread and cereal products, and, from the labels, find out the names of the B vitamins.</td>
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OUTLINE OF CONTENT

MAJOR UNDERSTANDINGS AND FUNDAMENTAL CONCEPTS

- All cells need vitamin C.
- Good sources of vitamin C are citrus fruits and juices, tomatoes and tomato juice, strawberries, melons, raw cabbage, white potatoes.
- Bone cells need vitamin D.
- Without vitamin D they cannot use calcium.
- Our skin can make vitamin D in the sunshine.
- We also get it from vitamin D fortified milk.
- All cells need water.

FOODS WE EAT.

17

SUGGESTED TEACHING AIDS AND LEARNING ACTIVITIES

Discuss:
- If there were no citrus fruits available what would you eat for vitamin C?
- Discuss:
  - Do you think children in New York State need vitamin D in their milk more than children in a tropical country? Why or why not?
  - Who might need vitamin D more than children in New York State? Do you think living habits or clothing could make a difference in need for vitamin D?
  - Ask students to guess the answer to this question: "How much of the human body is water?"

Ask students to guess the answer to this question:

- How much of the human body is water?
- How much of the water we get is water we eat?
- What would you eat for vitamin C?

DISCUSS: Do you think vitamin D fortified milk also gets water from the milk, fruit juice, water, and other beverages. We get water by drinking water.

Ask students to guess the answer to this question:
- What would you eat for vitamin C?
- What is the recommended daily allowance of vitamin D? Is it not commonly on the market.

Discuss:
- Why do you think vitamin D is a recent food fortification?
- A baked potato contains about half the recommended daily allowance.
- Vitamin D fortified milk is labeled as such.
- Skim milk may or may not be fortified.
- A recent Food and Drug Administration has legalized the selling of dry skim milk with vitamins A and D, but at this writing the product is not commercially available.

DISCUSS: Do you think vitamin D fortified milk also gets water from the milk, fruit juice, water, and other beverages. We get water by drinking water.

DISCUSS: Do you think vitamin D fortified milk also gets water from the milk, fruit juice, water, and other beverages. We get water by drinking water.
Discuss evidences that foods contain water. Students have seen some foods being squeezed for juice; they may relate the water seen in the pan after spinach is cooked, or the drying out of uncovered bread and cake to the presence of water. Ask whether students can think of a way to prove that foods contain water. This can be done by weighing a food -- a spinach or lettuce leaf works well -- and then placing the food in a warm place for a few days (or an oven for a shorter time). Then weigh the food again. The difference in weight is due to water lost. Compare the amounts of water in several foods by repeating the experiment using equal weights of several moist foods (fruits, vegetables) and some dry foods (rice, macaroni). 

B. NUTRIENTS ARE DELIVERED TO THE CELLS OF THE BODY BY THE CIRCULATION, AFTER BEING DERIVED FROM FOOD BY THE
PROCESS OF DIGESTION AND ENTERING THE CIRCULATION BY THE PROCESS OF ABSORPTION.

After food is swallowed, it travels down the esophagus into the stomach. Digestion starts in the mouth and continues in the stomach. The food goes from the stomach into the small intestine and then into the large intestine. In the small intestine, nutrients are absorbed through the walls of the intestines into the bloodstream. Waste material (the part of the food the body does not use) is excreted as feces. The food is moved along the gastrointestinal system by peristalsis -- muscle contractions which push food along. The following statement: "The gastrointestinal system is just a hollow pipe going through the body." is incorrect. The stomach starts in the mouth, and continues down through the pharynx, esophagus, stomach, small intestine, large intestine, and finally into the rectum. After food is swallowed, it moves through the body by this process of peristalsis, which is a series of muscle contractions that push food along. Board pieces should be cut out and arranged in order, with the stomach being the first piece, followed by the small intestine, large intestine, and finally the rectum. Have students label each part of the system with the correct names. Discuss the following statement: "The gastrointestinal system is just a hollow pipe going through the body."
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<td>force the food to move on -- rather than by just falling through. 2. Digestion is the process of breaking food down into small particles so that it can be used by the body.</td>
<td>Illustrate that peristaltic action forces food along regardless of gravity by showing that you can swallow uphill. A student can stand on his head, feet against a wall to steady himself, and drink water or milk from a straw. He can swallow without much difficulty, and the liquid goes uphill. Discuss the significance that this has for space travel (the ability to swallow does not depend on gravity.)</td>
<td>Demonstrate that starch will not dissolve. Hold up a cracker. Ask: What will happen to the cracker after it is eaten? - Is the cracker ready to be used by the cells as it is? - What must happen to it before the cells can use it? Grind the cracker into a powder, and put a teaspoon of powder into a glass of water. Put a teaspoonful of sugar in another glass of water. Stir each with a spoon.</td>
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<td></td>
<td>- Large food particles cannot be used by the body without being broken down or changed into smaller particles.</td>
<td></td>
<td>MATERIALS NEEDED: cracker, sugar, iodine, spoon, two clear glasses or jars.</td>
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<td></td>
<td>NOTE: TINCTURE OF IODINE IS POISONOUS IF TAKEN INTERNALLY. It also stains clothing, and if it is old will burn if spilled on the skin.</td>
</tr>
</tbody>
</table>
OUTLINE OF CONTENT

MAJOR UNDERSTANDINGS AND FUNDAMENTAL CONCEPTS

- Substances called enzymes are present in our mouth, stomach, and intestines. These enzymes change large food particles into smaller ones so they can be absorbed into the bloodstream and used by the cells.

SUGGESTED TEACHING AIDS AND LEARNING ACTIVITIES

Ask:

Why is the starch water cloudy?
Why is the sugar water clear?

(The starch particles are big enough to see. The sugar molecules dissolved in the water; they are too small to see.)

Add a few drops of iodine to the starch water.
It will turn blue-black.
This is a test for the presence of starch.

Add iodine to the sugar water.
It will remain tan colored, indicating that there is no starch present.

Conclude: Starch must be changed into some other substance.

Discover that starch is changed to sugar in the mouth.

Have students chew up part of a cracker, but do not swallow it.

MATERIALS NEEDED:
A cracker or piece of bread for each student.
Hold it in the mouth for several minutes.
Ask: What do you notice about the taste? (it will become sweet.) What do you think the starch changed to?

Demonstrate that starch is broken down by saliva.
Make a starch solution by adding a teaspoon of flour or cornstarch to about half a cup of water. Collect some saliva in another glass or cup. To one test tube, add about 2 tablespoons starch solution. To test tube #2, add 2 tablespoons starch solution and 2 tablespoons saliva. To test tube #3, add only about 2 tablespoons saliva. To all three tubes, add two or three drops of iodine. The two tubes containing starch will turn blue-purple.
Ask: Why did the tube with only saliva not turn blue?
Let the tubes stand for several hours until the blue color in the saliva-starch-iodine mixture

MATERIALS NEEDED:
3 test tubes, holder or other receptacle for test tubes, iodine, cornstarch or flour, two small glasses or cups.
3. Nutrients travel to the bloodstream after the cell absorbs them.

4. Nutrients enter the tissue.

- Starch is converted to sugar in fruits as they ripen. This is the result of enzymes at work, similar to the conversion of starch to sugar in the mouth by the enzymes of saliva.

3. Nutrients travel to the bloodstream after the cell absorbs them.

- SUGGESTED TEACHING AIDS AND LEARNING ACTIVITIES

  - Ask: Why did the solution change color? Do you think that there is any starch present in the tube now? Why not? What has the starch been changed into?

  - If microscopes or a microscope are available, discover that starch is digested or changed to sugar in plants. Make slides from a thin smear of ripe and unripe banana, and stain with iodine.

  - Relate this to the development of a sweet flavor in the ripening of fruits, by tasting ripe and unripe pieces of several fruits.

  - Discuss how the starch is changed into sugar.

  - MAJOR UNDERSTANDINGS AND FUNDAMENTAL CONCEPTS

  - Demonstrate that large amounts of starch disappear.

  -はずす手順が示されています。

  - Disappearance of sugar in the mouth by the enzymes of saliva.

  - Digestion of starch to sugar in plants, similar to the conversion of starch to sugar in the mouth.

  - Relate this to the development of a sweet flavor in the ripening of fruits.

  - Discuss how the starch is changed into sugar.

  - Materials Needed:

    - Microscopes or micro-projector, slides, cover glasses, iodine, knife, ripe banana, unripe banana, projector, slides, cover glasses, iodine, knife.

    - What has the starch been changed into?

    - If microscopes or a microscope are available, discover that starch is digested or changed to sugar in plants.

    - Make slides from a thin smear of ripe and unripe banana, and stain with iodine.

    - Relate this to the development of a sweet flavor in the ripening of fruits, by tasting ripe and unripe pieces of several fruits.

    - Discuss how the starch is changed into sugar.

    - MAJOR UNDERSTANDINGS AND FUNDAMENTAL CONCEPTS

    - Demonstrate that large amounts of starch disappear.
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<td>cell by penetrating the cell membrane.</td>
<td>molecules cannot cross the cell membrane, while small ones can.</td>
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<td></td>
<td>Large particles cannot enter the cell membrane; small particles can.</td>
<td>Make cell models as follows: Mix a teaspoonful of starch with a packet of gelatin. Add 1/2 cup cold water; let set a few minutes. Then slowly add 1 cup boiling water, stirring to dissolve. Cool slightly. Pour some of this mixture into a plastic bag (an amount about the size of a ping-pong ball will do). Add a piece of clay to represent the nucleus. Tie the bag tightly with string so it has the shape of a ball. There should be as little air as possible in the bag. Cut away the unused part of the bag with scissors. Let the gelatin cool and harden overnight in the bag. The plastic bag represents the cell membrane.</td>
<td>MATERIALS NEEDED: Unflavored gelatin, some cornstarch, two or three small plastic bags (sandwich size), string, scissors, a little modeling clay.</td>
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<td>Fill the jar about 3/4 full with warm water. Add enough iodine to turn a light tan. Place the gelatin cell model in the jar. Let sit for a few days.</td>
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<td>MATERIALS NEEDED: A gelatin cell model, iodine solution, a clear bowl or jar, water.</td>
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major understandings and suggested teaching aids

fundamental concepts and learning activities

for teachers

supplementary information

Outline of Content

C. The Cells of the Body

Change Nutrients Into Energy and Into Build-

Show that food burns and gives off heat energy by holding a piece of food between the flame on an alcohol burner. Try several kinds of food. High fat content foods (a peanut, a piece of bacon) burn longer than other foods (a piece of bacon (a peanut), cheese; note that high fat foods make the gelatin inside the bag turn blue). Interpreting: The energy given off heat energy by burning food burns up and gives off heat energy to keep our bodies warm; to keep our hearts beating, and lungs breathing, and other vital body functions going; and to give us energy to move, work, play, and do the work involved in building more cells.

Show the process can be studied. Hint: No starch will travel through the membrane. The water outside the bag will turn blue. Therefore, starch could not have traveled through the membrane. Interpreting: The water outside the bag must have reached the inside of the bag. So it must have passed through the membrane. But the sugar inside the bag would remain unaltered because it could not pass through the membrane. Consequently, the sugar must have been the solute that traveled through the membrane.

Use starch as indicator through a membrane. Place a starch solution inside a bag. Expose the bag to iodine solution outside the bag (iodine will turn the bag blue). Place more cells. The energy given off heat energy to keep our bodies warm; to keep our hearts beating, and lungs breathing, and other vital body functions going; and to give us energy to move, work, play, and do the work involved in building more cells.
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<tr>
<td>2. Protein, minerals, and other nutrients are used by the cells to build materials necessary for making more cells. More cells need to be made for growth and to repair and replace damaged or old and worn out cells.</td>
<td>Discuss: How is food energy measured? (calories) Does everybody need calories? Does everybody need the same amount of calories? Do you think a person who is growing needs more calories or the same as a person who is not growing? Use filmstrip How Food Becomes You. (Dairy Council). Shows how food is used by the body. Use booklet How Your Body Uses Food. (Dairy Council). Describes the processes of digestion and metabolism for the upper intermediate grades. Discuss: Do some kinds of cells keep reproducing at the rate necessary for growth, even when growth in height has stopped? (hair, fingernails)</td>
<td>A calorie is a unit of heat. It is defined as the amount of heat required to raise the temperature of one gram of water one degree centigrade.</td>
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<td>D. THE BODY'S NEED IS FOR NUTRIENTS, NOT FOR SPECIFIC FOODS.</td>
<td>Discuss: Why does a person who is growing need more protein than a person who is not? Have the class make a list of all the foods they think contain...</td>
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<tr>
<td>1. Many different combinations of food can supply the nutrients the body needs.</td>
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OUTLINE OF CONTENT

MAJOR UNDERSTANDINGS AND FUNDAMENTAL CONCEPTS
- We need certain kinds of foods to supply nutrients to our bodies. But there are many different nutrients that make up the different kinds of food. These nutrients are essential for our bodies to function properly. We need certain kinds of foods to supply these nutrients to our bodies.

SUGGESTED TEACHING AIDS AND LEARNING ACTIVITIES
1) protein, 2) fat, 3) starch. Then conduct tests for these three substances on a variety of foods which the children bring from home.

To conduct a test for protein:
Using a candle or a bunsen burner, burn a small feather. The resulting odor is characteristic of protein. Use this test to determine the presence of protein in foods -- if the odor of burning feathers results, protein is present.

Test cheese, meat, dry milk, powder, beans, eggs, white rice, peas, peanuts, lunch meats, muffins, breads, bread rolls, etc.

To conduct a test for fat:
Chop or mash the food sample or mash the food to be tested. To be tested:
- woods, tea leaves, foods.
- candle or bunsen burner.

MATERIALS NEEDED:
- candle or bunsen burner,
- matches, feathers, foods.

SUPPLEMENTARY INFORMATION FOR TEACHERS
MATERIALS NEEDED:
- Candle or bunsen burner, matches, feathers, foods.

(1) protein, (2) fat, (3) starch.
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<tr>
<td>- Foods which have mainly starch, sugar, and fat, give us energy. They are the &quot;Go Foods.&quot;</td>
<td>To conduct a test for starch: Place a drop or two of iodine on the food. If starch is present, a blue-purple-black color will result. Foods to try: potato, apple, bread, spaghetti, corn (cut or mashed), beans, squash.</td>
<td>MATERIALS NEEDED: Food samples, iodine solution, eye dropper. Remind the children that iodine is poisonous and is not to be tested under any circumstances.</td>
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<tr>
<td>- Foods which give us protein are body-building foods, and they are the &quot;Grow Foods.&quot;</td>
<td>Using food models or pictures pasted on cards, students can sort foods into categories of Go Foods, Grow Foods, and Glow Foods. Ask: Where did you put milk in your sorting? Is milk a Go food, a Grow food, or a Glow food? (Milk is all three. It gives energy because of the fat and sugar content; it has much protein; and it has calcium, vitamin D, and other minerals and vitamins.) Make a separate pile of cards for milk and milk foods made from milk.</td>
<td>This concept of functions of foods will be later related to the Four Food Groups, which coincide roughly with Go Foods, Grow Foods, and Glow Foods, plus milk. The Four Food Groups will have more meaning if preceded with this simplified version which emphasizes functions of food in the body.</td>
<td></td>
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<tr>
<td>- Foods which give us minerals and vitamins keeps us healthy. They are the &quot;Glow Foods.&quot;</td>
<td>is present. Foods to try: cheese, bacon, mayonnaise, egg yolk, egg white, lunch meat, peanut butter.</td>
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### OUTLINE OF CONTENT

**MAJOR UNDERSTANDINGS AND FUNDAMENTAL CONCEPTS**

- Different people use different foods to give them the nutrients they need.

2. Some nutrients can be taken in a pill. But it is usually better to get nutrients from food.

- Eating is fun. Taking a pill does not replace eating.

- No pill contains all the nutrients we need. (Neither does any one food.)

- There may yet be nutrients undiscovered which we get from food, which aren’t in a pill.

- It is possible to take too many vitamins; most of the time extras do no harm, but they are a waste of money.

### SUGGESTED TEACHING AIDS AND LEARNING ACTIVITIES

**Discuss:** Do you think that a boy or girl in Mexico eats the same foods that you do? What might he eat? Can he eat all the kinds of foods he needs without having any of the foods you ate today?

Bring in the label from a bottle of vitamin pills. List on the blackboard the contents of the pills. Ask the following questions:

- Can you think of nutrients we need which are not in the pills? (energy, protein, calcium. Some vitamin pills contain iron, some do not.)

- Is there anything in the pills which we can’t get from food? (no).

- If we get enough vitamins from food, do we need more? (no, extra vitamins do no good.)

- What happens to the extra vitamins if we already get enough from food and we take a pill? (most of them are excreted in the urine.)

### SUPPLEMENTARY INFORMATION FOR TEACHERS

A typical menu might be:

- Chicken and/or beans
- Tortillas (bread)
- Tomatoes
- Peppers
- Potatoes
- Cheese
- Coffee with lots of milk

For the teacher:

Leaflet "Vitamin Supplements and Their Correct Use." (American Medical Association)
Some vitamins (A and D) can be dangerous if taken in excess.

- Is it possible to take too many vitamin pills? Yes, a person can become ill from taking too many vitamins -- such as a whole bottle at once, or several times the recommended amount over a long period of time. This applies to vitamins A and D. Because these compounds are not soluble in water, an excess cannot be excreted in the urine.
- When should we take vitamin pills? (only when your doctor prescribes them).

Hold a debate on the two sides of this issue: If we could get all the nutrients we needed from a pill (which we cannot) do you think people would stop eating food and start taking pills instead?

VOCABULARY SUMMARY:

Cell
Nucleus
Cell wall
Cell membrane
Calories
Energy
Calcium
Phosphorous
Iron
Minerals
Acid
Vitamins
Enriched bread and cereal
B vitamins
Iodine
Thyroid
Goiter
Vitamin A
Vitamin C
Vitamin D
Rickets
Digestion
Circulation
Absorption
Enzyme
Saliva
Esophagus
Stomach
Small intestine
Large intestine
Peristalsis
Gastro-intestinal system
Starch
Sugar
Fat
Oxygen
FOOD PLAYS A ROLE

A. EACH INDIVIDUAL HAS IN GROWTH AND HIS OWN PATTERN OF DEVELOPMENT, DETERMINED BY HEREDITY.

1. Heredity and nutrition are both important in growth. Food supplies the building materials, but heredity draws the plans for building.

Find out: Are you larger or smaller than your family?

FOLLOW THE PLAN.

Why do we have food in order to have food? To stop growing, we must know how much to grow and when. Foods we eat help how much we grow. The plan tells our bodies what to do. Conclude: There is a plan which tells our bodies what to do.

Discuss:


Conclude: There is a plan which tells our bodies when to grow and how much to grow and when to stop growing. We must eat food in order to follow the plan. Food is needed for the building materials.

Ask: What makes us grow?
### OUTLINE OF CONTENT

#### MAJOR UNDERSTANDINGS AND FUNDAMENTAL CONCEPTS

2. Individual differences in amount and timing of growth are normal.

- Some people are taller or shorter, heavier or lighter than others. Some of us are faster or slower in growth and development than others.

### SUGGESTED TEACHING AIDS AND LEARNING ACTIVITIES

- Show that we are all different in size and proportion. Have each student measure four or five fellow students for:
  - height
  - sitting height
  - length of arms
  - length of hands

- Ask: Are all the students the same size? Are those who are the same height the same in other respects?

- Demonstrate that individual differences exist from the very beginning of life. Ask each student to obtain from his mother the following information (she may have it written in a baby book or other record):
  - His birth weight
  - The age at which he got his first tooth
  - The age at which he walked
  - The age at which he said his first words.

- In class, list all the different birth weights.

### SUPPLEMENTARY INFORMATION FOR TEACHERS

- parents taller than your grandparents? Do you think you will be taller than your parents?

- on the average in each succeeding generation. This is due at least in part to improved nutrition.

- In a class in which this information is not likely to be available, perhaps the activity could be carried out using only birth weights, since most mothers will remember this.
We all grow in "spurts"—times of fast growth interspersed with periods of slower growth. The differences in timing of development are normal. Compare to flowers; tulips bloom in the spring, chrysanthemums not until fall, but all are beautiful.

Find the average height or weight of all the children in the class. Then ask:

- Was anyone exactly average?
- How many children in the class are exactly average in height or weight?
- If we were all average, would we all be the same?
- Do you think you would like it if we were all the same size exactly?

If possible, have each child obtain height and weight data for himself since birth (or at least since first grade; this should be available from the school nurse.) Each child can plot his height and weight growth on a chart or use the "My Growth Record" chart (or use leaflet "My Growth Record" from Dairy Council). The teacher must not teach (or teach) "normal" heights or weights. Each child should be evaluated from since first grade; this should be available from the school nurse (or else the teacher must take into account her own data on growth and weight of the entire class since first grade.) These data will give every child himself (or at least the teacher herself) the chance to see how the growth of the entire class compares to her own.

Ask: Are there some years when one is not growing as fast as usual? Are there some years when one grows considerably more than usual?

Some children may have allergies or other health conditions that may affect growth. If such a case exists, then the teacher should consult a doctor before discussing growth with the class.

The teacher must take into account her own food practices may unduly influence her teaching (or not teaching) of certain sections of the subject matter. She must also be sensitive to the need for each child to be evaluated individually. Each child should be evaluated from since first grade; this should be available from the school nurse.

Caution: The teacher must be aware of her own data on growth and weight of the entire class since first grade; this should be available from the school nurse. She should not influence the teaching (or not teaching) of certain sections of the subject matter. She must also be sensitive to the need for each child to be evaluated individually. Each child should be evaluated from since first grade; this should be available from the school nurse.

We all grow in "spurts"—times of fast growth interspersed with periods of slower growth. This is important that they realize that they can be normal and healthy and still be far from average. It is not until the child can plot his height and weight growth on a chart or use the "My Growth Record" chart (or use leaflet "My Growth Record" from Dairy Council) that they realize that they are normal and healthy and still be far from average.

Some children may have allergies or other health conditions that may affect growth. If such a case exists, then the teacher should consult a doctor before discussing growth with the class.

The teacher must take into account her own food practices may unduly influence her teaching (or not teaching) of certain sections of the subject matter. She must also be sensitive to the need for each child to be evaluated individually. Each child should be evaluated from since first grade; this should be available from the school nurse. She should not influence the teaching (or not teaching) of certain sections of the subject matter. She must also be sensitive to the need for each child to be evaluated individually. Each child should be evaluated from since first grade; this should be available from the school nurse.
### MAJOR UNDERSTANDINGS AND FUNDAMENTAL CONCEPTS

3. Boys and girls have different growth patterns.

**B. ADEQUATE NUTRITION IS ESSENTIAL FOR AN INDIVIDUAL TO ACHIEVE HIS GROWTH POTENTIAL.**

in which you grew more than others? Were there any years in which you grew hardly at all? Do you think there will be more years when you will grow fast or slow?

Total and average the heights of the girls in the class separately from the boys in the class. Both the total and the average will probably be greater for the girls. Compare with typical heights for men and women.

Conclude that girls are only temporarily taller than boys. Boys will grow more when they are teenage, and be taller as adults.

Conduct an animal feeding experiment using weanling (3-week-old) white rats. Students should be responsible for caring for the animals, feeding them, weighing them and recording weights, cleaning cages, etc. Use two or three rats for each group. Feed as follows:

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<td>Some of the girls may have already begun the adolescent growth spurt. They will need reassurance that others (including boys) will catch up.</td>
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Information on obtaining and caring for animals, cages etc. may be found in the Dairy Council publication *Animal Feeding Demonstration for the Classroom*. |
MAJOR UNDERSTANDINGS AND FUNDAMENTAL CONCEPTS

1. No one food will provide all the nutrients needed for growth and health.

2. There are interactions among nutrients. For example, the protein in cereal is "incomplete." Protein is made up of molecules called amino acids. If all the essential amino acids are present in the diet, the protein is complete and can be efficiently utilized. If any amino acids are low or missing, the protein is incomplete and less valuable.

3. Dried whole milk, if not available in your local supermarket, may be ordered through your grocer or druggist. Land O'Lakes and Foremost both make a dried whole milk product, and Borden's makes a dried whole milk for infant feeding trademarked "Klim" which could be ordered through a supplier.

SUGGESTED TEACHING AIDS AND LEARNING ACTIVITIES

1. Mix 3 parts ground cereal and 2 parts milk.
2. Mix 2 parts ground cereal and 3 parts milk.
3. Mix 1 part ground cereal and 4 parts milk.

For Teachers

SUPPLEMENTARY INFORMATION

NOTE: Rats fed only milk have a marked tendency to develop diarrhea. This may be severe enough to cause death. To avoid this, start the milk-only rats on a diet of 9 parts whole milk to 1 part cellulose (order from the animal supplier). Cellulose is non-nutritive, so won't interfere with the experiment. Gradually decrease the amount of milk, 6 parts milk to 1 part cereal, then 3 parts milk to 1 part cereal, and finally milk only. The experiment will take six to eight weeks to complete. Keep growth records for the rats and record observations about changes in appearance, behavior, etc. The results should show:

1. Decided growth retardation in the rats fed only cereal.
2. Possible growth retardation in the rats fed only milk.
3. Iron deficiency anemia in the rats fed only milk. This will show up in general lassitude and more marked in the black rats.
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<td>specifically in the color of the animal's eyes. In albino rats the eyes will become pale.</td>
<td>part in 20 if the animals do not develop diarrhea.</td>
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<td>4. General good health, growth and vigor in the rats fed the combination of cereals and milk.</td>
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<td>Explanations from which to draw questions, discussion, etc:</td>
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<td></td>
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<td>a. The cereals-only diet does not contain adequate protein for growth. Calcium is also lacking.</td>
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<td>b. The milk-only diet provided plenty of protein, but no iron. Iron is necessary for making red blood cells. Without it fewer red blood cells are made. The albino rat's eyes reflect his blood, since there is no other color in them. The pale eyes indicate a lack of red blood cells.</td>
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C. OVER OR UNDER-WEIGHT MAY RESULT FROM TOO MUCH OR TOO LITTLE FOOD IN RELATION TO NEEDS FOR GROWTH AND ENERGY.

1. Most people have periods of relative chubbiness or lean-ness while growing up. If these are children or teenagers while growing or lean-ness or excess of weightiness or lean-ness of stature or temperamental the idea here is to stress.

SUGGESTED TEACHING AIDS AND LEARNING ACTIVITIES:

- c. No one food alone is sufficient for growth and health.
- d. The cereals-and-milk diet provided enough energy, protein, vitamins, and minerals. The rats were healthy and grew well.
- e. If the rats were humans, the cereal and milk wouldn't have been enough. Missing still is vitamin C, which we get from fruits and vegetables.
- Rats do not need dietary vitamin C, because they can synthesize it.
- If the cereals were grown well, they can synthesize vitamin C, because they need dietary vitamin C, which we get from fruits and vegetables.
- c. No one food alone is sufficient for growth and health.
- c. Over or under-weight.

ENERGY NEEDS FOR GROWTH AND FOOD IN RELATION TO MUCH OR TOO LITTLE MAY RESULT FROM TOO MUCH OR TOO LITTLE.

Review the real or fictional food intake of normal weight, overweight, under-weight persons in relation to their activity. Students can bring to class baby pictures of themselves, pictures at pre-school age if available, and pictures taken during the last year or two.

A bulletin board for teachers could be set up in the class where students can bring to class baby pictures of themselves, pictures at pre-school age if available, and pictures taken during the last year or two.
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<td>display of the children's growth can then be made. Note that most of the babies look quite round and chubby. Ask: are they &quot;fat&quot;? Isn't it natural for babies to go through a chubby stage? Were you thinner as a preschooler? (Most children thin out during the preschool years. Some, however, stay plump. Hereditary growth patterns as well as food habits affect the growth progress and characteristics of the individual child.)</td>
<td>medical evaluation through the school physician or by having the school nurse refer the child to his own physician. If there are several really obese children in a school, perhaps cooperative planning can be initiated to provide a program of counseling, nutrition education, and exercise to help these children cope with their weight problem. Obesity which begins in childhood usually continues into adulthood, and is the hardest kind of obesity to overcome. A feeling of &quot;differentness&quot; and inferiority may develop which, later on as sensitive teenage egos complicate the picture, can really make a youngster miserable. If there is an obese child in the class, the other children should be encouraged to regard him as just another child, even if he has a special problem. He should not be made fun of or singled out as an example of a child who eats too much.</td>
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MAJOR UNDERSTANDINGS AND FUNDAMENTAL CONCEPTS

2. A person may be heavier or lighter than average without being too fat or too thin.

3. Your physician's evaluation of your growth record is the best source of judgment for determining whether you are too fat or too thin.

SUGGESTED TEACHING AIDS AND LEARNING ACTIVITIES

List all the parts of your body which contribute to your weight:

- Bones
- Muscles
- Skin
- Blood
- Fat

Doesn't it make sense that some of us have bigger bones than others, or larger muscles? Weight doesn't depend only on fat.

We can't change the kind of bones we have---which determines our basic body size.

Invite the school physician or a local pediatrician to come and talk to the class about growth. He may bring and demonstrate his instruments for measuring height and weight, and show the kind of growth chart on which he records children's heights and weights. Students can ask him questions and receive immediate feedback.

SUPPLEMENTARY INFORMATION FOR TEACHERS

Traditional weight control programs have emphasized weight out of proportion. The real issue is fatness and muscle development; they don't affect bone structure.

What determines our basic body size?

Food and exercise patterns can influence fatness and muscle development; they don't affect bone structure, which is inherited.

Then, are we too fat or too thin without your weight or your weight control programs having emphasized your body weight?

Your physician's evaluation of your growth record is the best source of judgment for determining whether you are too fat or too thin.

Last all the parts of your body which contribute to your weight control.

The real issue is fatness.

Traditional weight control programs have emphasized your body weight without your weight control programs having emphasized your body weight.
IV. THERE ARE SOME CRITERIA WE CAN USE IN SELECTING FOOD TO MEET OUR NEEDS.

A. THE BASIC FOUR FOOD GROUPS OFFER A GENERAL GUIDE FOR WHAT KINDS OF FOODS WE NEED TO EAT.

We need to eat foods from all four groups everyday.

1. The milk group contains milk and all the foods made from milk -- cheese, ice cream, buttermilk, chocolate milk. It is important for calcium and protein.

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<tr>
<th>SUGGESTED TEACHING AIDS AND LEARNING ACTIVITIES</th>
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<tbody>
<tr>
<td>Use poster &quot;Foods to Eat&quot; (New York State Health Department)</td>
</tr>
<tr>
<td>Use poster &quot;A Guide to Good Eating&quot; (Dairy Council) - pictures the four food groups.</td>
</tr>
<tr>
<td>Leaflet &quot;Foods to Eat... and Why!&quot; (New York State Health Department)</td>
</tr>
<tr>
<td>Using food models or flash cards, students can sort foods into the four food groups. Written exercises</td>
</tr>
</tbody>
</table>

SUPPLEMENTARY INFORMATION FOR TEACHERS

VOCABULARY SUMMARY:
- Growth
- Heredity
- Individual
- Trait
- Proportion
- Development
- Average
- Normal
- Spurt
- Data
- Amino acids
- Utilization
- Anemia
- Red blood cells
- Overweight
- Underweight
2. The bread and cereal group contains all the enriched and whole grain breads and cereals -- spaghetti, macaroni, grits, bread, breakfast cereal, cornbread, rice, rolls. The bread and cereal group is important for energy, iron, and the B vitamins.

3. The fruit and vegetable group contains all the fruits and vegetables. It is important mainly for vitamins and minerals. Try to have a vitamin C food every day and a vitamin A food almost every day. Vitamin A can be stored by the body, so it is not needed every day. Vitamin C cannot be stored, so we need to supply it every day.

4. The meat group contains meat, fish, poultry, eggs, beans, and nuts. It is important mainly for protein. The meat group also contains foods that are high in iron and the B vitamins. Meat is a complete protein food, so it is desirable to eat a complete protein each meal. It is desirable to eat the daily intake of meats and other animal products to be represented at each meal. It is desirable to eat a balanced diet of all the basic food groups. The basic food groups are:

   - Milk and milk products
   - Cereal, bread, and pasta
   - Fruits and vegetables
   - Fat and oil

Relate these five food groups to the earlier and simpler classification of Go foods, Grow foods, and Glow foods. The meat group is the Grow foods group. Fruits and vegetables are the Glow foods group. The other two groups are Go foods and Grow foods. Students can keep a record of their own food intake each day. Better judgment is much more accurate when the results are recorded over a longer period of time. Students can use matching techniques to sort foods into groups.

SUGGESTED TEACHING AIDS AND LEARNING ACTIVITIES

- Use matching techniques to sort foods into groups.
- Relate the four food groups to the earlier and simpler classification of Go foods, Grow foods, and Glow foods.
- Students can keep a record of their own food intake for two or three days.
- Classify foods into food groups.
- Evaluate adequacy of day's diet on the basis of the food groups.

SUPPLEMENTARY INFORMATION FOR TEACHERS

Dietary adequacy is much better judged on the basis of the whole day's intake then on the basis of one meal. Meals don't necessarily have to be "balanced" if the whole day's intake is adequate in all respects. All the fruits and vegetables are in the Grow foods group. The meat group is the Grow foods group. The other two groups are Go foods and Grow foods. It is desirable to have a complete protein food each meal.
<table>
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<tr>
<th>OUTLINE OF CONTENT</th>
<th>MAJOR UNDERSTANDINGS AND FUNDAMENTAL CONCEPTS</th>
<th>SUGGESTED TEACHING AIDS AND LEARNING ACTIVITIES</th>
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<tr>
<td></td>
<td>B. INDIVIDUAL NEEDS AND CONCERNS WILL AFFECT THE SPECIFIC FOODS WE CHOOSE TO EAT.</td>
<td>From student's records of their food intakes, identify differences in amount of food eaten (energy intake). Discuss reasons for differences in energy needs (body size, growth rate, physical activity). Students can plan diets, based on the Four Food Groups, for individuals with different energy needs. (football player vs. typist; teenage boy vs. elderly grandmother; astronaut vs. nurse) Evaluate the plans on the basis of whether they show understanding that— All people need the same kinds of food. Amounts of food needed vary with size, physical activity, and growth. Students can plan a day's diet for individuals with special concerns: - Someone allergic to citrus fruit - Someone whose religion forbids eating beef - Someone who has no stove or refrigerator</td>
<td>Have student record food intake before getting into this study unit rather than after Basic 4 presented.</td>
</tr>
</tbody>
</table>
Basic Four Food Groups

VOCABULARY SUMMARY:

- Basic Four Food Groups

OUTLINE OF CONTENT

MAJOR UNDERSTANDINGS AND FUNDAMENTAL CONCEPTS

C. KNOWLEDGE OF THE RELATIONSHIP BETWEEN NUTRITION AND HEALTH GIVES US THE BASIS TO SELECT FOODS THAT WILL PROVIDE THE NUTRIENTS WE NEED.

SUGGESTED TEACHING AIDS AND LEARNING ACTIVITIES

- SOMEONE IN A HURRY WHO HAS NO TIME TO COOK.

Using the technique of group decision process can plan a menu for the school lunch. Have the class

Have the class plan a school lunch for a day. (Secure the cooperation of the school lunch supervisor. Perhaps she could be present during the planning to explain to the students the requirements of a Type A lunch and to help them plan.) Then present during the plan-

- APPLY KNOWLEDGE OF THE RELATIONSHIP BETWEEN NUTRITION AND HEALTH

- SELECT FOODS THAT WILL PROVIDE THE NUTRIENTS

- GIVES US THE BASIS TO

- ENRICH THE CURRICULUM

- SUPPLEMENTARY INFORMATION FOR TEACHERS

Using the technique of voting on disagreements, a group decision process can reinforce the learnings about accepting foods even if they are not favorites.

SEE APPENDIX I FOR REQUIREMENTS OF TYPE A SCHOOL LUNCH.
V. Food has always been an important factor in the history of man.

A. The success with which man has been able to obtain adequate food has influenced his ability to devote energy to accomplishing tasks.

1. Prehistoric man was a food gatherer. He ate what fruits, vegetables, and nuts he could find growing wild, and hunted for meat. Because he did not know how to store food or to produce food for himself, he had to devote nearly all his time to finding food. He was frequently hungry.

2. The beginnings of agriculture can be traced to the Near East at about 8000 B.C. This was after the Ice Age; dry weather forced people

SUGGESTED TEACHING AIDS AND LEARNING ACTIVITIES

Make a bulletin board, or have students make drawings, showing primitive man and his food supply, how he ate, how he found food.

Discuss: What weapons and other methods did primitive man devise in order to trap and kill animals to eat?

Discuss: What conditions had to exist before men could begin to develop agriculture and produce food for themselves?
OUTLINE OF CONTENT

MAJOR UNDERSTANDINGS AND FUNDAMENTAL CONCEPTS

1. The discovery that seeds dropped in the ground could yield a harvest several months later.
2. The importance of grain as a food source, leading to the development of agriculture.
3. The process of making bread from grain, from roasting to fermentation.
4. The nutritional contributions of grains to people's diets.

SUGGESTED TEACHING AIDS AND LEARNING ACTIVITIES

1. Make a display showing grain the world over.
2. Use a large world map for a background.
3. Have students bring in as many different kinds of grain and bread as they can find.
4. Identify each type of grain, the kind of food made from it, and the part of the world where it is grown and eaten.
5. If possible, make tortillas or other unleavened bread.
6. Discuss: In what ways besides bread do we eat grains?
7. Discuss: What nutritional contributions do grains make to people's diets?
8. Students can make short oral reports about the grains they brought for the display.

SUPPLEMENTARY INFORMATION FOR TEACHERS

Wheat is grown and eaten in the Middle East, Europe, North and South America. (Be sure to include both light and dark wheat bread. Use the opportunity to discuss the milling of wheat to make white flour.)

Rye is used mainly in Northern Europe; cassava (tapioca) in Africa, corn in Central and South America, and North and South America. (Be sure to include samples of cornmeal, hominy grits, cooked pasta, etc.).

In Mexico, corn (maize) is ground to make tortillas and other foods. In Africa, cassava (tapioca) is grown and eaten. In the Middle East, Europe, and North and South America, wheat is grown and eaten.

Students can make short oral reports about the grains they brought for the display.

Make tortilla bread (cornmeal, masa, etc.) and matzoh from Isreal, made from wheat. Make bread (cornmeal, flour, etc.) from a variety of grains and seeds. Students can make short oral reports about the grains and bread they made. The first bread was made from grain, and the first bread was eaten in the Middle East, Europe, and North and South America.

The main crop was wheat. This was very important because grain could be stored. It was grown in cool climates and could be stored for a longer period of time. Wheat was used to make bread, and bread was used to make other foods.

In order to have bread, people had to grow grain. In order to grow grain, people had to plant seeds. In order to plant seeds, people had to discover that seeds dropped in the ground could yield a harvest several months later. They discovered this because they dropped seeds to make a food supply for the next year.

The invention of agriculture made it possible to grow grain and have a food supply for the next year. This led to the development of cities and civilizations. The discovery of agriculture made it possible to have a food supply for the next year. This led to the development of cities and civilizations.

Students can make short oral reports about the grains they brought for the display.

Read the booklet Your Daily Bread and Its Dramatic History (American Institute of Baking).
**OUTLINE OF CONTENT**

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<td>People almost everywhere in the world depend on a grain for a large part of their food. In parts of the Middle East, bread is looked upon as sacred. It is considered improper to drop a crumb of bread. A meal is not considered a meal unless bread is eaten. Rice enjoys similar status in the Far East.</td>
<td><strong>Discuss:</strong> During the Middle Ages there was very little activity in science, music, art, or literature. Do you think the frequent famines during this period were connected in any way to this lack of scientific and cultural activity? Why or why not? Why were agricultural practices poor in the Middle Ages?</td>
<td>The protein in cereals is important in most of the world, although American diets include enough protein from other sources that cereal protein is less important. It should be emphasized that cereals contribute more than just calories to the diet.</td>
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<tr>
<td>3. During the Middle Ages hunger was common. Agricultural practices were poor, insects took their toll, wars were frequent, and food was scarce. Many people starved.</td>
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<td>4. Today in the United States we use machines and scientific knowledge to produce food efficiently.</td>
<td><strong>Discuss:</strong> If one man can produce enough food for twenty people instead of just for himself, what kinds of things can the other nineteen people do?</td>
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<tr>
<td>Invention of machines such as the tractor, the reaper, the milking machine have increased the productivity of the farmer. Knowledge of soils, fertilizers, genetics have also increased the amount of food a farmer can produce.</td>
<td><strong>Hold a debate or write a short report</strong> on the following</td>
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Now instead of producing only enough food for himself and his family, the farmer can produce food for many other people. He can then sell the food he produces and use the money to buy other goods and services.

B. THE NEED FOR FOOD HAS INFLUENCED WARS, REVOLUTIONS, PATTERNS OF SETTLEMENT AND EXPLORATION, AND OTHER IMPORTANT EVENTS IN HUMAN HISTORY.

1. The availability of food has influenced the course of wars, revolutions, and political alliances.

For example:
- Lack of food was a factor in the frustrations which led to the French Revolution in 1789. Hungry people, faced with a scarcity of bread (their basic staple food) and rising prices, and distrustful of the King and his family, "Let them eat cake!"

The historical situations and events described here are meant only as examples of the basic role that food plays as a motivating factor and political tool. Other instances can easily be found in the study of history and contemporary events. Examples should be selected to coincide with studies in Social Studies wherever possible.

SUGGESTED TEACHING AIDS AND LEARNING ACTIVITIES

- List the occupations of your brother's parents. How many are engaged in food-producing occupations? Contrast with a developing country, where 3/4 or more of the labor force may be engaged in food production. (Unskilled labor force may be engaged in food production in a developing country, whereas 2/4 or more in the labor force are engaged in food production in a developed country.)
- How many students are engaged in food production? How may the occupations of the farmers and their families be discussed?
- "Produce food domestically!" produces an activity to produce food domestically and to check the food chain of production. Major understandings and fundamental concepts taught are:
  - Production
  - Exchange
  - Consumption
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<td>Queen, believed that the royalty had the means to feed them but would not. They marched on Versailles and captured the King and Queen -- but no food. - The War Between the States demonstrated the effectiveness of interfering with an army's food supply in order to defeat it. The South depended on trade with England and France for grain. Long-continued blockading of Southern ports created a food shortage in the South.</td>
<td>Trace the role of food supply in the American Civil War. - Why was the Northern blockade of Southern ports effective in helping win the War? - Do you think the fact that the South produced cotton as its major agricultural crop contributed to its defeat? Why or why not? Individual students or small groups can check encyclopedia and history book accounts of such events as the Russian Revolution, French Revolution, World War I, World War II, Depression, Nigeria-Biafra War. Find out how frequently food is mentioned. What relation had these major events to food supply?</td>
<td>Discuss: A nation which depends on foreign trade to supply its food is more vulnerable politically than one which can produce its own food.</td>
<td></td>
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</table>
2. The search for needed or desired food items motivated much of the exploration of the world.

- Spices have always been prized—not only for their flavor, but for their value as preservatives.

Before the days of refrigeration, pepper and other spices helped to preserve food and to improve the flavor of food.

SUGGESTED TEACHING AIDS

FOR TEACHERS

Supplementary Information

Suggested Teaching Aids

 Fundamental Concepts

Major Understandings and

Outline of Content

To draw maps, diagrams, and other visual aids to help students understand the concepts and activities presented in this text. Provide the opportunity for students to see, taste, and smell a variety of spices.
which was partly spoiled. The
European desire for
spices was the basis
for an active trade
for centuries. Arabs
bought the spices
from India, Ceylon,
and Burma, and sold
them to Europeans.
It wasn't until Marco
Polo's stories of
seeing spices in the
Indies that Euro-
peans realized where
they came from. Then
there arose great
interest in finding a
sea route to the
Indies. This was
the motivation for
Vasco de Gama's voy-
age around the Cape
of Good Hope, and his
successful return to
Portugal with a ship-
load of spices (1497).

Columbus thought he
was going to the
Indies when he landed
in America. Instead
of bringing precious
spices back to
Portugal, he brought
Indian maize (corn)
which, until then,
didn't exist in Europe.

Discuss: Corn was even-
tually adopted as a food
by some people of southern
Europe. However, many
Europeans never were wil-
ling to try it. Even
during a time of real
famine, Frenchmen would
not eat corn. Why do you
think this?

This is an example of the
strength of food habits. A
people for whom wheat
bread had been the staple
food for centuries were
not interested in eating
different food.
The problems of providing adequate food have limited man's ability to explore and conquer his environment. For centuries, it was common on long sea voyages for many sailors to become ill and to die. The disease they got was called "scurvy." On Vasco da Gama's voyage around the Cape of Good Hope in 1497, 100 out of 160 men died from scurvy. Scurvy remained a plague until 1753, when a doctor in the British Navy discovered that citrus fruits and vegetables, when eaten with fresh water, would cure and prevent scurvy. It was not until many years later that we learned that scurvy is caused by a deficiency of vitamin C—-a vitamin that we get from fruits and vegetables. But there are other sources of vitamin C besides citrus fruits: cabbage, potatoes, tomatoes, green peppers, strawberries, melons, etc. Be careful to emphasize that there are other sources of vitamin C besides citrus fruits. Discuss: None of Columbus' men died from scurvy. Can you figure out why? (Let students do some individual reading about Columbus' voyage to discover why. Columbus sailed from Lisbon on September 6, arrived in America on October 12.)

Victamin C, "Pitilda Cinxns," Tales the story of early problems and solutions to become ill. Scurvy is common on long sea voyages for many centuries. It was called "scurvy." On Vasco da Gama's voyage, he discovered that citrus fruits would cure and prevent scurvy. In the British Navy in 1753, when a doctor was a plague until man died from scurvy. It was not until many years later that we learned that scurvy is caused by a deficiency of vitamin C—-a vitamin that we get from fruits and vegetables. But there are other sources of vitamin C besides citrus fruits: cabbage, potatoes, tomatoes, green peppers, strawberries, melons, etc. Be careful to emphasize that there are other sources of vitamin C besides citrus fruits. Discuss: None of Columbus' men died from scurvy. Can you figure out why? (Let students do some individual reading about Columbus' voyage to discover why. Columbus sailed from Lisbon on September 6, arrived in America on October 12.)

SUGGESTED TEACHING AIDS
Booklet "Hey Kids—Get Aboard the Good Ship Vitamin C" (Florida Citrus Commission).

Tells the story of early problems with scurvy aboard ships, and the discovery of the cure. Discuss:
None of Columbus' men died from scurvy. Can you figure out why? (Let students do some individual reading about Columbus' voyage to discover why. Columbus sailed from Lisbon on September 6, arrived in America on October 12.)
After the discovery that citrus fruits would prevent scurvy, the British Navy took limes on long voyages. Thus British sailors became known as "limeys."

- Exploration still requires that we provide adequate food for the explorers. Feeding astronauts in space has been a difficult problem and has prompted new ideas in food preparation and packaging.

- No matter where people are, provision must be made for them to eat. As our society advances technologically, providing new methods of education, entertainment, transportation, etc., new methods of feeding people must be devised also.

The voyage was not long enough for healthy men to become ill and die from the vitamin deficiency.

Collect from news sources stories which mention the type of food used and the methods of eating employed by astronauts in space.

Visit the school cafeteria and observe lunches being prepared.

If possible, visit an airport kitchen to see how meals are prepared for airplane passengers.

If possible, visit a hospital or other institution to see how meals are prepared.


VOCABULARY SUMMARY:
- Grain
- Staple food
- Agriculture
- Mechanization
- Leavened bread
- Unleavened bread
- Tortillas
- Cassava
- Matzoh
- Protein
- B vitamins
- Iron
- Productivity
- Food supply
- Blockade
- Spice
- Famine
- Scurvy
- Vitamin C
- Ascorbic Acid
- "Limey"
TEACHING AIDS

BOOKS

BOOKLETS AND LEAFLETS
Animals that give people milk. National Dairy Council, Chicago, Illinois, 60603
Hey kids! get aboard the good ship vitamin C! Florida Citrus Commission, Lakeland, Florida.

FILMSTRIPS

FILMS
The cell: structural unit of life. Coronet Films. 10 minutes, black and white. (Available from Cornell University Film


Film Library for $2.00 rental fee).

Miracles from agriculture. U.S. Department of Agriculture, Washington, D.C. 13 1/2 minutes, color. (available from Cornell University Film Library for $1.50 rental fee).

Science and superstition. Coronet Films. 10 minutes, black and white. (available from Cornell University Film Library, Roberts Hall, Ithaca, New York 14850, for $1.50 rental fee.)

You and your food. Walt Disney Productions (Available from Film Library, New York State Health Department.) Depicts basic four food groups.

MAGAZINE ARTICLE

AN EXCELLENT GENERAL OVERVIEW OF GROWTH AND DEVELOPMENT THROUGHOUT CHILDHOOD.

GROWTH AND DEVELOPMENT IN CHILDREN. ASSOCIATION PRESS, INC., 600 GRAND AVE., DES MOINES, IOWA, 50312.

FOR THE TEACHER

BOOKS


WE SUGGEST USE: 10¢.

AMERICAN SCHOOL FOOD SERVICE ASSOCIATION, P.O. BOX 10095, DENVER, COLORADO 80210.

NUTRITION EDUCATION IN SCHOOL LUNCH.

USEFUL FOR WORK WITH PARENTS.

AMERICAN MEDICAL ASSOCIATION, 535 NORTH DEARBORN STREET, CHICAGO, ILLINOIS 60610.

VITAMIN SUPPLEMENTS AND THEIR CORRECT USE. 10¢.

AMERICAN MEDICAL ASSOCIATION, 535 NORTH DEARBORN STREET, CHICAGO, ILLINOIS 60610.

BOOKLETS AND LEAFLETS

NATIONAL DIETARY COUNCIL. ANIMAL FEEDING DEMONSTRATIONS FOR THE CLASSROOM. 50¢.

GROWTH AND DEVELOPMENT IN CHILDREN. ASSOCIATION PRESS, INC., 600 GRAND AVE., DES MOINES, IOWA, 50312.

BOOKS

FOR THE TEACHER

Shows how urban and rural schools can manage to have a school lunch program. Good for work with parents and community in stimulating the formation of a school lunch program.


Contains very useful guidelines for teaching science-related subjects.

PERIODICAL ARTICLES

APPENDIX I

Summary of School Lunch Standards*

In order to qualify for federal school lunch funds by participation in the National School Lunch Program, a school must serve meals meeting established nutritional requirements. To qualify as a "Type A Lunch," a lunch must include:

1. 8 ounces of fluid milk

2. A protein-rich food: 2 oz. of cooked or canned lean meat or 2 oz. of peanut butter or equivalent combination of these foods.

3. 3/4 cup of vegetables and fruits: two or more to equal 3/4 cup total. Undiluted juice can be used as the equivalent of 1/4 cup of the total. The inclusion of an ascorbic acid source daily and vitamin A food on alternate days is recommended.

4. Bread or a bread substitute: either whole grain or an acceptable cereal product with added vitamin A and iron supplies daily and vitamin A food on alternate days. Two or more types of bread or bread substitutes may be used as a basis for the food services program.

5. Butter or fortified margarine: 2 teaspoons used as a spread or in preparation of other foods.

6. Special attention should be given to foods which supply iron, vitamin A, and carbohydrates. It is desirable that local school authorities develop and publicly announce policies that meet these nutritional standards.

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4. Bread or a bread substitute: either whole grain or enriched, one slice or its equivalent.

5. Butter or fortified margarine: 2 teaspoons used as a spread or in preparation of other foods.

6. Special attention should be given to foods which supply iron, vitamin A, and carbohydrates. It is desirable that local school authorities develop and publicly announce policies that meet these nutritional standards.

*As of the end of 1969, the requirements have been amended to specify only one teaspoon of butter or margarine, rather than two.

In addition, special attention should be given to foods which supply iron, vitamin A, and carbohydrates. It is desirable that local school authorities develop and publicly announce policies that meet these nutritional standards.
THE UNIVERSITY OF THE STATE OF NEW YORK

Regents of the University (with years when terms expire)

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President of the University and Commissioner of Education

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