The reading improvement activities in this handbook are intended for use by middle school science teachers. Focusing on study skills, vocabulary development, and comprehension development, the activities include (1) surveying science texts and science content area reading materials, (2) outlining, (3) spelling, (4) syllabication, (5) word recognition, (6) using synonyms, (7) understanding the main idea of a text, (8) remembering details, (9) determining the sequence of events stated in the text, and (10) making inferences from texts. Many of the descriptions of these activities include samples of teacher planning sheets and master copies of student worksheets. The appendixes contain additional advice and materials that science teachers can use to develop their students' content area reading skills. These items include a dictionary of word parts, a list of the reading skills needed in science instruction, the Fry and the SMOG readability formulas and directions for their use, a five-part strategy for word attack, and hints on accenting syllabication of science vocabulary. (RL)
A Classroom Teacher's Guide to Reading Improvement in Middle School Science

"PERMISSION TO REPRODUCE THIS MATERIAL HAS BEEN GRANTED BY Ruth Duncan"

TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)

P.K. Yonge Developmental Individualized Reading
P.K. Yonge Laboratory School/College of Education/University of Florida

An ESEA Title IV-C Dissemination Project
This Guide is designed to assist persons in implementing the P. K. Yonge Developmental Individualized Reading Program which has been in operation since 1970 at the P. K. Yonge Laboratory School and was developed by the following persons:

Hellen I. Guttinger, Associate Professor  
College of Education and Director  
Title IVC Reading Dissemination Project  
University of Florida

Janet J. Larsen, Associate Professor  
College of Education and Arts and Sciences Graduate School  
University of Florida

Vynce A. Hines, Professor  
College of Education  
University of Florida

This is a publication of the P. K. Yonge Developmental Individualized Reading Project operated by the University of Florida and supported by an ESEA, Title IVC grant issued by the Florida Department of Education. Any opinions expressed herein do not necessarily reflect the position or policy of the Department of Education or the United States Office of Education.
A CLASSROOM TEACHER'S GUIDE TO
READING IMPROVEMENT
IN MIDDLE SCHOOL SCIENCE

Developed by:

Hellen I. Guttinger, Project Director, Title IVC Reading Dissemination Project, P. K. Yonge, Gainesville, Florida;

Anna Garcia, Reading Laboratory Director, Roosevelt Jr. High School, Palm Beach County, Florida;

Coralie Glickman, Reading Laboratory Director, Conniston Junior High School, Palm Beach County, Florida;

Amy Goldstein, Reading Laboratory Director, P. K. Yonge, Gainesville, Florida;

Barbara Kaiser, Reading Laboratory Director, Hawthorne Junior-Senior High School, Alachua County, Florida;

Anne Parker, Area Resource Teacher, Palm Beach County School System, Florida.

Technical Assistance:

Lucy Brock, Editor, Title IVC Reading Dissemination Project, P. K. Yonge Laboratory School.

Anita Buck, Acting Project Director, Title IVC Reading Dissemination Project, P. K. Yonge Laboratory School.

Ruth Dunci, Coordinator of Research and Dissemination, P. K. Yonge Laboratory School.

Anne E. Nelson, Free-lance Artist, Cover Design.

Cherry K. Travis, Secretary III, Title IVC Reading Dissemination Project, P. K. Yonge Laboratory School.
We wish to acknowledge the following publishers and authors who have generously granted their permission for us to reprint their materials for this monograph.

<table>
<thead>
<tr>
<th>Page</th>
<th>Material</th>
<th>Author or Publisher</th>
</tr>
</thead>
<tbody>
<tr>
<td>97</td>
<td>The Eighth Day of the Week</td>
<td>Addison Wesley Publishing Company</td>
</tr>
<tr>
<td>111</td>
<td>&quot;SMOG Grading - A New Readability Formula,&quot; Journal of Reading</td>
<td>International Reading Association</td>
</tr>
<tr>
<td>111</td>
<td>Adapted SMOG Readability Formula</td>
<td>Lawrence L. Smith</td>
</tr>
<tr>
<td>113</td>
<td>Improving Reading In Every Class: A Sourcebook for Teachers</td>
<td>Allyn and Bacon</td>
</tr>
<tr>
<td>120</td>
<td>Electric Board</td>
<td>John Fielding</td>
</tr>
</tbody>
</table>
INTRODUCTION

The P. K. Yonge model for reading improvement at the middle and high school levels has been developed and tested over the past seven years, both in the Laboratory School and in several public schools in Florida. The model features a developmental, individualized approach to improving reading. Utilizing diagnostic and prescriptive procedures, the program includes all pupils at a grade level and focuses on improvement of reading skills considered important to the pupil. After fifteen hours practice in a laboratory, distributed over six weeks, reading rate, vocabulary, and comprehension have been substantially increased for most pupils (Guttinger, Hines & Larson 1972, Guttinger, 1974, Guttinger & Hines, 1977.)

As significant as is the progress made by participation in the reading laboratory, the real potential for growth in reading once students have left the laboratory setting is through extension of opportunities for improvement into content area classroom. The presence of the developmental individualized reading laboratory in schools has been found to stimulate content area teachers to seek assistance from the reading laboratory directors in selecting resource materials and in providing appropriate reading skill development experiences in the classroom.

As a result of numerous requests from these content area teachers, a group of reading laboratory directors devoted several weeks during the summer of 1974 to the development of materials and guides for the content areas of science, social studies, and language arts. During the 1974-75 school year these guides were tested in approximately forty schools in thirteen Florida counties.

After receiving feedback from teacher-users the science guide was edited and revised for printing in 1976. During the 1975-77 school years, additional testing of the language arts and social studies materials was conducted. When Title IVC funds became available to the P. K. Yonge Project in December, 1977, a revision and updating of the original guides were made possible. This handbook is one of the products of those endeavors.
Recognizing that the content area teacher is an expert in his or her own field, equipped with a vast background of experience and knowledge, no attempt has been made in the design of the activities presented here to prescribe language, vocabulary, or concepts to be taught. Neither are the suggestions intended to be comprehensive. Rather, they are presented as examples of the kinds of things which may be used to facilitate content area teaching by providing a variety of supplemental activities related to the process of reading.

No sequence is implied in the order in which activities are presented. The authors agree that basing variety on the needs of readers in the classroom is essential. Optimum enhancement of the reading skills developed during the reading laboratory experience and the subsequent transfer of these skills to the content area curriculum is most likely to occur when attention is focused on those individual needs.

Hellen I. Guttinger, Director
Reading Dissemination Project
ESEA Title IVC
P.K. Yonge

September, 1978

Grant #015-2478-78401
# TABLE OF CONTENTS

## INTRODUCTION

### I. STUDY SKILLS

#### Parts of a Book:

<table>
<thead>
<tr>
<th>Title Page</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Copyright Page</td>
<td>2</td>
</tr>
<tr>
<td>Table of Contents</td>
<td>3</td>
</tr>
<tr>
<td>Glossary</td>
<td>4</td>
</tr>
<tr>
<td>Index</td>
<td>6</td>
</tr>
</tbody>
</table>

#### Surveying:

<table>
<thead>
<tr>
<th>Title, Summary of Book</th>
<th>9</th>
</tr>
</thead>
<tbody>
<tr>
<td>Headings and Subheadings</td>
<td>11</td>
</tr>
<tr>
<td>Diagrams</td>
<td>13</td>
</tr>
<tr>
<td>Charts</td>
<td>15</td>
</tr>
<tr>
<td>Chapter Introductions</td>
<td>16</td>
</tr>
<tr>
<td>Categories</td>
<td>17</td>
</tr>
</tbody>
</table>

#### Questioning:

| Headings and Subheadings | 19 |

#### Recall and Review:

| Recall and Review | 22 |

#### Skimming:

| Skimming | 23 |

#### Scanning:

| Scanning | 24 |

#### Following Directions:

| Following Directions | 26 |

#### Outlining:

| Outlining | 28 |
II. VOCABULARY

Word Recognition:

Word Recognition
Informal Word Recognition
Inventory

Word Meaning:

Word Meaning

Spelling:

Spelling

Syllabication:

Syllabication

Prefixes:

Prefixes

Suffixes:

Suffixes

Synonyms:

Synonyms

Context Clues:

Context Clues
Words in Context and Sentence
Building

Categorizing:

Categorizing

Multiple Meanings:

Multiple Meanings
III. COMPREHENSION

Main Idea:

Main Idea
79

Details:

Details
82

Locating the Facts:

Locating the Facts
83

Sequence:

Sequence
84

Inferences:

Inferences
85

IV. APPENDICES

Ditto Master Copies

Word Maze
91
Word Twirl
92
Add-Up-The-Words
93
Seek and Find
94
Matching Spaces
95
Let's Travel Board Game
96

Dictionary of Word Parts
97

Reading Skills Needed in Science
107

Fry Readability Formula
109

Adapted SMOG Readability Formula
111

A Five Part Strategy for Word Attack
113

Accenting Hints
115

Syllabication Hints
116
Ways to Sell Books in the Science Classroom

Electric Board - Directions

Magic Slates - Directions

More Ditto Master Copies

Definition Sheet

Crossword Puzzles

Bibliography
STUDY SKILLS

ACTIVITIES
SKILL: Study Skills - Title Page

MATERIALS: Textbook or other instructional materials, teacher-made worksheet

TEACHER DIRECTIONS:
Using the Title Page of the textbook as a source, the teacher asks questions orally or provides each student with a worksheet similar to the one in the Sample Item.

---

Title Page Task Sheet

SAMPLE ITEM:
1. What is the title of your textbook?
2. Who is (are) the author(s) of your textbook?
3. What company publishes the book?

---

ALTERNATIVES:
1. Title Pages from discarded books are mounted on cardboard. Questions relating to each Title Page are developed and mounted on the reverse side of the cardboard. These lessons can be placed in boxes in a kit format.
2. Title Pages from discarded books are made into transparencies. Questions relating to each Title Page may be included on the transparency or each student may be given a worksheet.

---

PARTS OF A BOOK
SKILL: Study Skills - Copyright Page

MATERIALS: Textbook or other instructional material, teacher-made worksheet

TEACHER DIRECTIONS:
Using the Copyright Page of the textbook as a source, the teacher asks questions orally or provides each student with a worksheet similar to the one in the Sample Item.

Copyright Page Task Sheet

SAMPLE ITEM:

1. When was your textbook first issued a copyright?

2. To whom would you write in order to get permission to reproduce material in the textbook?

3. How many copyright dates does your textbook show? What are they?

ALTERNATIVES:

1. Copyright Pages from discarded books are mounted on cardboard. Questions relating to the Copyright Pages are developed and mounted on the reverse side of the cardboard. These lessons can be placed in boxes in a kit format.

2. Copyright Pages from discarded books are made into transparencies. Questions relating to each Copyright Page may be included on the transparency or each student may be given a worksheet.

PARTS OF A BOOK
SKILL: Study Skills - Table of Contents

MATERIALS: Textbook or other instructional materials, teacher-made worksheet

TEACHER DIRECTIONS: Using the Table of Contents of the textbook as a source, the teacher asks questions orally or provides each student with a worksheet similar to the one in the Sample Item.

### Table of Contents Task Sheet

**SAMPLE ITEM:**

1. On what page(s) do you find the Table of Contents?
2. How many Units does your text contain?
3. On what page does Unit 3 begin?
4. In what unit would you expect to find information about energy?
5. How many chapters are included in Unit 6?
6. In what chapter would you expect to read about bacteria?
7. On what page does the Glossary begin?
8. On what page does the Index begin?

### ALTERNATIVES:

1. Tables of Contents from discarded books are mounted on cardboard. Questions relating to the Table of Contents are developed and mounted on the reverse side of the cardboard. These lessons can be placed in boxes in a kit format.

2. Tables of Contents from discarded books are made into transparencies. Questions relating to each Table of Contents may be included on the transparency or each student may be given a worksheet.

### PARTS OF A BOOK
SKILL: Study Skills - Glossary

MATERIALS: Textbook or other instructional materials, teacher-made worksheet

TEACHER DIRECTIONS:

The teacher selects words from a given chapter or section of the textbooks with which students are expected to become familiar. Worksheets are constructed by using each word (either correctly or incorrectly) in a sentence similar to the ones in the Sample Item.

SAMPLE ITEM:

Glossary Task Sheet #1

DIRECTIONS: In order to answer each question, you will need to look up the underlined words in your glossary. Answer each item either true or false. If the item is false, use the underlined word correctly in a sentence of your own.

1. When people are cheerful, we say they have a good sense of humus.
2. Friction is a story that is not true.
3. Bacilli are rod shaped bacteria.

PARTS OF A BOOK
SKILL: Study Skills - Glossary

MATERIALS: Textbook, teacher-made worksheet

TEACHER DIRECTION:
Select glossary words with which the student needs to become familiar. Develop a worksheet which gives a set of clues to each glossary word.

SAMPLE ITEM:
Glossary Task Sheet #2

DIRECTIONS: Read each set of clues. Use each set of clues to help you locate a word in the glossary.

1. What word -
   a) is on page 364 of your glossary
   b) has two syllables
   c) means any substance that can burn and thus release energy

2. What word -
   a) begins with the letter "m"
   b) is a compound word
   c) means an organism generally too small to be visible without a microscope

3. What word -
   a) means the smallest single-celled plant without chlorophyll
   b) begins with the letter "b"
   c) has four syllables

Answers:
1. Fuel
2. Microorganism
3. Bacteria

SKILL: Study Skills - Index

MATERIALS: Textbook or other instructional material, teacher-made worksheet

TEACHER DIRECTIONS:

Using the textbook or other instructional material as a source, the teacher asks questions orally or provides each student with a worksheet similar to the one in the Sample Item.

SAMPLE ITEM:

Index Task Sheet #1

DIRECTIONS: Read each question. Write the key word(s) which you would look up in your index in order to find the answer to the question.

KEY WORDS

1. Where do bacteria grow?
2. What are antibiotics?
3. What is the method used to control smallpox?
4. Who were the scientists who developed a method for controlling polio?
5. How does the process of filtration work to control impurities in water?

Text: Concepts in Science, pp. 369 - 376

PARTS OF A BOOK
SKILL: Study Skills - Index

MATERIALS: Teacher-made worksheet

TEACHER DIRECTIONS:

The teacher constructs a worksheet similar to the one in the Sample Item. A copy is given to each student.

SAMPLE ITEM:

Index Task Sheet #2

DIRECTIONS: Under the topic, arrange the subtopics in alphabetical order, as they would appear in an index.

Topic: Environment

Subtopics: pollution of, 69, 320; adaptation to, 40; interdependence of living things in, 40, 76, 120, 131, 350; changing, 40, 132, 358; conservation of, 17, 77, 116, 359; living, 76.

Text: Concepts in Science, p. 371
SKILL: Study Skills - Index

MATERIALS: Textbook

TEACHER DIRECTIONS:

Using the Index of the textbook or other instructional material as a source, the teacher asks questions orally or provides each student with a worksheet similar to the one in the Sample Item.

SAMPLE ITEM: Index Task Sheet #3

1. On what pages would you find information about the general topic carbon dioxide?
2. On what page would you find information about Samuel Morse?
3. On what page would you find information about parts of a telephone?
4. On what page would you find information about the formula for water?
5. On what page could you find a picture of Larnard's Star?

Text: Concepts in Science, pp. 369 - 376

PARTS OF A BOOK
SKILL: Study Skills - Title, Introductory Paragraph and Summary

MATERIALS: Textbook or other instructional materials, teacher-made worksheet, 24" x 3" strip of construction paper, marking pencil

TEACHER DIRECTIONS:
The teacher writes the chapter title on the strip of construction paper for placement in the classroom. The students are asked to locate the page on which the chapter begins. Through discussion, the students analyze the chapter title and "guesstimate" as to what kinds of information the chapter contains.

The teacher, or a student who has had time to prepare, reads the introductory paragraph and summary to the class in order to compare their analysis of the title.

A worksheet similar to the one in the Sample Item is given to each student.

SAMPLE ITEM: Survey Task Sheet #1

The title of your new unit is: ________________________________

Choose one of the items below. Return this sheet and your work to your teacher by: ________________________________

1. Check a current T. V. Guide and find a program that relates to the new chapter.
   Title of program: ________________________________
   Date and time of program: ________________________________ Channel ________

2. Show this sheet to an adult you know and ask him/her to list some things that might be learned by studying this chapter.
   ____________________________________________
   ____________________________________________
   ____________________________________________
   ____________________________________________

SURVEYING
3. Find an article in a magazine or newspaper that relates to the new chapter.

4. Write and mail a letter to one of the following addresses. Request information that will help the class with the study of the new chapter.

5. Find someone who will be willing to speak to the class on a topic that relates to the new chapter.

   Name of speaker: ______________________ Telephone #: ______________________
   Date the speaker wishes to visit: ______________________

6. Draw or find pictures for the bulletin board that relate to the new chapter.

7. Locate in the library 4 or 5 books that relate to the new chapter and would be of interest to your classmates. The books may be fiction or nonfiction.

   **Title of Book** | **Call Number**
   --- | ---
   a. | 
   b. | 
   c. | 
   d. | 
   e. | 

8. Your choice. I am going to: ______________________

   Students should be encouraged to make different choices as each new chapter is introduced rather than select the same activity.

   **Addresses for obtaining free and inexpensive materials may be found in the following book:**

   Educators Guide to Free & Inexpensive Materials
   Educators Progress Service, Inc.
   Randolph, Wisconsin  53956

SURVEYING
SKILL: Study Skills - Headings and Subheadings

MATERIALS: Textbook or other instructional material, teacher-made worksheet

TEACHER DIRECTIONS:

In the initial lesson regarding the surveying of headings and subheadings, the teacher shows the students how to distinguish between each (i.e., the different type of print, the use of colored print, etc.). Afterwards, the students should be able to work independently.

A worksheet similar to the one in the Sample Item is given to each student. These are completed in small group sessions or independently. Ultimately students will be able to construct the outline without using a worksheet.

SAMPLE ITEM:

Survey Task Sheet #2

DIRECTIONS: Part of the outline has been completed. Use the headings and subheadings to Unit 3, Searching for Longer Life, to finish it.

I. SEARCHING FOR LONGER LIFE

A. Capturing the Tiniest

1. Seeing Tiny Organisms

2. 

B. Plants Without Color

1. 

2. 

Text: Concepts in Science, p. 83
C. ______________________________________________________________________
1. ______________________________________________________________________
2. ______________________________________________________________________
3. ______________________________________________________________________
4. Helping Your Body Defenses

D. ______________________________________________________________________
1. ______________________________________________________________________
2. ______________________________________________________________________
3. ______________________________________________________________________

E. A Problem -- for You and Yours
1. ______________________________________________________________________
2. ______________________________________________________________________
3. ______________________________________________________________________
4. ______________________________________________________________________

F. The Main Concept-Controlling the Environment
1. ______________________________________________________________________
2. Focus on the Scientist's Ways
3. ______________________________________________________________________

II. A NEW VIEW OF INTERDEPENDENCE
SKILL: Study Skills - Diagrams

MATERIALS: Textbook or other instructional material, teacher-made worksheet

TEACHER DIRECTIONS: The teacher selects diagrams from a given chapter or section of the textbook. A worksheet similar to one of those in the Sample Item is constructed. (The worksheets below are arranged in order of increasing difficulty.)

---

SAMPLE ITEM:

Survey Task Sheet #3

DIRECTIONS: Turn to the page number in parenthesis. Look at the diagram. Place a check before all words that name something you can see in the diagram. Add others you can support.

I. (page 110)

_____pump  _____ water  _____gravel

_____concrete  _____ pipe  _____ sand

or

Survey Task Sheet #3

DIRECTIONS: Turn to the page number in parenthesis. Look at the diagram. Place a check before all words that name an object or idea that the diagram makes you think of. Add others you can support.

I. (page 110)

_____ Industry  _____ Environment

_____ Danger  _____ Purification

_____ Pollution  _____ Prosperity

Test: Concepts in Science, p.110

SURVEYING
DIRECTIONS: Turn to the page number in parenthesis. Look at the diagram. Place a check before all statements that you believe tell about the diagram. Add other statements that you can support.

I. (page 110)

- Untreated water has bacteria in it.
- Sand and gravel act as filters for the water.
- A pump sends the water to the city.
- Untreated water goes directly to the pump.
SKILL: Study Skills - Charts

MATERIALS: Textbook or other instruction material, teacher-made Worksheet

TEACHER DIRECTIONS:

Using a chart in a particular chapter or section of the textbook as a source, the teacher asks questions orally or provides each student with a worksheet similar to the one in the Sample Item.

SAMPLE ITEM:

Survey Task Sheet #4

DIRECTIONS: Turn to page 106 in the textbook. Use the chart on that page to answer the following questions.

1. What is the title of the chart?
2. What scientist discovered a method for controlling smallpox?
3. When was a method for controlling malaria discovered?
4. What is another name for hydrophobia?
5. What method is used for controlling yellow fever?

Text: Concepts in Science, 106
SKILL: Study Skills - Chapter Introductions

MATERIALS: The introductions from textbook chapters or other instructional material, overhead projector, marking pencil, transparency, teacher-made worksheet

TEACHER DIRECTIONS: The teacher cuts the chapter introductions from discarded textbooks and makes a transparency. Each introduction is numbered with the marking pencil. The teacher uses the overhead projector to show the introductions to the class.

Each student is given a worksheet that lists the chapter titles from which each introduction was taken. After reading a particular introduction, the student matches the number on it with the appropriate chapter title.

SAMPLE ITEM: Survey Task Sheet #5

1. Chapter Introduction Sheet

   ![Chapter Introduction #1]

2. Worksheet Diagram

   Directions: Read each chapter introduction. Write the number of the introduction next to the title which you think matches it.

   _____ The Universe is in Constant Change
   _____ How to Calculate a Star's Temperature
   _____ The Energy of Stars
   _____ Star Movements
   _____ The Stars: How many?

Text: Concepts in Science, 323
SKILL: Study Skills - Categories

MATERIALS: Teacher-made worksheet, timer, four or five books at various reading levels from each of the following categories:

1) Botany  
2) Zoology  
3) Astronomy  
4) Geology  
5) Archaeology  
6) Chemistry  
7) Paleontology  
8) Medicine  
9) Meteorology  
10) Psychology

TEACHER DIRECTIONS:

Each category of books is placed at a learning station. A card at each station tells the category. The class, in groups of 3-4 students rotates from one station to the next at the signal from the teacher. At each station the students are to survey the books by:

1) reading the title
2) reading the comments on the inside flap of the jacket (if there is one)
3) reading the Table of Contents
4) reading the introductory paragraph
5) looking at pictures and diagrams

SAMPLE ITEM:

Survey Task Sheet #6

DIRECTIONS: You have been chosen by the President to be the first visitor from Earth to the newly discovered planet, Varwunda. The beings on Varwunda are friendly and happy, however, they know nothing of science. Since you are a world famous scientist your job will be to teach the Varwundans about science as it is on the Earth. As you survey the books at each station read the category card. Survey the books at each station. Decide what book would be most useful to assist you in teaching
the Varwundans. Write the title of the book that you select next to the appropriate category on this sheet.

Botany

Zoology

Astronomy

Geology

Archaeology

Chemistry

Paleontology

Medicine

Psychology

ALTERNATIVES:

This list can be used as the basis of a self-selected reading list. If the student wishes to make a substitution in any category he/she is free to do so.

SURVEYING
**SKILL:** Study Skills - Headings and Subheadings

**MATERIALS:** Teacher-made worksheet

**TEACHER DIRECTIONS:**

The teacher develops a worksheet based on the chapter outline of headings and subheadings. The students are assigned to groups of four to five. One student in the group acts as the recorder and writes the responses of the others in the group. Each recorder reports to the class and a composite list of questions is constructed.

---

**SAMPLE ITEM:**

Questioning Task Sheet #1

**DIRECTIONS:** You will be playing the role of the teacher. Your job is to construct questions for a test on "Unit 3, Searching for Longer Life." Think of a question that you would ask relating to each step of the outline. Write your question in the space provided. The first one has been done for you.

<table>
<thead>
<tr>
<th>Outline</th>
<th>Question</th>
</tr>
</thead>
<tbody>
<tr>
<td>I. SEARCHING FOR LONGER LIFE</td>
<td>What kinds of tools help to have a longer life?</td>
</tr>
<tr>
<td>A. Capturing the Tiniest</td>
<td></td>
</tr>
<tr>
<td>1. Seeing Tiny Organisms</td>
<td></td>
</tr>
<tr>
<td>2. Types of Bacteria</td>
<td></td>
</tr>
<tr>
<td>B. Plants Without Color</td>
<td></td>
</tr>
<tr>
<td>1. How a Mold Gets Food</td>
<td></td>
</tr>
<tr>
<td>2. A Bacterium and its Food</td>
<td></td>
</tr>
</tbody>
</table>

(The remaining steps of the outline would be included on the actual worksheet.)

Text: Concepts in Science, p. 83
SKILL: Study Skills - Headings and Subheadings

MATERIALS: Teacher-made worksheet, 20-25 books in various science categories (at least 2 different titles to each category)

TEACHER DIRECTIONS:

This activity is used at a learning station or set up as an activity that students work on when they have finished their regular assignments. The books are placed at a station or on a table in the classroom. Each student is given a worksheet similar to the one in the Sample Item.

SAMPLE ITEM:

Questioning Task Sheet #2

DIRECTIONS: Part of your job as head science researcher at Parapsychology Institute is to appear on a weekly television program. During each broadcast hundreds of TV viewers call with questions for the following week's program.

Since you cannot answer all of the questions in depth, you frequently refer the TV viewers to books which give additional information.

On this worksheet you will find some of the questions for this week's show. Read each question. Then survey the books on the table. Write the title of the book which you think would give additional information about each question.

Question from Mr. Theodore Bear:

"What are the eating habits of the Australian Koala?"

Question from Professor Kohoutec:

"When will Halley's Comet reappear?"
SKILL: Study Skill - Headings and Subheadings

MATERIALS: Textbook, Teacher-made worksheet

TEACHER DIRECTIONS:

The teacher assigns the students into teams of two. Each student receives a copy of the composite list of questions which were developed while completing Questioning Task Sheet #1. Team members read the textbook material under heading or subheading. After reading each section, the team members jot down words or phrases which would answer the question(s). The back of the card is used for this purpose.

SAMPLE ITEM:

Questioning Task Sheet #3

<table>
<thead>
<tr>
<th>Heading or subheading title:</th>
<th>Heading or subheading title:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Types of Bacteria</td>
<td>Plants Without Color</td>
</tr>
<tr>
<td>What are some of the kinds</td>
<td>What are some nongreen plants?</td>
</tr>
<tr>
<td>of bacteria?</td>
<td>Where do they live?</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Heading or subheading title:</th>
<th>Heading or subheading title:</th>
</tr>
</thead>
<tbody>
<tr>
<td>How a Mold Gets Food</td>
<td>A Bacterium and its Food</td>
</tr>
<tr>
<td>What are the needs of fungi?</td>
<td>Are bacteria harmful?</td>
</tr>
</tbody>
</table>

Text: Concepts in Science, p.83
SKILL: Study Skills - Recall and Review

MATERIALS: Composite set of question cards with the student's answers on the back. (These were completed by the student in the previous lesson, Question Task Sheet, #3)

TEACHER DIRECTIONS: In order to practice Recall the students are assigned to small groups, teams, or work individually. Each student tries to answer the question on the front of the card without referring to the answer side of the card. The same procedure as above is used for Reviewing before a test.

SAMPLE ITEM:

Recall and Review Task Sheet

<table>
<thead>
<tr>
<th>Heading or Subheading</th>
<th>Possible Answers:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Types of Bacteria</td>
<td>Bacilli - rod shaped</td>
</tr>
<tr>
<td></td>
<td>Cocci - spherical</td>
</tr>
<tr>
<td></td>
<td>Spirillum - corkscrew</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Heading or Subheading</th>
<th>Possible Answers:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plants Without Color</td>
<td>Bacteria</td>
</tr>
<tr>
<td></td>
<td>Fungi</td>
</tr>
<tr>
<td></td>
<td>On other living things</td>
</tr>
<tr>
<td></td>
<td>On bread</td>
</tr>
</tbody>
</table>
SKILL: Study Skills - Skimming

MATERIALS: Textbook or other instructional materials

TEACHER DIRECTIONS:

Students are assigned to teams of 4 - 5. A team recorder is selected. Each team is assigned a particular section of the textbook. Members of each team skim the assigned portion of the text to find words and phrases which are interesting. The team recorder writes these down. In this way, each team develops a word collage. The results of each team's efforts are shared with the class. This activity provides a quick introduction to a new chapter.

SAMPLE ITEM:

Skimming Task Sheet

microorganisms   tiny rod shapes
bacteria          disease
cultures          spherical bacteria
dead animals      feed on tissues of
found near you    the body

ALTERNATIVES:

Fictional materials which pertain to a particular unit of study can be used in place of the text.

Cut out letters, words and phrases from newspapers and magazines to create an attractive word collage.
SKILL: Study Skills - Scanning

MATERIALS: Textbook, Flair pens of different colors, paper

TEACHER DIRECTIONS:

Place a sheet of paper on the bulletin board. Divide the class into groups of 5-6 students. Give each group time to choose a group leader and one of the Flair-tip pens.

Tell the students that, at the beginning of each science class, their task will be to locate compound words in their textbooks. After locating a compound word, each student is to write the word and the page on which it is found on a sheet of scratch paper. At the end of the "search time" each group leader collects the words from the group members and writes these words on the bulletin board paper with the Flair-tip pen. At the end of a week, the group with the most compound words is the winner.

SAMPLE ITEM:

Scanning Task Sheet #1

<table>
<thead>
<tr>
<th>Red Group</th>
<th>Green Group</th>
<th>Blue Group</th>
<th>Yellow Group</th>
<th>Orange Group</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. into*</td>
<td>1. earthquake</td>
<td>1. cannot</td>
<td>1. cuplike</td>
<td>1. into*</td>
</tr>
<tr>
<td>2. statement</td>
<td>2. however</td>
<td>2. schoolyard</td>
<td>2. jelly fish</td>
<td></td>
</tr>
<tr>
<td>3. itself</td>
<td>3. windbreak</td>
<td>3. within</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>4. evergreen</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Words used by one team may be used by another team as well.

ALTERNATIVES:

1. During "search time" students may work in groups or individually.

2. Options in lieu of compound words:
   a. Vc/cv words: tis/sue; fan/der
   b. Words that begin with a particular letter
   c. Words with a particular number of syllables
   d. Words with prefixes
   e. Words with suffixes
   f. Words in italics or boldface print

SCANNING
SKILL: Study Skills - Scanning

MATERIALS: Textbook or other instructional material, 3-minute egg timer

TEACHER DIRECTIONS:

Students are asked to scan a particular section of the textbook and list words which belong in a special category. A time limit of 3 minutes for each question is set.

SAMPLE ITEM:

Scanning Task Sheet #2

1. List all of the types of bacteria mentioned on page 86.

2. On pages 84 - 106, list all of the words in bold face print.

3. In Unit 3, find all of the Investigations and list the page numbers where they are found.

4. In Unit 3, find all of the charts and write the title of each.

ALTERNATIVES:

Students might be asked to arrange each list in alphabetical order after the class has made a composite list.

Text: Concepts in Science, 83 - 131

SCANNING
SKILL: Study Skills - Following Directions
MATERIALS: Teacher-constructed worksheet

TEACHER DIRECTIONS:
Each student is provided with a copy of the test in the sample item. Stress that this is an individual test to be completed without conferring with fellow students.

SAMPLE ITEM:

FOLLOWING DIRECTIONS TEST

Can You Follow Directions? - Timed Test; you have three minutes.

1. Read everything carefully before you do anything.
2. Put your name in the upper right hand corner of this paper.
3. Circle the word "NAME" in sentence number two.
4. Draw five small squares in the upper left hand corner of this paper.
5. Put an "X" in each square.
6. Put a circle around each square.
7. Sign your name under the title of this paper.
8. After the title, write "YES YES YES."
9. Put a circle completely around sentence number seven.
10. Put an "X" in the lower left hand corner of this paper.
11. Draw a rectangle around the word "FIVE" in sentence four.
12. On the back of this paper multiply 703 by 66.
13. Draw a triangle around the "X" in sentence number ten.
14. Loudly call out your first name when you get this far.
15. If you think you have followed directions carefully to this point, call out "I HAVE IT."
16. On the reverse side of this paper add 8950 and 9805.
17. Put a circle around your answer and a square around the circle.
18. In your normal speaking voice, count from ten to one backwards.
19. Punch three small holes in the top of this paper with your pencil point.
20. If you are the first person to reach this point, loudly call out "I AM THE FIRST PERSON TO THIS POINT. I AM THE LEADER IN FOLLOWING DIRECTIONS."
21. Now that you have finished reading everything carefully do only sentences one and two.
SKILL: Study Skills - Following Directions

MATERIALS: Textbook or other instructional material, teacher-made worksheet

TEACHER DIRECTIONS:

After the students have studied a particular chapter or section of the textbook, the teacher develops a worksheet similar to the one in the Sample Item. The questions are based on material with which the students are concerned with the process of following written directions.

SAMPLE ITEM:

Following Directions Task Sheet

1. If some bacteria are harmful, underline the first word in this sentence.

2. If bacilli are rod shaped, write your age in the blank at the end of this sentence.

3. If fungi are not nongreen plants, underline all of the words in this sentence which begin with the letter "t".

4. If bacteria are living cells, draw a spirilli in the box at the end of this sentence.

5. If all bacteria are beneficial to man, work the following math problem. \(2 \times 53 = \)
SKILL: Study Skills - Outlining

MATERIALS: Terms appropriate to science concepts

TEACHER DIRECTIONS:

In each exercise below there is a list of words and a skeleton outline. Each list of words includes both main topics and subtopics. The skeleton outline shows how many main topics are in the list and how many subtopics are under each main topic. Have students fill in the skeleton outline with main topics and subtopics.

SAMPLE ITEM:

I. 
A. 
B. 
C. 
D. 
smallpox
penicillin
sodium
antibiotics
yellow fever

II. 
A. 
B. 
C. 
D. 
disease
malaria
streptomycin
polio

OUTLINING
SKILL: Vocabulary - Word Recognition

MATERIALS: Textbook, teacher-made exercise, cardboard

TEACHER DIRECTIONS:

Compile the vocabulary to be studied in a particular unit of the textbook into lists for introductory vocabulary screening. Place them on a ditto master and run enough copies for each of your students, plus one extra to be placed on a piece of cardboard. Allow the students to read off the copy on the blackboard while you score on another. Be sure to indicate the student's name on the teacher's copy for record keeping purposes. Have students begin reading the first list and read only those words they know. Place a mark beside those words the student knows. Assume he/she does not know words he/she does not read. Since this activity requires a one to one approach, it may be advisable to assign an exercise which will keep the class busy while you test each student. A certain degree of privacy will be necessary for the student being tested.

SAMPLE ITEM: (See the following 2 pages.)

ALTERNATIVE:

Lists may be compiled according to various categories such as words in biology, geology, botany or in relation to units of study such as stars, planets or energy for introductory vocabulary screening.

Sources: Format of Slosson Oral Reading Test adapted by Anna Meehan, Palm Beach County Schools
### INFORMAL WORD RECOGNITION INVENTORY  
- SCIENCE -

**Concepts in Science - 6**

Unit Seven - Harvesting the Atom  
Unit Eight - Probing the Stars  

<table>
<thead>
<tr>
<th>Name</th>
<th>Age</th>
<th>Date</th>
<th>School</th>
<th>Grade</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>List A</th>
<th>List B</th>
<th>List C</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. radiation</td>
<td>1. investigation</td>
<td>1. test tube</td>
</tr>
<tr>
<td>2. atmosphere</td>
<td>2. opposite</td>
<td>2. splint</td>
</tr>
<tr>
<td>3. phenomena</td>
<td>3. gas</td>
<td>3. liquid</td>
</tr>
<tr>
<td>4. observatory</td>
<td>4. bubbling</td>
<td>4. electric</td>
</tr>
<tr>
<td>5. launch</td>
<td>5. lighter</td>
<td>5. current</td>
</tr>
<tr>
<td>6. physicist</td>
<td>6. heavier</td>
<td>6. inverted</td>
</tr>
<tr>
<td>7. astronomer</td>
<td>7. combination</td>
<td>7. reaction</td>
</tr>
<tr>
<td>8. transmit</td>
<td>8. flame</td>
<td>8. substances</td>
</tr>
<tr>
<td>9. data</td>
<td>9. formation</td>
<td>9. nuclear</td>
</tr>
<tr>
<td>10. universe</td>
<td>10. compound</td>
<td>10. neutrons</td>
</tr>
<tr>
<td>11. gratify</td>
<td>11. evidence</td>
<td>11. protons</td>
</tr>
<tr>
<td>12. curiosity</td>
<td>12. symbol</td>
<td>12. particles</td>
</tr>
<tr>
<td>13. electronic</td>
<td>13. split</td>
<td>13. fused</td>
</tr>
<tr>
<td>14. chemically</td>
<td>14. dilute</td>
<td>14. fusion</td>
</tr>
<tr>
<td>15. hydrogen</td>
<td>15. sulfuric acid</td>
<td>15. subtract</td>
</tr>
<tr>
<td>16. oxygen</td>
<td>16. apparatus</td>
<td>16. burst</td>
</tr>
<tr>
<td>17. molecule</td>
<td>17. formula</td>
<td>17. fission</td>
</tr>
<tr>
<td>18. atom</td>
<td>18. amount</td>
<td>18. bomb</td>
</tr>
<tr>
<td>19. nuclei</td>
<td>19. clue</td>
<td>19. collect</td>
</tr>
<tr>
<td>20. tremendously</td>
<td>20. sunlight</td>
<td>20. starve</td>
</tr>
</tbody>
</table>

Text: Concepts in Science, 271-402
### List D
1. uranium  
2. produce  
3. definitely  
4. obtained  
5. careful  
6. spectroscope  
7. helium  
8. information  
9. measured  
10. atomic weights  
11. arithmetic  
12. units  
13. matter  
14. total  
15. subtract  
16. difference  
17. mass  
18. remember  
19. examination  
20. intense

### List E
1. abundant  
2. supply  
3. temperature  
4. nuclear reactor  
5. determine  
6. steelworker  
7. accurately  
8. glowing  
9. white-hot  
10. red-hot  
11. object  
12. analyze  
13. lens  
14. prism  
15. solar  
16. diagram  
17. spectrum  
18. spectra  
19. bluish  
20. violet

### List F
1. Deneb  
2. space  
3. constellation  
4. Antares  
5. tending  
6. Algol  
7. solution  
8. beaker  
9. motion  
10. kinetic energy  
11. pyrex  
12. thermometer  
13. tongs  
14. flask  
15. diameter  
16. distance  
17. vast  
18. gravitation  
19. Galileo  
20. unnoticed

### List G
1. giant  
2. dwarf  
3. circumstance  
4. illustration  
5. relative  
6. orbit  
7. directly  
8. depend  
9. techniques  
10. telescope  
11. Mt. Palomar  
12. vantage point  
13. Stonehenge  
14. pillar  
15. predict  
16. eclipses  
17. instrument  
18. probing  
19. section  
20. galaxy

### List H
1. Milky Way  
2. calculate  
3. photograph  
4. sample  
5. known area  
6. trillion  
7. Alpha Centauri  
8. searchlight  
9. light year  
10. pinpoint  
11. Nova  
12. process  
13. continue  
14. explodes  
15. supernova  
16. plutonium  
17. neptunium  
18. curium  
19. einsteinium  
20. downstro' e

### List I
1. J tube  
2. volume  
3. mercury  
4. cyclotron  
5. nitrogen  
6. carbon  
7. potassium  
8. iron  
9. factory  
10. whirling  
11. pitched  
12. Doppler Effect  
13. frequency  
14. vibrates  
15: "red shift"  
16. expanding  
17. Barnard's Star  
18. comets  
19. approximately  
20. Newton's Law
List J

1. volcanic
2. eruption
3. violent
4. dramatic
5. earthquake
6. disorder
7. indirect
8. chromosomes
9. geraniums
10. environment

SCORE

List A ___
List B ___
List C ___
List D ___
List E ___
List F ___
List G ___
List H ___
List I ___
List J ___

RAW SCORE

(Total number of correct words including the words below starting level.)

4C

WORD RECOGNITION
SKILL: Vocabulary - Word Recognition

MATERIALS: Word list, index cards

TEACHER DIRECTIONS:

After determining those words which are not part of each student's sight vocabulary in Science, have students create their own word file of "words to learn" using index cards. The words may be placed on one side and the definition on the reverse side for further study. The student can set up a contract with the teacher as to how many words will be tackled each week. Upon completion of this goal, the student may be tested by the teacher. It might be wise to encourage students to help one another in fulfilling their goals. One or two days a week could be set aside for independent vocabulary study.

SAMPLE ITEM:

The number of words will vary according to each child's level of achievement.

<table>
<thead>
<tr>
<th>New Word Contract</th>
</tr>
</thead>
<tbody>
<tr>
<td>Student's name will hereby attempt to learn ___ new words the week of ___ dates.</td>
</tr>
<tr>
<td>Signed Student</td>
</tr>
<tr>
<td>Witness Peer</td>
</tr>
<tr>
<td>Approved by Teacher</td>
</tr>
</tbody>
</table>
Atomic Weight - The sum of the protons in an atom
**SKILL:** Vocabulary - Word Recognition

**MATERIALS:** Paper, pencil, teacher-made word list. Refer to Word Maze Master on page 91

**DIRECTIONS:** The student enters the maze. The object is to find words hidden in the maze. The student may be given the first letter of each word. The letters are in correct order within the maze. This may be a timed activity. After an appropriate length of time, the student is given the Answer Key and receives credit for each word found.

---

**Word Maze Pencil and Paper Game**

**SAMPLE ITEM:**

```
\[ Maze Diagram \]
```

<table>
<thead>
<tr>
<th>Answer Key</th>
<th>Words</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>lava</td>
</tr>
<tr>
<td></td>
<td>dust</td>
</tr>
<tr>
<td></td>
<td>bomb</td>
</tr>
<tr>
<td></td>
<td>vent</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>W O R D S</th>
</tr>
</thead>
<tbody>
<tr>
<td>l</td>
</tr>
<tr>
<td>d</td>
</tr>
<tr>
<td>b</td>
</tr>
<tr>
<td>v</td>
</tr>
</tbody>
</table>

**WORD RECOGNITION**
SKILL: Vocabulary - Word Recognition

MATERIALS: Paper, pencil, teacher-made word list. Refer to Word Twirl Master on page 92.

DIRECTIONS: The teacher selects five (5) words that are in some way closely related, i.e., the five words scrambled below are the names of objects the student would associate with poetry. The teacher places the letters of the words randomly in the loops as shown below. The student is instructed to start at the arrow and "travel" the line to the finish, selecting those letters that may be used to make the desired words.

SAMPLE ITEM:

Start

Subject

THE

SCIENCE

LAB

Answer Key

Words

microscope

hand lens

thermometer

experiment

litmus paper

1. __________
2. __________
3. __________
4. __________
5. __________
SKILL: Vocabulary - Word Recognition

MATERIALS: Pencil, paper, teacher-made word list, timer or clock. Refer to Add-Up-The-Words Master on page 93.

DIRECTIONS: Letters are written in each of the numbered spaces. The student is instructed to make as many words as possible from the letters in each of the numbered spaces. The object is to make as many words as possible in a 5-minute time period and have the highest number score. For each word made from a space the student is given the number score indicated by the circled number in the space.

"Add Up the Words" Pencil and Paper Game

SAMPLE ITEM:

From the spaces below the following words can be made. Three of these words come from space 7 and four words from space 3. The student has made seven words, adding up to 33 points.

\[
\begin{align*}
7 & \text{ star, mist, time} \\
3 & \text{ocean, flow, splash, color}
\end{align*}
\]

\[
\begin{align*}
(3 \times 7 = 21) \hspace{1cm} & \text{plus} \\
(4 \times 3 = 12) \hspace{1cm} & \text{equals} \\
33 & \text{points}
\end{align*}
\]
SKILL: Vocabulary - Word Recognition

MATERIALS: Pencil, paper, teacher-made vocabulary list for specific subject within content-area. (Refer to Seek and Find Master on page 94)

TEACHER DIRECTIONS:

On a sheet of ruled squares, arrange words in horizontal, vertical or diagonal order - as shown on the sample below. Fill in remaining squares with random letters. List words on side at bottom of sheet. Instruct students to find words within the squares that correspond to word list.

SAMPLE ITEM: Seek and Find Pencil and Paper Game

<table>
<thead>
<tr>
<th>Ash</th>
<th>Block</th>
<th>Bomb</th>
<th>Cinder</th>
<th>Craters</th>
<th>Dormant volcanoes</th>
<th>Dust</th>
<th>Earthquakes</th>
<th>Eruption</th>
<th>Flood eruptions</th>
<th>Gas</th>
<th>Lava</th>
<th>Magma</th>
<th>Molten rock</th>
<th>Pumice</th>
<th>Shield</th>
<th>Steam</th>
<th>Stuff</th>
<th>Vents</th>
<th>Volcano</th>
</tr>
</thead>
</table>

WORD RECOGNITION
SKILL: Vocabulary - Word Recognition

MATERIALS: Textbook, teacher-made exercise. Refer to Seek and Find Master on page 94.

TEACHER DIRECTIONS:

Create a "Word Search" to correspond with a new chapter being introduced or a new concept being taught. This may be used to get students involved with new words to be learned.

SAMPLE ITEM:

Word Search Pencil and Paper Game

Stars and Starlight Word Search
Unit 8 - Probing the Stars

| S | Q | P | C | U | R | I | O | S | I | T | Y | X | P |
| U | R | N | M | F | O | R | M | U | L | A | O | H | H |
| L | L | A | T | M | O | S | P | H | E | R | E | P | Y |
| F | G | T | B | O | T | P | I | I | S | N | Z | T | S |
| U | C | O | U | L | F | L | H | R | O | H | A | M | I |
| R | P | M | J | E | G | I | Q | M | B | B | J | R | C |
| I | G | K | D | C | P | T | E | E | C | G | K | L | I |
| C | C | E | H | U | P | N | E | D | E | F | R | M | S |
| D | K | O | A | L | A | T | I | M | S | N | A | R | T |
| A | N | Z | B | E | H | F | E | Y | X | O | D | N | J |
| A | Y | Č | D | L | L | E | C | T | Q | P | I | R | G |
| C | O | M | P | O | U | N | D | V | W | D | A | T | A |
| I | J | I | A | G | A | P | P | A | R | A | T | U | S |
| D | K | H | N | C | H | E | M | I | C | A | L | L | Y |
| L | E | L | E | C | T | R | O | N | I | C | O | T | S |
| M | W | X | B | A | Z | I | E | L | C | U | N | V | U |

Apparatus  Data  Phenomena
Atom  Electronic  Physicist
Atmosphere  Formula  Radiation
Chemically  Gas  Split
Collect  Molecule  Sulfuric Acid
Compound  Nuclei  Transmit

Text: Concepts in Science, 323 - 359

WORD RECOGNITION 53
SKILL: Vocabulary - Word Recognition

MATERIALS: Textbook, teacher-made exercise

TEACHER DIRECTIONS:
Create a Bingo game using words introduced in a new chapter. Use the format of a Bingo card, but place words in the slots where numbers occur. Make about five different combinations of words to make it competitive. This game should be played after students have spent time studying the new vocabulary. This may be played by the entire class or in small groups.

SAMPLE ITEM:

Bingo Pencil and Paper Game

<table>
<thead>
<tr>
<th>B</th>
<th>I</th>
<th>N</th>
<th>G</th>
<th>O</th>
</tr>
</thead>
<tbody>
<tr>
<td>radiation</td>
<td>atmosphere</td>
<td>investigation</td>
<td>opposite</td>
<td>phenomena</td>
</tr>
<tr>
<td>gas</td>
<td>observatory</td>
<td>bubbling</td>
<td>launch</td>
<td>lighter</td>
</tr>
<tr>
<td>physicist</td>
<td>astronomer</td>
<td>heavier</td>
<td>combination</td>
<td>flame</td>
</tr>
<tr>
<td>formation</td>
<td>compound</td>
<td>transmit</td>
<td>data</td>
<td>universe</td>
</tr>
<tr>
<td>gratify</td>
<td>curiosity</td>
<td>electronic</td>
<td>chemically</td>
<td>hydrogen</td>
</tr>
<tr>
<td>evidence</td>
<td>oxygen</td>
<td>molecule</td>
<td>atom</td>
<td>nuclei</td>
</tr>
<tr>
<td>symbol</td>
<td>split</td>
<td>dilute</td>
<td>sulfuric acid</td>
<td>Hoffman apparatus</td>
</tr>
<tr>
<td>formula</td>
<td>amount</td>
<td>clue</td>
<td>apparatus</td>
<td>collect</td>
</tr>
</tbody>
</table>

WORD RECOGNITION
SKILL: Vocabulary - Word Meaning

MATERIALS: Pencil, paper, teacher-made word list with definitions. Refer to Matching Spaces Master on page 95.

DIRECTIONS: Students are instructed to match the words in double-lined rectangles with their meaning in single-lined rectangles.

SAMPLE Matching Spaces Pencil and Paper Game 

ITEM: The word "Amplitude" in rectangle A1 matches the definition in rectangle C2. Student would write C2 in line after A1, as shown below.

```
<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>amplitude</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>the motion of moving masses</td>
<td>long waves</td>
<td>height of a wave</td>
<td>node</td>
</tr>
<tr>
<td>3</td>
<td>inertia</td>
<td>point where vibrations take place</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>sound wave making low notes</td>
<td>octave</td>
<td>a disc that vibrates easily</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>diaphragm</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td></td>
<td></td>
<td>eight notes on a musical scale</td>
<td></td>
</tr>
</tbody>
</table>
```
**Vocabulary - Word Meaning**

Poster board (or board similar in weight and construction); magic markers; felt-tipped writing pens; white glue* - masking tape* - scissors*; pencil and paper for each player; dice; place markers (wooden blocks or toothpaste caps) for each player, each identified by a different color; one-minute timer, (or clock with second hand). Refer to Let's Travel Master on page 96.

* - optional

1. Select a sheet of poster board not less than 24" x 30" and copy the design, illustrated on page 96 on the poster board with a pencil.

2. Fill in letters of the alphabet as shown.

3. In the larger spaces write words (as illustrated, or other selected words that are appropriate). Optional: Instead of words, use drawings or pictures of objects that are appropriate.

4. With felt-tipped writing pen, trace the letters and words you have written in pencil.

5. With magic markers, outline the larger spaces.

---

**How the "Let's Travel" - Board Game Is Played**

1. The first player rolls the dice and moves the marker the correct number of spaces.

2. The player must, in one minute, write as many science-related words as possible that begin with the letter in the space. If the marker lands on a word space the player must, in two minutes, write a definition for the word that is in the word space.

3. Each player proceeds in the same manner as the first player.

4. The first player to arrive in the Goal space with the most correctly spelled and correctly defined words wins the game.

**Word Meaning**
SKILL: Vocabulary - Word Meaning

MATERIALS:
(1) Index cards or construction paper (if laminated for longer wear) cut into 3" x 5" cards - at least 50 cards should be made; 25 of one color and 25 of another
(2) Felt-tipped writing pen

TEACHER DIRECTIONS:
On the face side of the first 25 cards a single word is written. For each of these words the remaining 25 cards have a matching definition. If construction paper is used, separate colors should be chosen for the vocabulary and the definitions.

-orange- (yellow)

vibrate shake rapidly to and fro

HOW THE GAME IS PLAYED
Zimbo - Card Game
All of the word cards are dealt evenly to the players. The definition cards are placed face down in the center of the table. The player to the left of the dealer begins the game by taking the first card from the center pile. The player must match the definition card with one of the word cards in his or her hand. If this cannot be done, the card is returned to the bottom of the pile. If the card can be matched, a "book" is made and the matching cards are placed on the table in front of the player. The WINNER is the first player to match all of the cards.

ALTERNATIVE:
One-half of the cards may have drawings or pictures related to the subject and the matching half may contain phrases or sentences which are related to the pictures.

WORD MEANING
SKILL: Vocabulary - Word Meaning

MATERIALS: 3 x 5 cards (2 cards per word) scissors, glue

TEACHER DIRECTIONS: MATCHING CARDS GAME

Divide the students into groups of 4 to 8. Assign or have students think of a word or phrase that pertains to the subject and write it on one card. Then draw or find an illustration of the word or phrase on another card. Collect the cards into two separate decks (i.e. phrase deck and picture deck) and shuffle each deck. Each student is dealt a card from each deck. The students then try to be the first to match their cards correctly. The players decide by vote if the cards match. This encourages discussion about word meaning and interpretations.

ALTERNATIVES: The teacher may select the words and pictures, but that deprives the students of an opportunity to think creatively.

Each author holds on to his phrase card. The picture cards are called and are distributed so that no one has his own. The phrase author holds up his card and the others try to match their pictures to it. When the correct picture is matched the two explain how they came to their decision. Continue around the circle until all are matched.
SKILL: Vocabulary - Spelling

MATERIALS: Science word list

TEACHER DIRECTIONS:

Divide the class into two teams. A player may choose a word from a five cent, fifteen cent or twenty-five cent category. Words are grouped in categories of difficulty from five to twenty-five cents. Add the value of a correct word to the team's score. If a player misspells a word, it is not necessary to sit down, but the team does not add that word's value to its final total.

SAMPLE ITEM: Spelling Money Bank

<table>
<thead>
<tr>
<th></th>
<th>5¢</th>
<th>10¢</th>
<th>25¢</th>
</tr>
</thead>
<tbody>
<tr>
<td>matter</td>
<td>environment</td>
<td>kinetic</td>
<td></td>
</tr>
<tr>
<td>color</td>
<td>relative</td>
<td>spectrum</td>
<td></td>
</tr>
<tr>
<td>rate</td>
<td>mixture</td>
<td>atmosphere</td>
<td></td>
</tr>
<tr>
<td>flow</td>
<td>fission</td>
<td>molecule</td>
<td></td>
</tr>
<tr>
<td>motion</td>
<td>formula</td>
<td>analyze</td>
<td></td>
</tr>
<tr>
<td>clue</td>
<td>formation</td>
<td>chemically</td>
<td></td>
</tr>
<tr>
<td>gas</td>
<td>data</td>
<td>apparatus</td>
<td></td>
</tr>
<tr>
<td>atom</td>
<td>astronomer</td>
<td>phenomena</td>
<td></td>
</tr>
</tbody>
</table>

SPELLING
SKILL: Vocabulary - Spelling

MATERIALS: None

TEACHER DIRECTIONS:

Players sit in a semicircle and one person begins the game with a letter (the person should have a word used in the field of science in mind). The next person in the circle adds a letter, as does the next, and so on. The player who ends a word subtracts a point. The lowest score wins.

SKILL: Vocabulary - Spelling

MATERIALS: Several science spelling lists

TEACHER DIRECTIONS:

Students are divided into two teams and line up in rows. A leader is appointed in each row. Each leader pronounces the first word from the test. The first player in each row (not the leader) uses the chalkboard and writes the word as quickly as possible. If the word is misspelled, the next player in the row must correct it. If that player also misses it, the next player in the row must correct it. This continues until the word is spelled correctly. The team that completes the list is the winner.
**SKILL:** Vocabulary - Syllabication

**MATERIALS:** Textbook, teacher-made exercise

**TEACHER DIRECTIONS:**

Compile a list of words from the textbook assignment or the unit being taught. Read the words aloud and have students indicate by a numerical symbol how many syllables are found in the word.

---

**SAMPLE ITEM:** Concepts in Science - 6

Unit Seven - Harvesting the Atom.

<table>
<thead>
<tr>
<th>Teacher's List</th>
<th>Student's List</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. chemically</td>
<td>1. 4</td>
</tr>
<tr>
<td>2. hydrogen</td>
<td>2. 3</td>
</tr>
<tr>
<td>3. oxygen</td>
<td>3. 3</td>
</tr>
<tr>
<td>4. molecule</td>
<td>4. 3</td>
</tr>
<tr>
<td>5. atom</td>
<td>5. 2</td>
</tr>
<tr>
<td>6. nuclei</td>
<td>6. 3</td>
</tr>
<tr>
<td>7. apparatus</td>
<td>7. 4</td>
</tr>
<tr>
<td>8. investigation</td>
<td>8. 5</td>
</tr>
<tr>
<td>9. opposite</td>
<td>9. 3</td>
</tr>
<tr>
<td>10. combination</td>
<td>10. 4</td>
</tr>
</tbody>
</table>

**Text:** Concepts in Science, 271 - 321

---

**SYLLABICATION**
SKILL: Vocabulary - Syllabication
MATERIALS: Textbook, teacher-made exercise
TEACHER DIRECTIONS:

Compile a list of words from the textbook assignment or the unit being studied. Have students write the syllable parts of each word on spaces provided.

SAMPLE ITEM:

Concepts in Science - 6
Unit Eight - Probing the Stars

DIRECTIONS: Write the syllable parts of each word in the spaces provided.

1. radiation ____________
2. atmosphere ____________
3. phenomena ____________
4. observatory ____________
5. scientist ____________
6. astronomer ____________
7. predicting ____________
8. data ____________
9. universe ____________
10. electron ____________

Text: Concepts in Science, 323 - 359
SKILL: Vocabulary - Syllabication

MATERIALS: Textbook or other instructional material, teacher-constructed worksheet

TEACHER DIRECTIONS:
The teacher selects words from a given textbook or chapter. Each word is divided into syllables. The syllables in each word are scrambled. The student is asked to unscramble the syllables and make a word.

SAMPLE ITEM:

DIRECTIONS: Unscramble the syllables to make a word. Write the word in the space provided.

1. tory a serv ob
2. ac tion re
3. dro hy gen
4. o bry em

ALTERNATIVE:
The syllables of a word can be printed on cards of the same color. The student is asked to arrange the cards to make a word and then write the word on paper. Sets of syllable words may be kept in envelopes for use at learning stations.

SYLLABICATION
SKILL: Vocabulary - Syllabication

MATERIALS: Textbook, teacher-made exercise

TEACHER DIRECTIONS:

Take a paragraph or more from the textbook assignment and leave out the syllables in some of the words. Have students add the missing syllables using the book first and then without the book when they feel confident enough.

---

SAMPLE ITEM: Concepts in Science - 6

Unit Eight - Probing the Stars

Chapter 2. Energy from the Sun, p. 329

"Where does the Sun get its energy? You can get some clues by studying the make-up of the Sun. When scientists do so, they find that the Sun is made up mainly of the _____es ______drogen and helium. In fact, about 97 percent of the Sun is made up of these two gases. The rest of the _______ of the Sun is made up of other ______es. But these atoms are not in the same state as they are on Earth."

Text: Concepts in Science, p 329

SYLLABICATION
SKILL: Vocabulary - Syllabication

MATERIALS: Instructional material, word list, teacher-made exercise

TEACHER DIRECTIONS:

Compile a list of words from the unit being studied. Have students write the syllable parts of each word on spaces provided.

SAMPLE ITEM:

DIRECTIONS: Write the syllable parts of each word on the spaces provided.

1. gravitation _____ _____ _____ _____
2. inertia _____ _____ _____ _____
3. satellite ___ _____ _____
4. orbit _____ _____
5. energy _____ _____ _____
6. rotation _____ _____ _____
7. galaxy _____ _____ _____
8. thrust ______________
9. mass ______________
10. protoplanet _____ _____ _____ _____

SYLLABICATION
SKILL: Vocabulary - Prefixes

MATERIALS: Instructional materials, teacher-made exercise, (Refer to "Dictionary of Word Parts" on pages 97 - 106)

TEACHER DIRECTIONS:

Compile a list of words from the instructional materials for a unit of study which contains prefixes. Help students to decipher meaning by using prefix clues in vocabulary development.

SAMPLE ITEM:

DIRECTIONS: Fill in the blanks using your knowledge of prefixes.

1. A star which transmits energy sends it __________ the universe.

2. When something explodes it bursts from the inside __________.

3. If an astronomer predicts the end of a planet, he has announced his knowledge of it __________ it happens.

4. If a physicist tells about the circumstances of a comet's arrival, he must know about all the facts, events and influences __________ it that caused this to happen.

5. To remember a fact you must bring it from memory or think about it __________.

PREFIXES
SKILL: Vocabulary - Prefixes

MATERIALS: Textbook or other instructional materials, (Refer to "Dictionary of Word Parts pages 97 - 106)

TEACHER DIRECTIONS:
Compile several sentences from the textbook assignment or other instructional materials which contain prefixes and develop exercises to help students use prefix clues in deciphering meaning.

SAMPLE ITEM:
Concepts in Science - 6

Unit Eight - Probing the Stars

DIRECTIONS: Read the sentences below. Using your knowledge of prefixes, choose the correct response to the question given.

(p. 346) 1. "When most of the original hydrogen in the star has been used up, the star explodes.

1Q. Which is the true statement about the star?

   a. It has not changed.
   b. It gets denser because all of the elements come closer together.
   c. Its particles shoot out across space.

(p. 334) 2. "Our star, the sun, is a kind of longlasting nuclear reactor."

2Q. Which is the true statement about the sun?

   a. It does certain things again and again.
   b. It does certain things before it is expected.
   c. It does certain things after it is supposed to.

Text: Concepts in Science, pp. 346, 334

PREFIXES
3. By analyzing the spectrum of a star, astronomers can tell what its surface temperature is.

3Q. Which is the true statement?
   a. by looking at the spectrum all at once.
   b. by looking at the separate parts of the spectrum.
   c. by lying again about the spectrum.

4. "When most of the original hydrogen in the star has been used up, the star explodes. It flares up with a great and brilliant light. It becomes a nova. It may even become a supernova."
   a. smaller nova.
   b. a more distant nova.
   c. a greater, extremely brilliant nova.
SKILLS: Vocabulary - Prefixes

MATERIALS: (Refer to "Dictionary of Word Parts" on pages 97 - 106)

TEACHER DIRECTIONS:
Compile a list of words from the textbook (or other) assignment or unit of study which contain prefixes. Help students to decipher meaning by using prefix clues in vocabulary assignments.

SAMPLE ITEM:

DIRECTIONS: Using your Dictionary of Word Parts fill in the blanks.

1. Observatory has the prefix ____ which means _____.
   Observatory means _________________________.

2. Transmit has the prefix _____ which means _______.
   Transmit means _____________________________.

3. Combination has the prefix ____ which means _______.
   Combination means _________________________.

4. Compound has the prefix _____ which means _______.
   Compound means ___________________________.

5. Dilute has the prefix ______ which means _______.
   Dilute means _____________________________.

6. Collect has the prefix ______ which means _______.
   Collect means _____________________________.

PREFIXES

69
7. Substance has the prefix _______ which means _______
   Substance means ________________________________

8. Examination has the prefix _____ which means _______
   Examination means _____________________________

9. Produce has the prefix _______ which means _______
   Produce means _________________________________

10. Subtract has the prefix _______ which means _______
    Subtract means _______________________________
SKILL: Vocabulary - Suffixes

MATERIALS: Textbook or other instructional materials, teacher-made exercise, (Refer to "Dictionary of Word Parts" on pages 97 - 106)

TEACHER DIRECTIONS:

Compile a list of suffixes from the textbook assignment or unit of study. Help students to decipher meaning of words by using suffix clues in vocabulary development.

SAMPLE ITEM:

Concepts in Science - 6
Unit Eight - Probing the Stars

DIRECTIONS: Using your Dictionary of Word Parts, connect the suffix to its proper meaning.

1. chemically  a. stat-e, process of being
2. examination  b. diminutive
3. observatory  c. occupation, doer
4. scientist  d. pertaining to
5. volcanic  e. resembling, characteristic of
6. frequency  f. of, like, pertaining to
7. circumstance
8. particle
9. astronomer
10. environment

Text: Concepts in Science, 323 - 359

SUFFIXES
SKILL: Vocabulary - Suffixes

MATERIALS: Textbook, teacher-made exercise, (Refer to "Dictionary of Word Parts" on pages 97 - 106)

TEACHER DIRECTIONS:

Compile a list of words from the textbook assignment which contain suffixes and develop an exercise which helps students to use suffix clues in vocabulary development.

SAMPLE ITEM: Concepts in Science - 6

Unit Eight - Probing the Stars

DIRECTIONS: After reading the examples write the meaning of the words which follow.

SUFFIXES

The meaning of some suffixes is obvious, e.g.,

careful, full of care

Some suffixes mean state of or act of being:

ex. investigation state of looking into

ex. curiosity state of being curious, wanting to know

radiation

combination

formation

reaction

fusion

fissic

examination

information

Text: Concepts in Science, pp 323 - 359

SUFFIXES
Some suffixes indicate what a thing is or is doing:
ex. violent is doing something dangerously reactive

different

abundant

distance

circumstance

Many suffixes indicate who a person is, what he is:
ex. astronomer one who studies stars

physicist

reactor

steelworker

(continued)
Some suffixes mean place of:

ex: observatory  a place to observe stars

factory
laboratory

Some suffixes mean resembling or characterized by:

ex: electric  characterized by electricity

volcanic
sulfuric
electronic
dramatic
SKILL: Vocabulary - Suffixes

MATERIALS: Textbook or other instructional material, teacher-made exercise, (Refer to "Dictionary of Word Parts" on pages 97 - 106)

TEACHER DIRECTIONS:
Compile a list of words from the class assignment which contains suffixes. Help students to decipher meanings by using suffix clues in vocabulary development.

SAMPLE ITEM:
Concepts in Science - 6
Unit Eight - Probing the Stars

DIRECTIONS: Select from the following list the words whose suffixes have the meaning given below. Define the word by completing the line. Use your Dictionary of Word Parts when necessary.

reactor factory physicist
definitely careful

1. ___________ in the state of __________________________
2. ___________ a place where __________________________
3. ___________ a thing or person who ___________________
4. ___________ full of ________________________________
5. ___________ in a ________________________ manner

Text: Concepts in Science, pp 323 - 359

SUFFIXES
SKILL: Vocabulary - Suffixes

MATERIALS: Textbook or other instructional materials, teacher-made exercises, (Refer to "Dictionary of Word Part" on pages 97 - 106)

TEACHER DIRECTIONS:

Compile a list of suffixes from the textbook assignment or other instructional unit. Help students to decipher meaning of words by using suffix clues in vocabulary development.

SAMPLE ITEM Concepts in Science - 6

Unit Eight - Probing the Stars

DIRECTIONS: Create a new word by adding suffixes to the following:

1. physics + ist = ________________________________
2. inform + tion = ________________________________
3. examine + tion = ________________________________
4. relate + ive = ________________________________
5. sulfur + ic = ________________________________
6. react + tion = ________________________________
7. fuse + tion = ________________________________
8. electricity + ic = ________________________________
9. part + cle = ________________________________
10. volcano + ic = ________________________________

CAUTION: Some words will need a change in spelling.

Text: Concepts in Science, pp. 323 - 359
SKILL: Vocabulary - Suffixes

MATERIALS: Textbook, teacher-made exercises, (Refer to "Dictionary of Word Parts" on pages 97 - 106)

TEACHER DIRECTIONS:

Develop an exercise from the textbook assignment to help students decipher meaning by using suffix clues in vocabulary development.

SAMPLE ITEM:

Concepts in Science - 6
Unit Eight - Probing the Stars

DIRECTIONS: In the following passage you will find words which contain these suffixes: -est, -ism, -um, -er, -ists. Underline these words.

"Astronomers can find out the temperature of a star by finding out its color. They can also find out the temperature of a star by looking at the spectrum of the light from the star. Astronomers do this with the help of a spectroscope, an instrument for examining light.

The main part of the spectroscope is really the prism. The prism separates light into bands of colors, a spectrum. Notice that white light entering the spectroscope has been separated into bands of colors.

Have you ever noticed that stars are not all the same color? A star may be red, yellow, white, even blue-white—or something in between. If you suspect that red stars are coolest and blue-white stars are hottest, you are right. If you look at the spectra of stars of various colors, you will see that the spectra differ. By measuring the band where a star's spectrum has the most energy, scientists can calculate the star's surface temperature."

Text: Concepts in Science, pp. 334 - 335

SUFFIXES
SKILL: Vocabulary - Synonym

MATERIALS: Textbook or other instructional materials, teacher-made exercise

TEACHER DIRECTIONS:

Develop an exercise from the textbook assignment or unit of study to help students expand their vocabulary through the study of synonyms.

SAMPLE ITEM:

DIRECTIONS: Find the two words in each row that are most nearly alike in meaning. Circle the two words.

1. air water atmosphere soil
2. opposite same near unlike
3. get send transmit follow
4. compound mixture cell weight
5. gas liquor water liquid
6. splitting fusion fission vision
7. analyze put together carry away take apart
8. color spectrum vision taste
9. lesson tool instrument trumpeter
10. fire flame game gas

SYNONYMS
SKILL: Vocabulary - Synonyms

MATERIALS: Textbook or other instructional materials, teacher-made exercise

TEACHER DIRECTIONS:

Develop an exercise from the textbook assignment or unit of study. Help students expand their vocabulary through the study of synonyms.

SAMPLE ITEM: Word Scramble

DIRECTIONS: Unscramble the words given to find two words that are alike in meaning.

1. ria epshamtoer
2. popsoeit eulinkel
3. rsatntim dsne
4. exmtiur p: wmnudo
5. qliuid rwtae
6. sniiofs gnlsitipt
7. atke tpraa zynalae
8. mapetcru olcro
9. tnistrnume otol
10. efalm rife

SYNONYMS
SKILL: Vocabulary - Synonyms

MATERIALS: Textbook or other instructional materials, teacher-made exercise

TEACHER DIRECTIONS: Develop an exercise from the class assignment to help students expand their vocabulary through the study of synonyms.

SAMPLE ITEM: Concepts in Science - 6
Unit Eight - Probing the Stars

DIRECTIONS: Choose the synonym for each of the following words listed below:

1. constellation
2. current
3. environment
4. fission
5. frequently
6. compound
7. fusion
8. kinetic
9. matter
10. spectrum

difference, surroundings, mixture, flow, rate, relative, stars, splitting, molecule, moving, motion, substance, combining, analyze, supernova, formation, color

ext: Concepts in Science, 323 - 359
SKILL: Vocabulary - Context Clues

MATERIALS: Textbook or other instructional materials, teacher-made exercise

TEACHER DIRECTIONS:
Select or write a paragraph or several paragraphs about a unit being studied and create exercises for using the context. This exercise may be used as an introduction to a new study.

SAMPLE ITEM:

DIRECTIONS: Fill in the blanks with the correct answer from those listed below.

Before our scientists broke the 1) ________ of our atmosphere, our 2) ________ of the sun was 3) ________. The atmosphere stops most of the radiant 4) ________ of the sun. An 5) ________ outside the atmosphere--perhaps on the moon, would assist us in learning the how, when and why of the sun's phenomena.

1. a) barrier  b) prism  c) mist
2. a) belief   b) knowledge c) awareness
3. a) expansive b) great    c) limited
4. a) matter  b) oxygen    c) energy
5. a) ocean   b) tower    c) observatory

CONTEXT CLUES
SKILL: Vocabulary - Context Clues

MATERIALS: Textbook or other instructional material, teacher-made exercise

TEACHER DIRECTIONS:

Using words taken from the unit of study, create an exercise to assist students in deciphering word meaning through the use of context clues.

---

SAMPLE ITEM:

DIRECTIONS: Select the word that belongs in the blanks from those definitions listed below.

1. The sun gives off energy from the _____ of hydrogen into helium.

2. The sun's heat energy _____ water that later forms clouds and then comes down as rain.

3. The sun's energy is produced because small amounts of the sun's _____ are constantly being changed into energy.

4. Light from an object that scientists wish to analyze is broken up by a _____.

5. The Milky Way _____ is made up of all the stars in the group of which our sun is a part.

   a. evaporates - the change from a solid or a liquid to a gas
   b. galaxy - a large group, or system, of stars which is rotating around a center
   c. fusion - the combining of atomic nuclei of one element, resulting in the nucleus of another
   d. matter - all substances on the earth or in space or any part of them; anything that has weight and takes up space
   e. prism - a device, such as a triangular piece of glass that separates light into its different wavelengths, visible as a spectrum

CONTEXT CLUES

---

ERIC
SKILL: Vocabulary - Context Clues

MATERIALS: Textbook, 24" by 3" strips of construction paper, one black marking pencil, one red marking pencil

TEACHER DIRECTIONS:

The teacher selects sentences from the textbook which contain words with which students are expected to become familiar. Each sentence is printed on a strip of paper. The word to be learned is printed in red. The students are asked to figure out the meaning of the word by using the other words in the sentence as clues.

SAMPLE ITEM:
"Energy released by nuclear fission is far greater than energy released by chemical change, such as the burning of fuels. Our new concept of the atom as divisible makes it possible for us to control this vast energy from fission for our own uses.

So you have come to a deeper understanding of a major concept of matter and energy:

MATTER CAN BE CHANGED INTO ENERGY, BUT THE TOTAL SUM OF MATTER AND ENERGY REMAINS THE SAME.

This concept is sometimes called the concept of Conservation of Matter-Energy."

ALTERNATIVE:

Lessons of this type can be produced in worksheet format.

Text: Concepts in Science. p 316

CONTEXT CLUES
SKILL: Vocabulary - Words in Context and Sentence Building

MATERIALS: Index cards (3" x 5" one side lined, plain); felt-tipped pen; dice; Magic Markers - red, yellow, and blue; paper and pencil for each player; selected vocabulary list containing nouns, verbs, and modifiers; approximately 20 each (for two players)

TEACHER DIRECTIONS: (1) Mark across corner (lined side) an even number of cards - red, yellow, and blue. ed = verbs; blue = nouns; yellow = modifiers. (At least 20 cards for each color)
(2) On plain side of card, using felt-tipped marker, place nouns, verbs, and modifiers according to color card. Note: All words should come from a related vocabulary list. See sample list that follows.

HOW THE GAME IS PLAYED

Sentence Mate

To begin the game, all blue, red, and yellow cards are placed, word side down (color side up) in the center of the table in their respective piles. First player throws dice and may pick up the number of cards indicated by the number on the dice. Any combination of colors may be chosen as long as the correct total number of cards are chosen. Each player proceeds in turn until one of the players has enough cards to make a sentence. Only one card of each color is required to make a sentence. Player may hold cards as long as they choose before making a sentence. Players may when it is their turn, exchange a card from their hand for a card from the table if they prefer. (Always a card of the same color must be exchanged.) The object of the game is to make a sentence from the cards selected. The sentence is written on the player’s paper. The player with the most words used in sentences when the last card is pulled from the deck WINS THE GAME!!!

CONTEXT CLUES
SAMPLE ITEM:

<table>
<thead>
<tr>
<th>blue (B)</th>
<th>(red) (R)</th>
<th>(yellow) (Y)</th>
</tr>
</thead>
<tbody>
<tr>
<td>NOUNS</td>
<td>VERBS</td>
<td>MODIFIERS</td>
</tr>
<tr>
<td>1. heat</td>
<td>1. launch</td>
<td>1. intense</td>
</tr>
<tr>
<td>2. ramjet</td>
<td>2. carry</td>
<td>2. fast</td>
</tr>
<tr>
<td>3. speed</td>
<td>3. flow</td>
<td>3. hot</td>
</tr>
<tr>
<td>4. direction</td>
<td>expand</td>
<td>4. opposite</td>
</tr>
<tr>
<td>5. fuel</td>
<td>5. requires</td>
<td>5. tremendous</td>
</tr>
<tr>
<td>6. nozzle</td>
<td>6. needs</td>
<td>6. additional</td>
</tr>
<tr>
<td>7. gases</td>
<td>7. turn</td>
<td>7. increased</td>
</tr>
<tr>
<td>8. combustion</td>
<td>push</td>
<td>8. expanding</td>
</tr>
<tr>
<td>9. power</td>
<td>9. mix</td>
<td>9. compressed</td>
</tr>
<tr>
<td>10. particles</td>
<td>produce</td>
<td>10. high</td>
</tr>
<tr>
<td>11. temperature</td>
<td>guide</td>
<td>11. first</td>
</tr>
<tr>
<td>12. chamber</td>
<td>12. regulate</td>
<td>12. ordinary</td>
</tr>
</tbody>
</table>

By using 3 (Y), 7 (B), 3 (R), 6 (B), 5 (Y), and 3 (B), the following sentence is constructed.

**Hot gases flow from the exhaust nozzle at tremendous speeds.**
SKILL: Vocabulary - Categorizing

MATERIALS: Textbook or other instructional material, paper and pencil, word list

TEACHER DIRECTIONS:

Arrange words from word list in categories. Add one word that is "science related" but does not belong to the specific category involved. Instruct the student to cross out the word that does not belong in each group or category.

SAMPLE ITEM:

1. aphids weevils potato bugs ants cutworms
2. rabbit mouse beaver lamb squirrel
3. ant roach fly mosquito spider
4. ostrich chicken kiwi heron emu
5. goat kitten colt puppy lamb

ANSWER KEY: Words that should be crossed out are as follows:

1. potato bugs
2. lamb
3. spider
4. heron
5. goat

ALTERNATIVES:

Extra credit may be given to the student who can add a word (not included in the teacher's list) that belongs to one of the given categories.
SKILL: Vocabulary - Categorizing

MATERIALS: Textbook or other instructional materials, teacher-made worksheet

TEACHER DIRECTIONS:
The teacher selects categories that are related to a unit of study and develops a worksheet according to the format in the Sample Item. The students are asked to fill in the blanks. This can be an untimed or timed activity.

SAMPLE ITEM:

<table>
<thead>
<tr>
<th>Category</th>
<th>N</th>
<th>S</th>
<th>B</th>
<th>A</th>
<th>P</th>
<th>Total Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kinds of Scientists</td>
<td></td>
<td>biologist</td>
<td>astronomer</td>
<td>physicist</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Parts of matter</td>
<td></td>
<td>neutron</td>
<td>atom</td>
<td>proton</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Galactic Bodies</td>
<td></td>
<td>nova</td>
<td>super nova</td>
<td>asteroid</td>
<td>planet</td>
<td>4</td>
</tr>
<tr>
<td>Planets</td>
<td></td>
<td>Neptune</td>
<td>Saturn</td>
<td>Pluto</td>
<td>3</td>
<td>13</td>
</tr>
</tbody>
</table>

ALTERNATIVES:
1. Students can be given blank charts to create their own categories.
2. Completed charts can be used to introduce simple outlines by having the students arrange the words in outline format.
3. Scanning techniques can be reviewed by having students use their textbook in order to complete the chart.
SKILL: Vocabulary - Multiple Meaning

MATERIALS: Vocabulary words used in science that also have other meanings

TEACHER DIRECTIONS:

List words found in science that often have other meanings. Have students match each word with the appropriate meaning.

SAMPLE ITEM:

1. automatic energy compound
2. the smallest living unit of structure and function in an organism.
3. a visible group of bacteria originating from division of a single cell.
4. a substance consisting of two or more kinds of atoms chemically combined.
5. a colony of bacteria grown under controlled conditions.
6. the ability to do work, the ability to set matter in motion.
7. to join the stem of one plant to the root or stem of a related plant.
8. a young growth or shoot on a plant.
9. a ray of light.
10. a group of tissues that carries on a specialized function in an organism.
11. a fungus that grows on a plant or animal matter.
COMPREHENSION

ACTIVITIES
SKILL: Comprehension - **Main Idea**

MATERIALS: Textbook or other instructional materials

TEACHER DIRECTIONS: Select a paragraph or paragraphs from the science textbook and construct multiple choice statements pertaining to the material. One of the items should state the main idea.

---

SAMPLE ITEM:

**DIRECTIONS:** Read the following paragraphs and choose from the items below the statement which best expresses the **Main Idea** of the paragraphs.

"People once thought that everything in the universe remained pretty much the same. Now we know that things are not always what they seem. We do not feel that the Earth is moving, for example. Yet we know that the Earth is moving. It is rotating. It is also revolving around the Sun."

"The Moon revolves around the Earth. The Earth revolves around our star, the Sun. And the Sun itself is moving. All the billions of stars in our galaxy are moving. And all the millions of galaxies in the Universe are moving."

"The Universe is vast, and there is much in it that we do not yet understand. But we do understand that all things in the Universe are in motion."

**Multiple Choice Statements**

1. Things are not always what they seem.
2. We do not feel the earth is moving.
3. All things in the Universe are in motion.
4. All stars are moving.

**Text:** Concepts in Science, p. 355.
SKILL: Comprehension - Main Idea

MATERIALS: Textbook or other instructional materials of varying levels or take a paragraph from the science text in use, 5 X 8 cards

TEACHER DIRECTIONS:
Teacher writes out each paragraph on index cards. The students are asked to write a title for each paragraph.

SAMPLE ITEM:

DIRECTIONS: After reading the paragraph, write a title that tells about it.

"Our understanding that matter can be changed to energy helps us to explain how the Sun radiates light and energy. We know that on the Sun, matter is changed to energy. Indeed the experiments of scientists have told us:

Energy can be changed into other forms of energy. Matter can be changed into other forms of matter. Matter can be changed into energy. However, the total amount of matter and energy remains the same."

Text: Concepts in Science, pp. 356 - 357

MAIN IDEA
SKILL: Comprehension - Main Idea

MATERIALS: Magazine or textbook pictures, tagboard, glue

TEACHER DIRECTIONS:
The teacher selects pictures which are mounted on tagboard or construction paper. The students are asked to write a title for each picture.

SAMPLE ITEM:

DIRECTIONS: Think of and write a title for each picture.
SKILL: Comprehension - Details

MATERIALS Textbook or other instructional materials, 3X5 cards.

TEACHER DIRECTIONS:

The teacher selects 4 - 6 paragraphs related to a science unit. The main idea of each paragraph is typed on a colored card. The remaining sentences from each paragraph are typed on cards of another color. All of the cards are shuffled. The students are asked to match each sentence with the correct main idea.

SAMPLE ITEM:

1. Living things are dependent on their environment.
2. Humans, as scientists, have learned to observe and to investigate their environment.

**********************************************************************

Cattle cannot live without grass.
Grass cannot live without other organisms
They search for relationships which help us to understand our environment.
From relationships, humans develop concepts which help us to understand our environment.
They depend on and use light energy from the sun, 93,000,000 miles away, to make their food.
They are always looking for new and better ideas to create.
Questions are listed before the story or passage is read. The students locate the information needed to answer the questions as they read.

SAMPLE ITEM:

DIRECTIONS: Look for the answers to these questions as you read the following selection.

1. What kind of bacteria is helpful?
2. Of what use is decay bacteria?
3. What would happen without decay bacteria?

"Bacteria are found almost everywhere, in air and water and soil. Invisible though they are to the unaided eye, they are very important. In the soil they help fertilize plants. They cause decay of dead plants and animals. They are useful in industry for instance, in the making of cheese. There are many highly useful bacteria. But there are harmful bacteria, too. They cause the spoilage and loss of vast amounts of food. They are the cause of many serious diseases."

Text: Concepts in Science, pp. 91 - 92
SKILL: Comprehension - Sequence

MATERIALS: Textbook or other instructional materials, construction paper.

TEACHER DIRECTIONS:

Select a short paragraph from the text and put each sentence on a strip of construction paper. Mix the strips in a box. Each student or group of students must arrange the strips in order. Compare results with the original paragraph. Discuss the differences between the author's paragraph and the group paragraph.

Key words to assist students in determining the sequence of events are:

first  as a result  after that
then  finally  and then
next  when  at least
in the meantime  while

SAMPLE ITEM:

DIRECTIONS: Organize the sentences into a complete paragraph.

This energy can be sent through a wire to a distant place before you can blink.

Radio and television change sound energy and light energy into the energy of electromagnetic waves, and back again.

Then the electric energy is changed into sound energy again.

The telephone changes the energy of sound waves into electric energy.

Text: Concepts in Science, p. 263

SEQUENCE
SKILL: Comprehension - Inferences

MATERIALS:
24" x 18" sheet of tagboard or construction paper, magazines and newspaper clippings, glue, 24" x 3" strips of construction paper.

TEACHER DIRECTIONS:

The teacher identifies a concept to be taught (i.e., Living things are dependent on their environment,) Pictures are then selected which substantiate the concept. These are glued on the tagboard sheet.

Students are assigned to teams of 4 - 5. Each team is given a tagboard concept sheet. The team is asked to think of a title and a statement about the concept sheet. The statement is printed on the strip of construction paper. The concept sheet and statement about it are displayed in the classroom in order to reinforce the concept.
SKILL: Comprehension - Inferences

MATERIALS: Magazine advertisements

TEACHER DIRECTIONS: Display five advertisements. Have students list five facts and five opinions about each.

SAMPLE ITEM:

Protein Enriched
Buy Health Food
Builds Bodies in 25 Ways
Inexpensive
Delicious
45¢

FACT

1. Has protein
2. Lists ingredients
3. 45¢

OPINION

1. Good for you
2. Builds bodies in 25 ways
3. Inexpensive
4. Delicious

ALTERNATIVES: Have students read orally advertisements from which they have deleted all opinion.

INFERENCES
SKILL: Comprehension - Inferences

MATERIALS: Teacher-constructed questions, paragraph from science text or other instructional material

TEACHER DIRECTIONS:

Ask students to read paragraph and answer questions or draw conclusions based on what they have read.

SAMPLE ITEM:

Between 1650 and 1750 more than sixty million people died of smallpox in Europe. The virus was spread by contact with a person suffering from the disease. This disease is extremely contagious.

In 1947, a man left Mexico for a bus trip to New York. He became ill while on the way. When he had reached New York, it was found he had smallpox.

A great many people had been exposed to smallpox as this man travelled across the country from Mexico to New York. Soon, more cases of smallpox were reported here and there. The news was flashed over radios and in newspapers. People were urged to have themselves vaccinated. Thousands stood in line at doctors' offices to get vaccinations.

Judging from what you have read, would you conclude that we probably had a smallpox epidemic in our country in 1947? Why or Why not?

INFERENCES
ADD-UP-THE-WORDS

Reference: p. 38
SEEK AND FIND

Subject ____________________  Name ____________________

Date ____________________

SEEK AND FIND
MASTER

Reference: pp. 39, 40
**MATCHING SPACES**

<table>
<thead>
<tr>
<th>A1</th>
<th>B2</th>
<th>C1</th>
<th>D2</th>
</tr>
</thead>
<tbody>
<tr>
<td>A3</td>
<td>B4</td>
<td>C3</td>
<td>D4</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>6</td>
<td>7</td>
<td>8</td>
</tr>
</tbody>
</table>

Name _____________________________  Date ______________

**MATCHING SPACES MASTER**

Reference: p. 42
"LET'S TRAVEL" BOARD GAME

SUGGESTED WORDS

ENERGY  HYDROGEN
MATTER   SYSTEM
LIGHT    FUSION
GALAXY   ATOM
PRISM    MATTER
SOLID    OXYGEN
LIQUID   HELIUM
SPECTRUM

Reference: p. 43

LET'S TRAVEL
MASTER
DICTIONARY OF WORD PARTS

a-, ac-, ad-, af-, ag-, al-, an-, ap-, ar-, as-, at-, prefix.
To; toward:
attract = to draw
to or toward itself

a-, an-, prefix.
Not; without:
anaerobic = without oxygen

ab-, a-, abs-, prefix.
Away from:
abstract = to draw away

-able, -ible, suffix.
That can be ___ed;
able to be ___ed;
qualified to be ___ed:
obtainable = able to be obtained

-ac, -(adj.), suffix.
Pertaining to:
maniac

-acy, suffix.
Quality, state, or condition of being:
delicacy = quality of being delicate

-age, suffix.
1. Act or state of:
breakage = act of breaking. 2. A collection or group of:
baggage = group of bags

-al, -ial, suffix.
1. Of; like; pertaining to:
regal = pertaining to a king. 2. Act of ___ing:
refusal = act of refusing

ambi-, prefix.
Both:
ambidextrous = use both hands

-an, -ian, suffix.
1. Of; having to do with:
republican = having to do with a republic. 2. A native or inhabitant of:
American = native of America

ana-, prefix.
Up, backward:
analysis = to break up

-ance, -ence, suffix.
1. Act or fact of:
resistance = act of resisting. 2. Quality or state of being ___ed or ___ant:
importance = quality of being important

-ant, -ent, suffix.
1. One who ___s:
servant = one who serves. 2. ___ing:
plesasant = pleasing

ante-, prefix.
Before:
antebellum = before the war

References: pp. 53, 54, 55, 56, 58, 59, 62, 63, 64
anthropo, combining form.
Man; human:
anthropoid = resembling a man

anti-, prefix.
Against; opposed to:
anticommercialism = against commercialism

apo-, prefix.
Away from:
apostle = one who is sent away on a mission

aqua, aque, combining form.
Water:
aquacade = water show

-ard, suffix.
One who performs some action:
steward = one who manages or serves

-ary, suffix.
Pertaining to; connected with, of or having to do with:
honorary = pertaining to the honor

astro-, combining form.
1. Star; other heavenly bodies:
astrophysics = physics of the stars or heavenly bodies. 2. Space:
astronaut = space traveler

-ate, suffix.
1. Possessing; having:
compassionate = having compassion. 2. Become:
mature = become mature. 3. Of or having to do with:
collegiate = having to do with college

audio, audi, combining form.
Hearing; sound:
audiometer = an instrument for measuring hearing

auto, combining form.
1. Self; same:
autohypnosis = self hypnosis. 2. Of or by oneself:
autograph = written by oneself

be-, prefix.
Away, completely:
behead = to take one's head off completely

bene-, prefix.
Well, good:
benevolence = desire to do good

bi-, prefix.
Twice; two:
biannual = twice a year

bio, combining form.
Life; of living things:
biology = study of life or living things

cap, cip, root.
Take; seize:
captive = one who is taken

cata-, prefix.
Down, in accordance with; akin to:
catacomb = a subterranean cemetery;
catamaran = a raft or boat with planing surfaces side by side
cede, ceed, root.
Go; move:
precede = go before

cent, centi, combining form.
Hundredth, hundred:
centipede = hundred feet

cide, combining form.
1. Killer; slayer:
insecticide = killer of insects. 2. Act of killing:
homicide = killing of a human being

cip. See cap

circum-, prefix.
Around; on all sides:
circumrotate = rotate around

co-, com-, con-, prefix.
With; together:
combine = bring together

contra-, prefix.
Opposite; opposing:
contradict = say the opposite

cur, curs, root.
Run; work:
concur = to work or come together

-cy, suffix.
Office; state:
democracy = a political unit that has a democratic government

de-, prefix.
Down; away; to take away:
defrost = to take frost from

dec, deca, dek, combining form.
Ten:
decade = ten years

dia-, prefix.
Through, across:
diameter = measurement across the middle

dic, root.
Say; speak:
diction = manner or style of speaking

dis-, prefix.
1. Negative: opposite of:
dissimilar = not similar. 2. Reversal:
disconnect = remove or reverse the connection

-dom, suffix.
State or fact of being:
wisdom = state of being wise

duc, duct, root.
Lead; bring; draw along:
conduct = lead together

e-, See ex-

ec-, See ex-
ed, suffix.
Forms the past tense of many verbs:
he walked home

-ee, suffix.
Receiving action:
vendee = one to whom a thing is sold

-eer, ier, suffix.
One who is concerned with:
profiteer = one who is concerned with profits
en-, prefix.
1. To put in or on:
   enthrone = to put on a throne.
2. To cause to be; make:
   enfeebles = to make feeble

-en. -n, suffix.
1. To cause to be; make:
   blacken = to make black.
2. Made of:
   golden = made of gold.
3. Ends past participles of many strong verbs:
   he had fallen

-ence. See -ance

-ent. See -ant

epi-. prefix.
Upon, beside:
epitaph = an inscription on a tombstone

er, suffix.
1. One who ___s; thing that ___s:
   burner = thing that burns.
2. One who lives in:
   Long Islander = one who lives in Long Island.
3. One who works with:
   farmer = one who works a farm.
4. Forms the comparative degree of adjectives and adverbs:
   softer, deeper; slower, later

-ery, suffix.
State or condition:
slavery = the state of being a slave

-3s. See -s

-esc, suffix.
To do:
evanesce = to dissipate like vapor

-esque, suffix.
Like:
statuesque = like a statue

-ess, suffix.
Female:
hostess = a female host

-est, suffix.
Forms the superlative degree of adjectives and adverbs:
greenest, warmest, slowest

ex-, e-, ec-, prefix.
1. Out; out of; from:
   export = to send or take out.
2. Former:
   ex-member = former member
3. Out of:
   eccentric = out of a circular path

extra-, extro, prefix.
Beyond, outside:
extraordinary = beyond the ordinary

fac, fect, root.
Do; make:
factory = a place to make goods.

fer, root.
Bear; bring; carry:
confer = bring together

form, forma, root.
Form:
formless = without form
-ful, suffix. 
Full of: 
cheerful = full of cheer. 2. Characterized by: 
thoughtful = characterized by thought

-fy, suffix. 
To make; cause to be: 
beautify = to make beautiful

-graph, combining form. 
1. Something written, drawn, or recorded: 
autograph = something written by oneself 
2. Something that writes, draws, or records: 
phonograph = a machine for reproducing sound recording

-hood, suffix. 
State or condition of being: 
priesthood = state of being a priest

-hyper-, prefix. 
Over; above; more than normal: 
hyperexcitement = more than normal excitement

-ial. See -al

-ian. See -an

-ible. See -able

-ic, suffix. 
Resembling; characterized by: 
angelic = resembling an angel

-ice, suffix. 
State or condition: 
novice = state or condition of being new at something

-ier. See -eer.

-il-. See in-

-ile-, suffix. 
Relating to; capable of: 
infrile = related to infancy

-im-. See in-

-in-, il-, im-, ir-, prefix. 
1. Not; opposite; absence: 
inexpensive = not expensive. 2. In; into: 
inhal = breathe in

-ine, suffix. 
Made of; like: 
opale = resembling an opal

-ing, suffix. 
1. Expresses the action, result, or product of a verb: 
a building = the result of building. 2. Forms present participle of verbs: 
he is growing

-inter-, prefix. 
1. Between; among: 
interpose = put between. 2. Together; one with the other: 
intercommunicate = communicate with each other
intra-, intro-, prefix.
Within:
intravenous = inside the veins

-ion, suffix.
Act or process of:
condition or state of being:
creation = act of creating

ir-. See in-

-ish, suffix.
Belonging to; having the characteristics of:
English = belonging to England. 2. Somewhat:
sweetish = somewhat sweet

-ism, suffix.
Action; practice; condition:
criticism = act of criticizing

-ist, suffix.
1. One who does or makes:
tourist = one who travels. 2. One who knows about, has skill in, or studies:
bioiogist = one who knows about biology

-ity, suffix.
State or condition of being:
rapidity = condition of being rapid

-ive, suffix.
Tending to; of or having to do with:
destructive = tending to destroy

-ize, suffix.
Make; become; engage in:
legalize = make legal

ject, root.
Throw:
reject = to throw away as useless

leg, root.
Law:
legal = pertaining to law

less, suffix.
1. Without:
homless = without a home 2. Not able:
restless = not able to rest

-like, suffix.
Like:
lifelike = like life

logy, combining form.
Science or study of:
psychology = study of the mind or mental processes

-ly, suffix.
1. In a ___ manner; in ___ ways; to a ___ degree:
gradually = in a gradual manner. 2. Like:
manly = like a man

mal-, male-, prefix.
Bad, evil:
malefactor = one who does evil

manu, combining form.
Hand:
manuscript = written by hand
-ment, suffix.
   Act, state, or fact or being:
   management = act of managing

meter, combining form.
   1. An instrument for measuring:
      speedometer = an instrument for measuring speed.
   2. Meter (39.37 inches):
      centimeter = one hundredth of a meter

micr, micro, combining form.
   Small; that enlarges something small:
   microscope = an instrument that enlarges small sound

mis-, prefix.
   Mistaken; wrong; negative:
   misally = to ally mistakenly

mis, miss, mit, root.
   Send; let go:
   transmit = send over

mono, mono, combining form.
   Alone; single; one:
   monocle = eyeglass for one eye

multi, combining form.
   Much; many:
   multicolor = many colors

naut, combining form.
   Crewman of a ship; traveler:
   astronaut = crewman of a spaceship

nav, root.
   Ship; warships:
   naval = pertaining to warships

-ness, suffix.
   Quality, state, or condition of being:
   preparedness = condition of being prepared

non-, prefix.
   Not:
   nonpayment = no payment

ob-, oc-, of-, op-, prefix.
   Against, toward:
   Obstacle, occasion, offend, opposite

oct, octa, octo, combining form.
   Eight:
   octagon = a figure having eight sides

-or, suffix.
   A person or thing that
   sailor = one who sails

-ory, suffix.
   Pertaining to:
   advisory = pertaining to advice

-ose, -ous, suffix.
   Full of; characterized by;
   having:
   1. verbose = full of words.
   2. wondrous = characterized by wonder

out-, prefix.
   1. Outward; away:
   outgoing = going away.
   2. Outside:
   outpatient = a patient living outside the hospital.
   3. Surpassing; better than:
   outrun = run better than
over-, prefix.
Over; too much:
overcrowded = to crowd too much

para-, prefix.
Beside, beyond:
parapsychology = beyond the realm of psychology

per-, prefix.
Through; thoroughly:
perfuse = to flow or spread through

peri-, prefix.
Around:
perimeter = around the outside

phon, phono, combining form.
Sound; voice:
phonometer = an instrument that measures sound

photo, combining form.
1. Light:
photograph = a picture produced by light.
2. Photographic:
photengraving = photographic engraving

poly, prefix.
Much; many:
polyglot = knowing many languages

pon, pos, root.
Place; put:
position = the place where something is

port, root.
To carry, transport, or convey:
porter = one who carries

cast, pos. See pon

post-, prefix.
Behind; after:
postscript = writing that comes after the body of the letter

pre-, prefix.
Before in place, time, order, rank, or importance:
prehistory = before history began to be recorded

pro-, prefix.
1. In favor of:
pro-American = in favor of America.
2. Advancing; forward:
proceed = move forward
3. Before; in front of:
prologue = a speech before or at the beginning of a play

psych, combining form.
Human mind; mental structure:
psychology = study of the human mind

quadr, quadri, combining form.
Four; four times:
quadruped = four footed

quin, quint, combining form.
Five; fifth:
quintet = group of five

re-, prefix.
1. Again; once more:
Reappear = appear again
2. Back:
replay = play back

rect, reg, root.
Straighten; rule:
regime = system of rule or government
retro-, prefix.
Backward; back:
retroactive = effective as of a prior date

-s, -es, suffix.
1. Forms third person singular of many present tense verbs:
he runs
2. Forms plural of most nouns:
hats

ship, suffix.
State of:
dictatorship = state of rule by a dictator

-th, suffix.
1. Forming abstract nouns:
length = state of being long
2. Forming ordinal numbers:
thirtieth = state of being thirty

-thermo, combining form.
Heat; hot:
thermometer = an instrument for measuring heat

-ty, suffix.
State:
anxiety = state of being anxious
ultra-, prefix.
   Beyond; excessively:
   ultramodern = excessively modern

vid, vis, root.
   See:
   visible = capable of being seen

un-, prefix.
   1. Not; the opposite of:
      unequal = not equal
   2. Reverse the act of:
      undress = reverse the act of dressing

voc, vok, root.
   Call:
   revoke = call back

-ward, suffix.
   Toward; in the direction of:
   upward = in the direction of up

-y, suffix.
   Characterized by; inclined to:
   grouchy = inclined to grouch

under-, prefix.
   Under; lower; lesser:
   underlie = to lie under

uni, combining form.
   One; single:
   unicycle = one-wheeled vehicle

-ure, suffix.
   Act; process; being:
   agriculture = the act or process of cultivating crops

ven, root.
   Come:
   intervene = come between

vers, vert, root.
   Turn:
   reverse = turn back

vice-, prefix.
   In place of:
   vice regent = in place of the regular regent

Source: Adapted from "Dictionary of Word Parts" reprinted in Addison-Wesley's Kaleidoscope Reader: The Eighth Day of the Week by B. Belden, 1969, by Luci Brock and Joanne Weinman. REPRODUCTION PERMITTED
READING SKILLS NEEDED IN SCIENCE

Note: This "extended graph" does not outmode or render the earlier (1968) version inoperative or inaccurate; it is an extension. (REPRODUCTION PERMITTED—NO COPYRIGHT)

(Continued on next page)
Directions for Using the Readability Graph

1. Randomly select three (3) sample passages and count out exactly 100 words each, beginning with the beginning of a sentence. Do count proper nouns, initializations and numerals.

2. Count the number of sentences in the hundred words, estimating length of the fraction of the last sentence to the nearest one-tenth.

3. Count the total number of syllables in the 100-word passage. If you don't have a hand counter available, an easy way is to simply put a mark above every syllable over one in each word, then when you get to the end of the passage, count the number of marks and add 100. Small calculators can also be used as counters by pushing numeral 1, then push the + sign for each word or syllable when counting.

4. Enter graph with average sentence length and average number of syllables; plot dot where the two lines intersect. Area where dot is plotted will give you the approximate grade level.

5. If a great deal of variability is found in syllable count, putting more samples into the average is desirable.

6. A word is defined as a group of symbols with a space on either side; thus, Joe, IRA, 1945. and & are each one word.

7. A syllable is defined as a phonetic syllable. Generally, there are as many syllables as vowel sounds. For example, stopped is one syllable and wanted is two syllables. When counting syllables for numerals and initializations, count one syllable for each symbol. for example, 1945 is four syllables, IRA is three syllables, and & is one syllable.

Adapted SMOG Readability Formula*

Lawrence L. Smith
University of Florida

1. Count 10 consecutive sentences near the beginning of the text to be assessed, 10 in the middle and 10 near the end.

2. In the 30 selected sentences count the words of three or more syllables. [Any string of letters or numerals beginning and ending with a space or punctuation mark should be counted if you can distinguish at least three syllables when you read it aloud in context. If a polysyllabic word is repeated, count it only once.]

3. Estimate the square root of the number of polysyllabic words counted. (This is done by taking the square root of the nearest perfect square.)

4. If the perfect square is 9 or less, the square root gives the adapted SMOG Grade. If the nearest perfect square is 16 or greater, add one to the square root to determine the adapted SMOG Grade.

TABLE for Determining Adapted SMOG Reading Grade Level

If the number of polysyllabic words is between ___(A)___, then the readability level will be ___(B)___ grade.

<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>3</td>
<td>6</td>
</tr>
<tr>
<td>7</td>
<td>12</td>
</tr>
<tr>
<td>13</td>
<td>20</td>
</tr>
<tr>
<td>21</td>
<td>30</td>
</tr>
<tr>
<td>31</td>
<td>42</td>
</tr>
<tr>
<td>43</td>
<td>56</td>
</tr>
<tr>
<td>57</td>
<td>72</td>
</tr>
<tr>
<td>73</td>
<td>90</td>
</tr>
<tr>
<td>91</td>
<td>110</td>
</tr>
<tr>
<td>111</td>
<td>132</td>
</tr>
<tr>
<td>133</td>
<td>156</td>
</tr>
</tbody>
</table>

*Source: The original SMOG Formula -
A FIVE PART STRATEGY FOR WORD ATTACK

Source: From The Eighth Day of the Week by Bernard Belden and Henry A. Bamman. Copyright (c) 1974, 1969 by Addison-Wesley Publishing Company, Inc. REPRINTED BY PERMISSION.
SYLLABICATION HINTS

Source: From The Eighth Day of the Week by Bernard Belden and Henry A. Bamman. Copyright (c) 1974, 1969 by Addison-Wesley Publishing Company, Inc. REPRINTED BY PERMISSION.
WAYS TO SELL BOOKS IN THE SCIENCE CLASSROOM

1. Have a small group to plan a panel discussion in which they discuss the lives of famous scientists about whom they have read. The discussion may include:
   a. A contrast of the childhood of the people
   b. What may have happened to influence their later life
   c. What they did to make them famous
   d. What struggles they faced to accomplish their goals

2. Make a biographical dictionary including the scientists about whose lives you have read during the year. Include place of birth, special characteristics and deeds for which the person is famous, hobbies, and anything of special interest. Alphabetical arrangements with last names first is necessary. This could be a class project or an individual project.

3. After reading a book which explains how to make something related to science the student may make two large charts. Both charts should be headed "How To Make (fill in with subject):" Chart 1 should list the things needed. Chart 2 should list what to do. With the chart, have the finished product on display.

4. Select some of the events which took place in a book. Using these events make up a newspaper which could have been printed in the town where the story took place. The headlines would be something very important which took place. The news stories would contain interesting events of the story.

5. Arrange a book reporting session as a television program, such as "I've Got a Secret" or "To Tell the Truth." A panel of experts could ask a person questions in order to find out which scientist is represented.

6. After reading a factual book about space, write a funny story about outer space. Examples of titles:
   a. The Cat That Rode a Spaceship
   b. Who Threw Those Flying Saucers?
   c. Mr. Chase, What is Space?
   d. Mr. Martin from Mars
   e. Mary Moonbeam Visits Earth
7. After reading a biography or book of science fiction, describe the main characters and their individual common problems. Tell how these problems were or were not solved.

8. After reading a book on science, make a game to review items covered. (Organize information into good questions with brief answers.) Make a master card such as a race track or ball field. Have spaces marked for each move from "start to finish" line so that players can move forward each time a question is answered correctly. Interest can be added by marking spots where a player can land and be sent ahead or sent back a designated number of spaces.

9. Make a crossword puzzle on a theme derived from a book or science unit. Duplicate enough to give each member of the class.

10. Prepare a collection of something you have read about (rocks, coins, stamps, etc.) with appropriate information for an exhibit.

11. Develop an individual dictionary as new words are encountered in reading, including pronunciations and definitions as used in the book.

12. Make a poster (either flat or three-dimensional) which shows a scene or stimulates interest in a book.


14. Write a book review using the following outline or work out a similar one:
   a. title
   b. author
   c. where and when the story takes place
   d. main characters
   e. the most interesting thing that happened
   f. why you enjoyed the book


WAYS TO
SELL BOOKS
16. books about how to do things or how to make things can be shared by making the object and bringing it to class or explaining how to do what you have learned from the book.

17. Draw a series of pictures on a long sheet of paper and put it on a roller for a "Movie" of the story.

18. Plan a pantomime and have students guess the title of the book.

19. Write a letter to a friend or a librarian and recommend a book which you especially liked.

20. Plan and present a puppet show to illustrate a book.

21. Write a set of questions and answers to check the comprehension of someone else who reads the book.

22. Dress as one of the characters in a book and tell about yourself.

23. Find out about the author of the book. If possible, write to the author and tell him or her how much you enjoyed the book.

24. Make a model with clay, soap, or wood to represent something or someone in the book.

25. Stretch a word across the room on which you can display drawings depicting books the students have read. Use the caption "A Line of Good Books", "Airing and Sharing Books", or any suitable caption.

Source: In appreciation of The Williston Instruction Center, 6131 Williston Drive, Falls Church, VA. 22044. REPRODUCTION PERMITTED
Some heavy cardboard and a sheet of acetate can be turned into a magic slate. After the acetate is placed over the cardboard, the sides are taped, leaving the top and bottom open. With a magic slate of proper size (9 inches by 12 inches is recommended), individual exercises can be slipped between the cardboard and the sheet of acetate and marked with crayon. Crayon marks will rub off very easily with a dry cloth or cleansing tissue. With five or six magic slates on hand it isn't difficult to keep a sizable number of students working independently with a variety of materials of individualized nature.
ACROSS
A1 ____________________
A8 ____________________
A14 ____________________
B3 ____________________
B7 ____________________
B13 ____________________
C1 ____________________
C6 ____________________
C10 ____________________
D1 ____________________
D6 ____________________
D10 ____________________
D16 ____________________
E2 ____________________
E16 ____________________
F11 ____________________
G1 ____________________
G12 ____________________
H1 ____________________
H9 ____________________
H15 ____________________

DOWN
J2 ____________________
J12 ____________________
K8 ____________________
K16 ____________________
L1 ____________________
L12 ____________________
M1 ____________________
M12 ____________________
N3 ____________________
N6 ____________________
N10 ____________________
N13 ____________________
P1 ____________________
P7 ____________________
P11 ____________________
R1 ____________________
R11 ____________________
R14 ____________________

DEFINITION SHEET
MASTER
1. CROSSWORD PUZZLE

A B C D E F G H J K L

1. name

2. date

CROSSWORD PUZZLE MASTER
CROSSWORD PUZZLE

CROSSWORD PUZZLE
MASTER
BIBLIOGRAPHY


