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A Curriculum of Activities and Materials Used in Teaching Decomposition and Flowcharting Skills in Grades 5-7

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UNF UNIVERSITY of NORTH FLORIDA

A CURRICULUM OF ACTIVITIES AND MATERIALS USED IN TEACHING DECOMPOSITION AND FLOWCHARTING SKILLS IN GRADES 5-7

by

Ronald P. Hafner

A thesis submitted to the Division of
Curriculum and Instruction
in partial fulfillment of the
requirements for the degree of
Master of Education

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Abstract

This curriculum project provides instructional activities and materials to be used in teaching decomposition and flowcharting skills to students in grades 5-7. It is indicated and supported by research that the use of a variety of activities geared toward problem solving are of great value to students who will make use of decomposition and flowcharting. This project is specifically designed for teachers in grades 5-7 who wish to prepare their students for programming activities on the microcomputer. The criteria for selection of activities and materials are included. This project includes activities categorized under one of the following headings: sequencing activities, selecting information activities, flowcharting activiites, and working with computer activities. Finally, the materials and activities used in this project are listed by source so that teachers might find other references that could be helpful in teaching decomposition and flowcharting to students in grades 5-7.

Table of Contents

Introduction

Problem Statement 1

Rationale 1

Purpose 3

Review of the Literature

Introduction 4

Decomposition and Task Analysis 5

Flowcharting 7

Summary 13

Design of the Project

Criteria for Selection of Activities and Materials 14

Use of the Materials 15

Sample Activity 15

Evaluation of Materials and Activities 17

A Curriculum of Activities and Materials Used in Teaching Decomposition and Flowcharting Skills in Grades 5-7 18

Permissions 200

References 208

Problem Statement

What instructional activities can be found, or assembled to be used in teaching the skills of decomposition (the breaking down of problems into minute step-by-step procedures for the purpose of finding a solution) and flowcharting (the use of a diagram made up of geometric symbols and written language which represents the strategy needed in order to solve a specific problem) to students in grades 5-7 as a precursor to programming on the microcomputer.

Rationale

Classroom teachers spend a great deal of time assisting students in their learning of problem solving skills. "If we can get across the understanding that is illustrated here - drawing a diagram, flowcharting, following directions, recording information, deciphering information - we have achieved important goals of education today." (Bitter, 1983, p. 20) These skills have become more important for students who are being exposed to programming techniques used in working with the microcomputer. Dr. Gary Bitter, professor of math and computer education at the Arizona State University, has found that teachers may strive for years to assist students in learning logical problem solving strategies needed in order to sharpen logical thinking skills. Dr. Bitter believes that these skills are taught "with great difficulty and sometimes unsuccessfully". (Bitter, 1983)

Dr. B. F. Skinner, who has made great contributions to the field of programmed instruction, has given new attention to the use of the computer as a means of instruction. However, Dr. Skinner states that

before the computer can become a useful tool, students must be able to decompose an idea. He states, "The main thing in programming is to break the subject matter up into small steps that are easily taken. The steps should progress so that after you've taken one, you're in a better position to take the next." (Green, 1984, p. 28)

In the rush to make students computer literate, some well meaning educators have actually hindered their students' progress. Andy Platt, director of programs in the Wayland Public School System of Massachusetts, has found that teaching students BASIC and then expecting them to use the computer in programming situations is an unrealistic notion. Mr. Platt stated that "students who knew some BASIC...needed help in planning programs from the top down and avoiding 'spaghetti style' programs." (Platt and Byron, 1983, p. 60) He found that students were more successful with their programming when they had practice in problem solving activities before attempting program writing. In order to accomplish this task, "student experiences were planned to include a variety of problem-solving activities." (Platt and Byron, 1983)

In a study of small children's problem solving abilities, Sandra Hines, who is a doctoral candidate from North Texas State University, has found that there is a direct correlation between a child's problem solving ability and his success in learning to use the computer. In her study, Ms. Hines pre-tested a group of children before they were introduced to computer activities. The children were again tested at the end of the summer session. Results of her research

indictated that the students who did well on programming tasks were those who had a good background in problem solving. Ms. Hines reported that these same students accomplished their tasks by using a variety of problem solving strategies. (Hines, 1983, p. 12)

In summary, the research would tend to indicate that the use of a variety of activities geared toward problem solving are of great value to students who will learn to use the microcomputer. Decomposition and flowcharting skills are considered to be essential precursors to computer programming.

Purpose

The purpose of this project was to find and assemble a curriculum of instructional activities to be used in teaching the skills of decomposition and flowcharting to students in grades 5-7 as a precursor to programming on the microcomputer.

Decomposition is being defined as the breaking down of a problem into minute step-by-step procedures for the purpose of finding a solution. Flowcharting is being defined as the use of a diagram made up of geometric symbols and written language which represents the strategy needed in order to solve a specific problem.

Review of Literature

Introduction

This study is being done in order to assist the classroom teacher by providing instructional activities and materials to be used in the teaching of decomposition and flowcharting skills to students in grades five, six and seven. These skills are important skills for students who wish to develop programming abilities on the microcomputer.

A search through various educational indexes indicated that very little has been published on the topics of decomposition and flowcharting in relation to elementary school children and their preparation for doing programming on the microcomputer. A computerized literature search was then ordered.

In the process of ordering the computer search, three item descriptors were selected for use. Those descriptors were flow charts, task analysis and problem solving. It was noted that these topics were to be limited to information that centered around students in grades 5-7. The results of the computer search were disappointing. No information was available on flow charts, task analysis or problem solving as it applies to students in grades 5-7. An order for another computer search was then issued. This time the same descriptors were used, however, the stipulation that the material apply to students in grades 5-7 was removed. The second computer search provided current information in the form of fifty-one references. A study of the abstracts indicated that only 12% of the references would be useful.

The absence of information on decomposition and flowcharting as used in the elementary setting seems to indicate a need for such materials.

Because computer education is such a new part of the curriculum, most teachers feel unprepared to meet the demands of the subject matter. In the elementary school, programming skills are not universally accepted as appropriate. Students' computer experiences are often limited to drill and practice. (Slesnick, 1984, p. 27)

Decomposition and Task Analysis

The purpose of decomposition and task analysis points to information processing and the ability to identify specific operations and decisions needed in the performance of an overall task. Procedures, or series of steps, are then determined in order to solve a specific problem. (Merrill, 1980, p. 11) It is suggested that specific steps be taken when beginning the decomposition process. Merrill offers the following steps as an initial organizational activity:

STEP 1 Select all the operations or concepts to be taught.

STEP 2 Decide which operation or concept is to be considered first.

STEP 3 Sequence all the remaining operations or concepts.

STEP 4 Identify any prerequisites that are highly supportive for learning each operation or concept.

"The task analysis process uses a variety of techniques to break down the task into the constituent elements, determine the relationship among these elements, and restructure in accordance with the underlying

principle." (Carlisle, 1982, p. 9) An easy way to begin the decomposition or task analysis process is by asking the questions, "How does one do this?" or "What does this consist of?" before attempting further steps. It might also be helpful to define the taks in terms of a procedural task, a conceptual task, or a principle task. A procedural task can be thought of as a how-to-do-it task. It can be identified by the use of such verbal cues as perform, demonstrate, show and use. A conceptual task can be recognized by the use of such verbal indicators as contrast, classify, discriminate, or identify. Essentially, a conceptual is concerned with a what-is-it type statement. The third category, or principle related task, is a why-do-it statement. The use of such verbs as judge, choose, evaluate, and support signal a principle oriented task. In analyzing a procedural task to be decomposed, it should be noted that the general purpose of the task is to provide an overview or provide some sort of corrective feedback. This is different from the conceptual task in that the conceptual task provides examples and clearly defines some distinctive attributes of the task. When decomposing a task related to a principle, the purpose is to ensure understanding of procedures and concepts as the task is performed. (Carlisle, 1982)

Having a clear understanding of the type of task being analyzed and decomposed makes the work logical. Once the task has been identified, the components of the task may then be applied to the flowcharting process.

Flowcharting

Flowcharting is simply a mechanism or tool designed to aid in logical thinking and communication. Dr. John Von Neumann and his associates at Princeton University first published a description of flowcharting as it was used for finding the solution of problems on electronic computers. This was first done in 1947. (Hallam and Hallam, 1975, p. 20) It was found that flowcharts serve two purposes. First, they help one visualize the logical steps in the problem solving process. Secondly, they can provide a vital means of documentation.

"Flow charts are used in computer programming to describe the sequence of instructions, choices, loops, etc., which the computer is to carry out in the course of a calculation." (Watson, 1975, p. 24) Once the task has been applied to the flowchart, the writing of the program itself has been reduced in complexity.

Many students find flowcharting to be difficult or boring. It has been suggested that a major cause of this negative attitude toward flowcharting is the result of teaching flowcharting by dwelling on rules and symbols as opposed to flowcharting concepts. The concepts to be stressed in flowcharting are sequence and linking, decision points and exhaustive alternatives, loooping, and completion. (Hallam and Hallam, 1975)

The concept of sequence and linking shows the task as it is being divided into step-by-step and ordered patterns. It also gives a visual representation of how each step is joined to the step that comes before and after it. In thinking about decision points and alternatives, the

writer of the flowchart must be able to indicate visually those points where different choices resulting in various outcomes need to be placed. Looping is the method of bringing the task or a portion of the task to a spot where an alternative choice might be made. In the completion process, the task is brought to a well-defined ending. Before a student is able to reduce a task or problem to the form of a flowchart, he must clearly understand these basic concepts. "Flowcharting exercises using these simple concepts will help students approach problem solving in a systematic manner...Teachers who help their students clarify their thinking process through this technique provide a valuable service." (Hallam and Hallam, 1975)

There are some definite advantages of the flowchart as compared to a general listing of steps to be taken in the solution of a problem. These advantages are:

1. The student sees where to begin and where to stop.
2. The student sees what decisions to make or what questions to ask in order to solve the problem.
3. The student sees what processes to use in order to find the solution to the problem.
4. The student sees where to find the prerequisite information in order to carry out the process.
5. By following the path of the flowchart, the student does not take any unnecessary or wrong steps. (Bluman, 1976, p. 133)

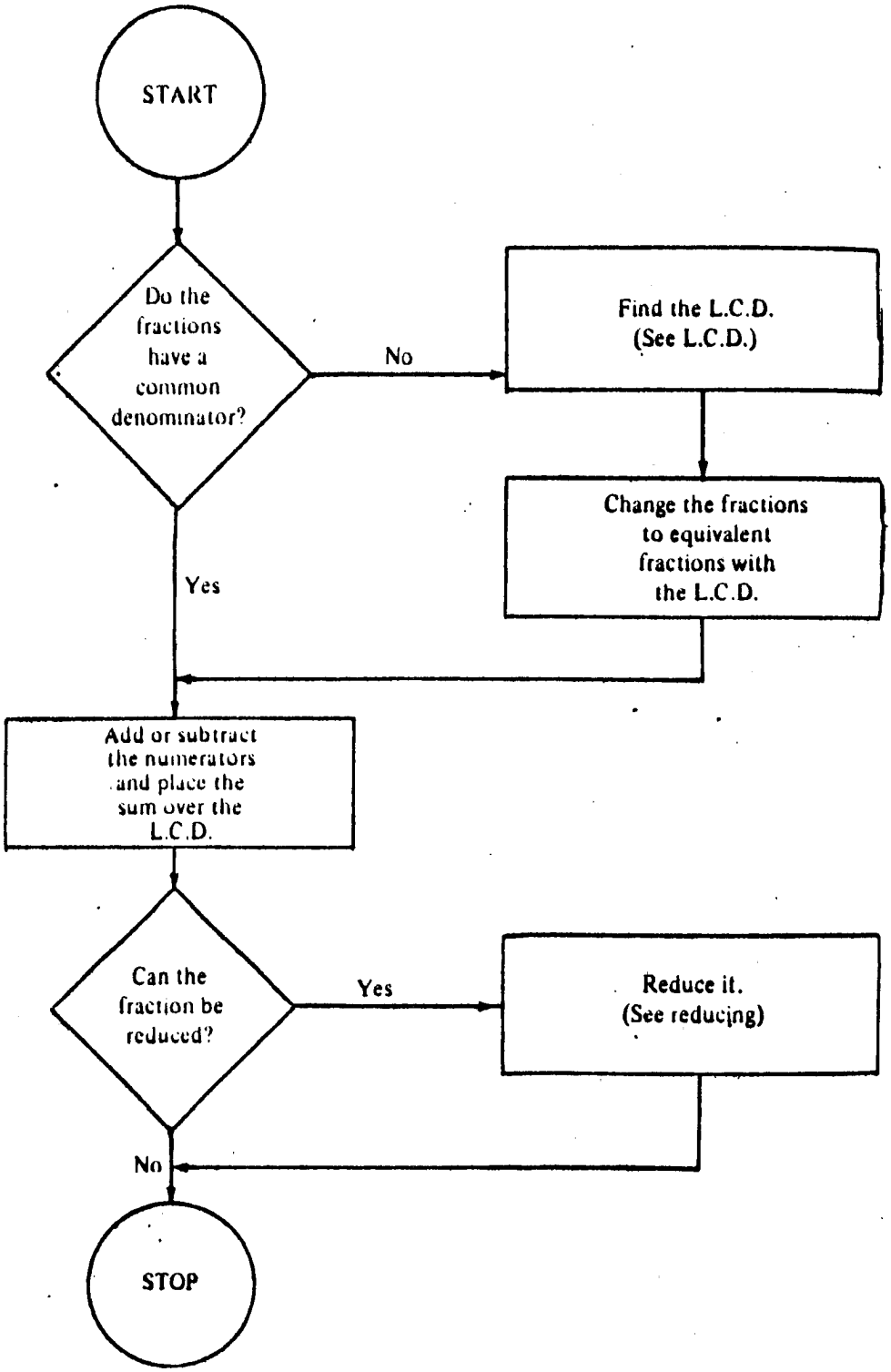
The construction of the flowchart is dependent on the proper use of four basic symbols. Variations of these symbols are used for more

complex flowcharts which may be used to visualize a more detailed problem or task for the learner. The four basic symbols used in flowcharting are the circle, the rectangle, the diamond and the line.

The circle is the "begin-end" symbol. It is used to indicate the beginning of the flowchart and the ending of a problem. The use of the circle indicates that only two circle will be used in the chart. The rectangle is identified as the "process" symbol. This symbol is used to give directions or indicate what operation is to be performed. It may take many rectangles to give directions for even a simple task. The diamond is termed the "decision" symbol. After giving directions or indicating a task to be performed, a decision may need to be made which will determine the remaining flow of the chart. When this happens, the diamond is used to visualize the placement of the decision making points in the flowchart. Each of the geometric symbols is connected with the line in order to indicate the relationships between the various parts. Arrows at the end of the lines serve the user by showing the direction of the flow within the chart. The simple illustration of a flowchart which follows shows the use of these symbols. The problem being solved by use of the flowchart is about adding and subtracting fractions. (Bluman, 1976)

In following the illustration, the use of some basic rules for flowcharting should be noted. These basic rules suggested by Bluman are:

1. Use standard symbols.
2. Always diagram the chart so that it reads from the top of the


START
Do the fractions have a common denominator?
No
Find the L.C.D. (See L.C.D.)
Change the fractions to equivalent fractions with the L.C.D.
Yes
Add or subtract the numerators and place the sum over the L.C.D.
Can the fraction be reduced?
Yes
Reduce it. (See reducing)
No
STOP

(Bluman, 1976)

page to the bottom of the page.

3. Do not cross the flow lines.
4. Use short descriptive statements in the symbols.
5. Be sure to indicate all possible options with the use of the decision symbol.
6. With the process symbols indicate where the user can find the necessary information to carry out the task.
7. Use arrowheads on the flow lines to indicate directions.

"A chart is a communcation tool or method for graphically representing in symbolic form operations, work relationships, information flow, and other ongoing work situations found in daily life." (Kallaus and Clark, 1971, p. 18) The illustration on the addition and subtraction of fractions made use of Bluman's rules for flowcharting. It should be noted that these rules would be most useful for those students in their initial flowcharting experiences. As the complexity of the problem increases, or as skill in flowcharting increases, the following guidelines for flowcharting as given by Kallaus and Clark might be given serious consideration for use. These rules involve identification of both the thought process and the specific sequential steps required to solve a problem.

1. Think through the problem to be solved, first in general terms and then in specific terms giving the procedures used to solve the problem.
2. Chart slowly and accurately, including all the necessary details. Where the chart gets too unwieldly in size, a

subsection of the process can be charted separately on another chart with appropriate cross referencing.

3. Use only essential symbols, as a proliferation of symbols overworks the reader and reduces the effectiveness of the chart.
4. Give the chart an appropriate title.
5. Number each of the steps in the process being charted to show the order of steps in the solution and to facilitate reference to the steps later on.
6. Within the symbol, insert only those words absolutely necessary to instruct the reader. Use brief instructions, each starting with a verb, such as:

   ...CLEAR the Machine

   ...DEPRESS the Division Key

   ...SET Decimal Point in the Answer.
7. Provide a column adjacent to the chart for details and comments.
8. Use a template (your own constructed from cardboard or one of the low-cost plastic templates available at bookstores) for neatly drawing the symbols.

The use of flowcharting skills in problem solving leads to a more successful treatment of the task. Dr. B. F. Skinner remarked, "And the program should be broken into segments small enough that the student succeeds frequently...For all but the angriest and most turned-off students, the feelings of mastery and successful completion are enough." (Green, 1984)

Summary

For some students, the use of the microcomputer is more than drill and practice. It can be used as a means of creative expression and a tool for exercising logical thinking strategies. These students will find programming a rewarding and useful experience. However, before a student can be expected to succeed in programming, he must be able to analyze a problem and state the elements of the problem in a systematic way. Dr. Arthur Luehrmann, the man who coined the phrase "computer literacy" in 1972, defines computer literacy as consisting of two parts. A person who is computer literate must know the limits and capabilities of the computer. At the same time, he must be able to tell the computer what to do. (Kratzer, 1984, p. 8) Being able to tell a computer what to do is more than learning the meanings of terms used in the various styles of computer languages. It also means being able to take a task or problem and take it apart and re-state it in a logical, sequential manner. Therefore, the skills of decomposition and flowcharting are necessary to students in grades 5-7 in order for them to maximize their success in learning programming on a microcomputer.

Design of Project

The following description provides the reader with directions for developing a curriculum of instructional activities and materials to be used in teaching the skills of decomposition and flowcharting to students in grades 5-7. The ability to break down problems into minute step-by-step procedures for the purpose of finding a solution and the skills needed to communicate the step-by-step procedures in the form of a chart made up of geometric symbols and written language and considered to be necessary precursors to computer programming.

Criteria for Selection of Activities and Materials

1. Using the guidelines for task analysis and flowcharting that have been found in the literature or suggested by other curriculum developers, this developer will gather activities and materials dealing with decomposition and flowcharting skills.
2. Materials will be selected from a variety of sources so that a good representation of decomposition and flowcharting skills will be given for major curriculum areas in order that students using the materials will have the opportunity to become well rounded in their use of the skills.
3. Material will be selected that will be of interest to and within the ability range of students in grades 5-7.
4. After the activities and materials chosen have met the criteria for numbers one, two and three, they will be categorized according to difficulty level with the easiest activities in the set coming first and with activities of increasing difficulty following.

5. An objective will be stated for each activity group thereby giving the teacher using the materials a clear idea of the purpose of the lessons.
6. Materials selected from various curriculum sources will be identified by source.
7. All materials used in the curriculum section of this project will be accompanied by an answer key.

Use of the Materials

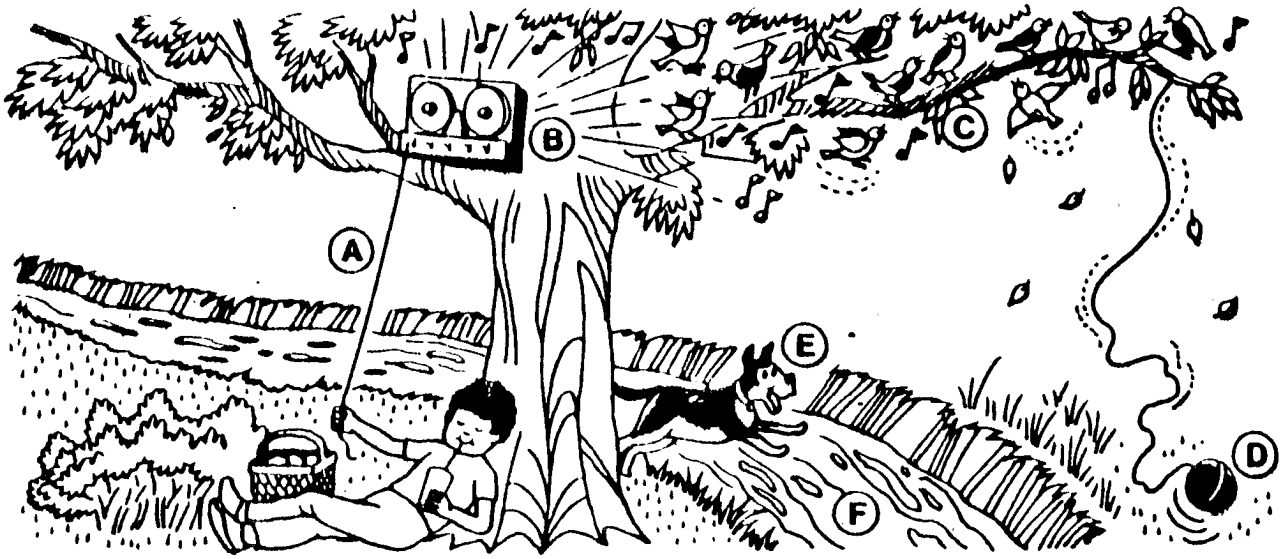
1. The materials are intended for use in grades 5-7 as an activity for the development of decomposition and flowcharting skills.
2. The activities are supplemental in nature. They are provided for those students who need additional practice in problem solving skills so that learning programming on the microcomputer might be made easier. The teacher should be selective in the use of the activities. All students need not use all of the activities. Once the student demonstrates the ability to apply decomposition and flowcharting skills, the purpose of the activities will have been accomplished.
3. Activities may be done independently, by students in pairs or small groups, or as a class activity. Students working independently should be allowed to progress at their own rate.

Sample Activity

The sample activity may be used in the 6th grade. It was selected from the New Open Highways (Scott, Foresman and Company, 1975) curriculum materials. The topic of the activity is sequencing, and the

A Silly Invention

It lets you go on a picnic and relax while giving your dog a bath.



Explanation of Sequence:

Pull string (A).
This turns on tape player (B) that plays bird calls.
Birds (C) start singing and jumping on branches.
The movement of branches causes ball (D) to bounce.
Dog (E) sees bouncing ball and begins to chase it.
Dog then falls into stream (F), getting its bath.

Write your answers to these questions.

1. What is the cause of B? pulling string A
2. What is the effect of B? Birds start singing and jumping on branches.
3. What is the cause of D? movement of branches
4. What is the effect of D? Dog sees bouncing ball and chases it.
5. What is the effect of F? Dog gets its bath.

Can you think of a better invention for giving your dog a bath? Write your answer below or draw your invention on another piece of paper. **Sequence the steps.**

(Aaron, I., Artley A., Jenkins, W., Robinson, H., Schiller, A., Smith, M., 1975)

objective is that the student will recognize the sequence of the events and the cause-effect relationship.

Evaluation of Materials and Activities

The curriculum activities and materials included in this project will be evaluated by those teachers who will be making use of the lessons as a precursor to programming activities on the microcomputer. The following portion of a check list is to be used for evaluation purposes. The complete check list may be found at the end of the project.

Evaluating the Materials

Directions: Please check the appropriate response following each question. The best time to make an evaluation is immediately following the use of the materials. The numbers on the Scale of Effectiveness range from one (low) to six (high).

ACTIVITY #	USED	NOT USED	SCALE OF EFFECTIVENESS
1.	____	_____	1 2 3 4 5 6
2.	____	_____	1 2 3 4 5 6
3.	____	_____	1 2 3 4 5 6

A Curriculum of Activities and Materials Used in Teaching Decomposition and Flowcharting Skills In Grades 5-7

A Curriculum of Activities and Materials Used in Teaching Decomposition and Flowcharting Skills In Grades 5-7

TABLE OF CONTENTS

A Note to the User 18

Sequencing Activities . . . . . .

Sequencing Activities Overview 19

Objective for the Section 19

Activities 20

Selecting Information Activities . . . . . .

Selecting Information Activities Overview 66

Objective for the Section 66

Activities 67

Selecting Details Activities . . . . . .

Selecting Details Activities Overview 77

Objective for the Section 77

Activities 78

Flowcharting Activities . . . . . .

Flowcharting Activities Overview 110

Objective for the Section 110

Activities 111

Working with Computers Activities . . . . . .
Working with Computers Overview 148
Objective for the Section 148
Activities 149
Evaluating the Materials Checklist 195
Activity References 202

A NOTE TO THE USER

The materials in this curriculum collection are intended for use in grades 5-7 as an activity for the development of decomposition and flowcharting skills. The activiites are supplemental in nature. They are provided for those students who need additional practice in the problem solving skills so that learning programming on the microcomputer might be made easier. The teacher should be selective in the use of the activities. All students need not use all of the activities. Once the student demonstrates the ability to apply decomposition and flowcharting skills, the purpose of the activities will have been accomplished. The activities may be done independently, by students in pairs or small groups, or as a class activity. Students working alone should be allowed to progress at their own rate. The activities have been arranged according to difficulty level. Special care has been made not to identify the materials with a particular grade level. The lessons have been placed in an order that becomes progressively more challenging. Finally, the curriculum materials have been categorized under one of the following headings: sequencing activities, selecting information activities, selecting details activiites, flowcharting activities, and working with computers activities.

SEQUENCING ACTIVITIES

SEQUENCING ACTIVITIES OVERVIEW

This section of curriculum materials is composed of Activities numbered one through twenty-three. Each activity is accompanied by an answer key. Logical thinking skills are stressed in the lessons.

OBJECTIVE FOR THE SECTION

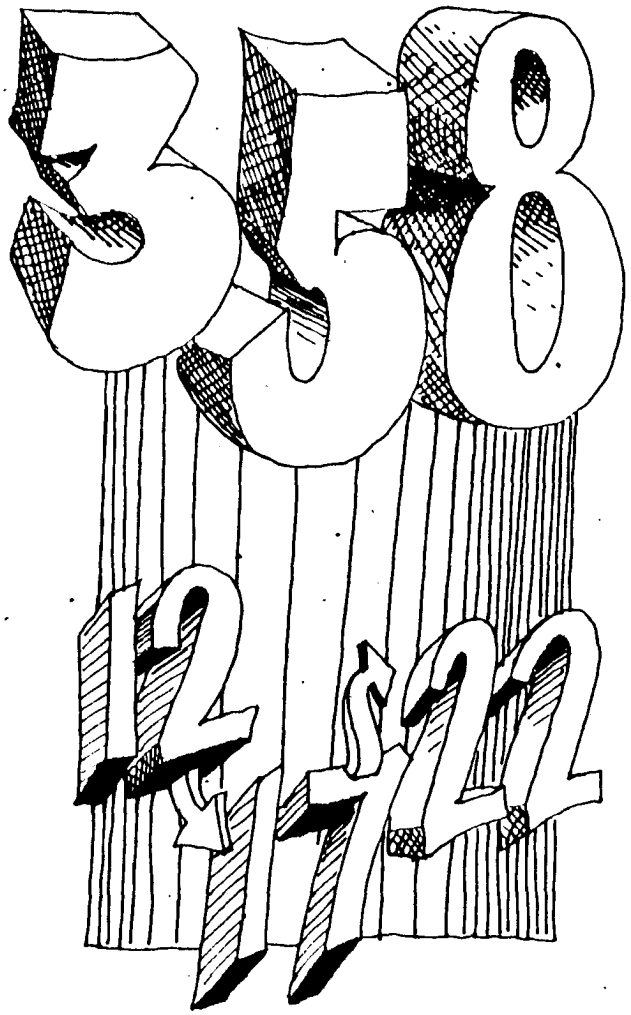
Students will demonstrate the ability to exercise logical thinking skills by successfully completing selected sequencing activities with 90% accuracy.

SUGGESTED USES

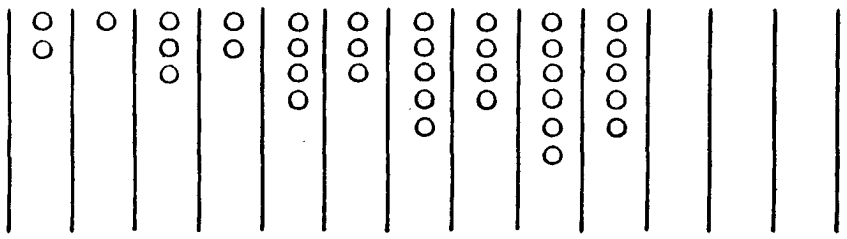
1. Activities 1-7 could be used with younger students or with students who have had little sequencing experience.
2. Activities 8-17 could be used to reinforce sequencing skills with students who have been introduced to the concept of sequencing. They are of moderate difficulty.
3. Activities 18-23 are more challenging activities. They deal with sequencing time and place relationships.

Sequence

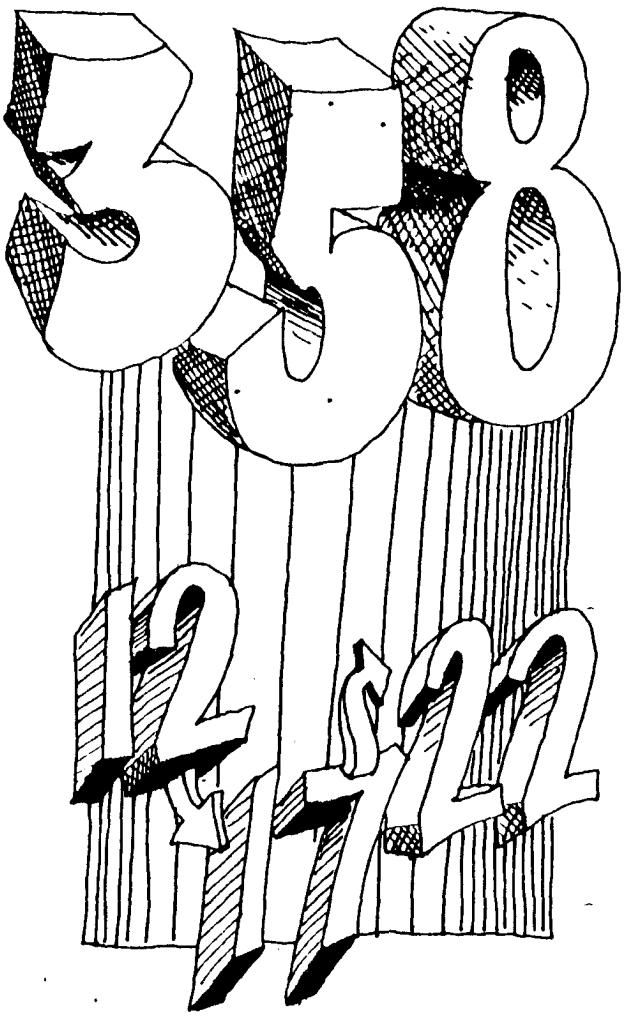
Find the missing number in sequence.



1. 1, 2, 3, 4, 5, 6, _____, 8
2. $\frac{1}{2}$, 1, 1 $\frac{1}{2}$, 2, _____, 3, 3 $\frac{1}{2}$
3. 3, 5, 7, 9, _____, 13, 15
4. $\frac{1}{3}$, 1, 1 $\frac{2}{3}$, 2 $\frac{1}{3}$, 3, _____, 4 $\frac{1}{3}$
5. 2, 2, 1, 1, 5, 5, 4, _____, 6, 6
6. $\frac{5}{3}$, $\frac{5}{3}$, $\frac{7}{1}$, $\frac{7}{1}$, $\frac{4}{2}$, _____, $\frac{4}{3}$, $\frac{4}{3}$
7. 21, 18, 15, _____, 9, 6
8. 5 $\frac{1}{4}$, 5, 4 $\frac{3}{4}$, _____, 4 $\frac{1}{4}$, 4
9. 1, 0.1, 0.01, 0.001, _____, 0.00001
10. 1, $\frac{1}{10}$, $\frac{1}{100}$, $\frac{1}{1000}$, _____ $\frac{1}{100,000}$
11. 8 $\frac{6}{7}$, 7 $\frac{5}{6}$, 6 $\frac{4}{5}$, 5 $\frac{3}{4}$, _____, 3 $\frac{1}{2}$
12. 8 $\frac{6}{7}$, 8 $\frac{4}{7}$, 8 $\frac{2}{7}$, 8, 7 $\frac{5}{7}$, _____, 7 $\frac{1}{7}$
13. 8 $\frac{6}{7}$, 8 $\frac{3}{7}$, 8, 7 $\frac{4}{7}$, 7 $\frac{1}{7}$, 6 $\frac{5}{7}$, _____, 5 $\frac{6}{7}$
14. 8 $\frac{6}{7}$, 7 $\frac{6}{7}$, 6 $\frac{6}{7}$, 5 $\frac{6}{7}$, 4 $\frac{6}{7}$, 3 $\frac{6}{7}$, _____, 1 $\frac{6}{7}$
15. Complete the next three pictures in this sequence.

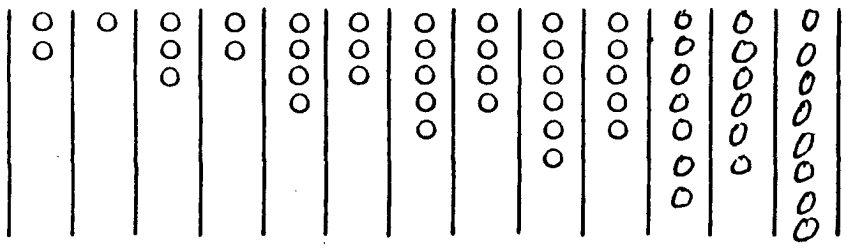


Find the missing number in sequence.



1. 1, 2, 3, 4, 5, 6, 7, 8
2. $\frac{1}{2}$ 1, 1 $\frac{1}{2}$ 2, 2½, 3, $3\frac{1}{2}$
3. 3, 5, 7, 9, 11, 13, 15
4. $\frac{1}{3}$, 1, $1\frac{2}{3}$, $2\frac{1}{3}$, 3, $3\frac{2}{3}$, $4\frac{1}{3}$
5. 2, 2, 1, 1, 5, 5, 4, 4, 6, 6
6. $\frac{5}{3}$, $\frac{5}{3}$, $\frac{7}{1}$, $\frac{7}{1}$, $\frac{4}{2}$, 4½, $\frac{4}{3}$, $\frac{4}{3}$
7. 21, 18, 15, 12, 9, 6
8. $5\frac{1}{4}$, 5, $4\frac{3}{4}$, 4½, $4\frac{1}{4}$, 4
9. 1, 0.1, 0.01, 0.001, 0.0001, 0.00001
10. 1, $\frac{1}{10}$, $\frac{1}{100}$, $\frac{1}{1000}$, $\frac{1}{10,000}$ $\frac{1}{100,000}$
11. $8\frac{6}{7}$, $7\frac{5}{6}$, $6\frac{4}{5}$, $5\frac{3}{4}$, $4\frac{2}{3}$, $3\frac{1}{2}$
12. $8\frac{6}{7}$, $8\frac{4}{7}$, $8\frac{2}{7}$, 8, $7\frac{5}{7}$, $7\frac{3}{7}$, $7\frac{1}{7}$
13. $8\frac{6}{7}$, $8\frac{3}{7}$, 8, $7\frac{4}{7}$, $7\frac{1}{7}$, $6\frac{5}{7}$, $6\frac{2}{7}$, $5\frac{6}{7}$
14. $8\frac{6}{7}$, $7\frac{6}{7}$, $6\frac{6}{7}$, $5\frac{6}{7}$, $4\frac{6}{7}$, $3\frac{6}{7}$, $2\frac{4}{7}$, $1\frac{6}{7}$

15. Complete the next three pictures in this sequence.

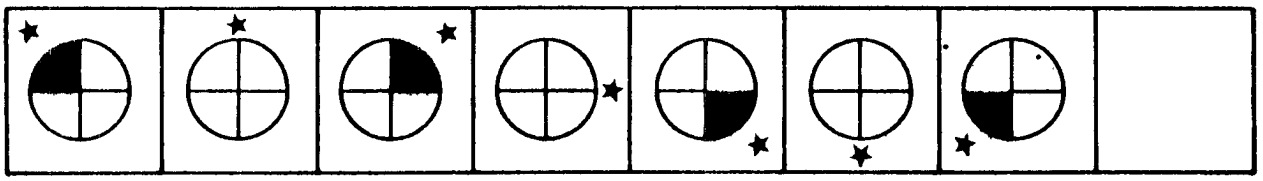


Number Sequences

Fill in the blanks to complete each sequence.

1. 9, $7\frac{1}{2}$, 6, $4\frac{1}{2}$, _____, $1\frac{1}{2}$
2. 11, $9\frac{2}{3}$, $8\frac{1}{3}$, 7, _____, $4\frac{1}{3}$
3. 15, $13\frac{1}{4}$, $11\frac{1}{2}$, _____, 8, _____, $4\frac{1}{2}$
4. 12, $10\frac{4}{5}$, $9\frac{3}{5}$, _____, $7\frac{1}{5}$, _____, $5\frac{4}{5}$
5. 20, $18\frac{1}{5}$, $16\frac{2}{5}$, $14\frac{3}{5}$, _____, 11, _____, $7\frac{2}{5}$
6. 100, $94\frac{1}{4}$, $88\frac{1}{2}$, $82\frac{3}{4}$, _____, $71\frac{1}{4}$, _____
7. 100, $90\frac{1}{2}$, 81, $71\frac{1}{2}$, 62, _____, _____, $33\frac{1}{2}$
8. 11, $9\frac{9}{10}$, $8\frac{8}{10}$, $7\frac{7}{10}$, _____, _____, $4\frac{4}{10}$
9. 25, $21\frac{7}{10}$, $18\frac{4}{10}$, _____, $11\frac{8}{10}$, _____, $5\frac{2}{10}$
10. 100, $74\frac{1}{10}$, $48\frac{2}{10}$, _____
11. 21, $17\frac{1}{6}$, $13\frac{2}{6}$, $9\frac{3}{6}$, _____, $1\frac{5}{6}$
12. 14, $12\frac{5}{8}$, $11\frac{2}{8}$, $9\frac{7}{8}$, _____, _____, $5\frac{6}{8}$
13. 75, $63\frac{5}{6}$, $52\frac{4}{6}$, $41\frac{3}{6}$, _____, $19\frac{1}{6}$, _____
14. 65, $55\frac{1}{5}$, $45\frac{2}{5}$, $35\frac{3}{5}$, $25\frac{4}{5}$, _____, _____
15. 7, $6\frac{1}{16}$, $5\frac{2}{16}$, $4\frac{3}{16}$, _____, $2\frac{5}{16}$
16. 35, $30\frac{11}{16}$, $26\frac{6}{16}$, $22\frac{1}{16}$, $17\frac{12}{16}$, _____

The pictures below form a sequence. Complete the last frame.



Number Sequences

Fill in the blanks to complete each sequence.

1. 9, $7\frac{1}{2}$, 6, $4\frac{1}{2}$, 3, $1\frac{1}{2}$
2. 11, $9\frac{2}{3}$, $8\frac{1}{3}$, 7, $5\frac{2}{3}$, $4\frac{1}{3}$
3. 15, $13\frac{1}{4}$, $11\frac{1}{2}$, $9\frac{3}{4}$, 8, $6\frac{1}{4}$, $4\frac{1}{2}$
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12. 14, $12\frac{5}{8}$, $11\frac{2}{8}$, $9\frac{7}{8}$, $8\frac{4}{8}$, $7\frac{1}{8}$, $5\frac{6}{8}$
13. 75, $63\frac{5}{6}$, $52\frac{4}{6}$, $41\frac{3}{6}$, $30\frac{2}{6}$, $19\frac{1}{6}$, 8
14. 65, $55\frac{1}{5}$, $45\frac{2}{5}$, $35\frac{3}{5}$, $25\frac{4}{5}$, 16, $6\frac{1}{5}$
15. 7, $6\frac{1}{16}$, $5\frac{2}{16}$, $4\frac{3}{16}$, $3\frac{4}{16}$, $2\frac{5}{16}$
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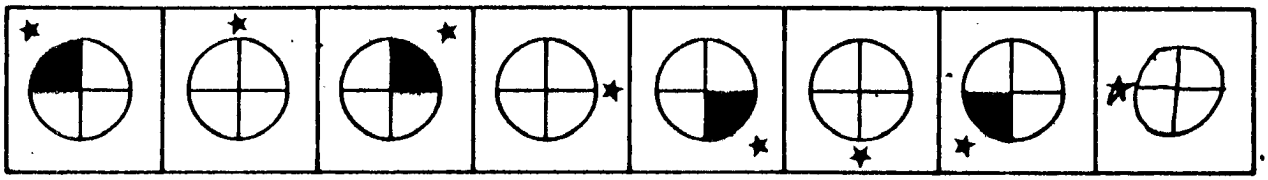
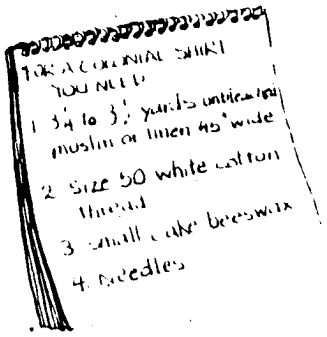
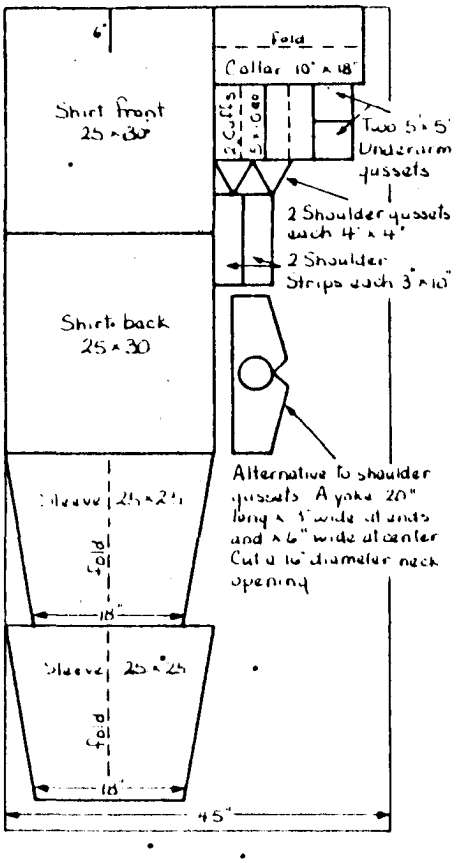


Multi-Step Problems



This is a pattern for a colonial man's shirt. The home economics class was making several of them for a Colonial Heritage Day Celebration.

Use the pattern.



Describe the steps to use to solve the problem. The pattern calls for $3\frac{1}{4}$ to $3\frac{1}{2}$ yards of pure linen or white, muslin fabric 45" wide.

1. If $3\frac{1}{2}$ yd are bought, how many square inches would the whole pieces of fabric measure?

   Step 1. _____

   Step 2. _____

2. If linen cost $3.95 a yard, how much would be saved by buying $3\frac{1}{4}$ rather than $3\frac{1}{2}$ yards?

   Step 1. _____

   Step 2. _____

3. Cotton muslin costs $2.25 a yard. How much less would $3\frac{1}{2}$ yards of it rather than linen cost?

   Step 1. _____

   Step 2. _____

   Step 3. _____

4. What is the area of the shirt front and the shirt back together?

   Step 1. _____ Step 2. _____

5. How many square inches of fabric are left from the two 25" x 25" pieces after the two sleeves are cut out?

   Step 1. _____ Step 2. _____

   Step 3. _____ Step 4. _____

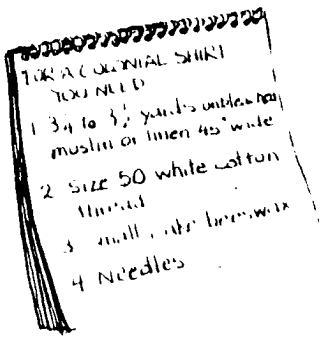
6. How much fabric is needed to make the cuffs for 10 shirts?

   Step 1. _____ Step 2. _____ Step 3. _____

7. How much material is cut out for a 16" diameter neck opening?

   Step 1. _____ Step 2. _____

Multi-Step Problems



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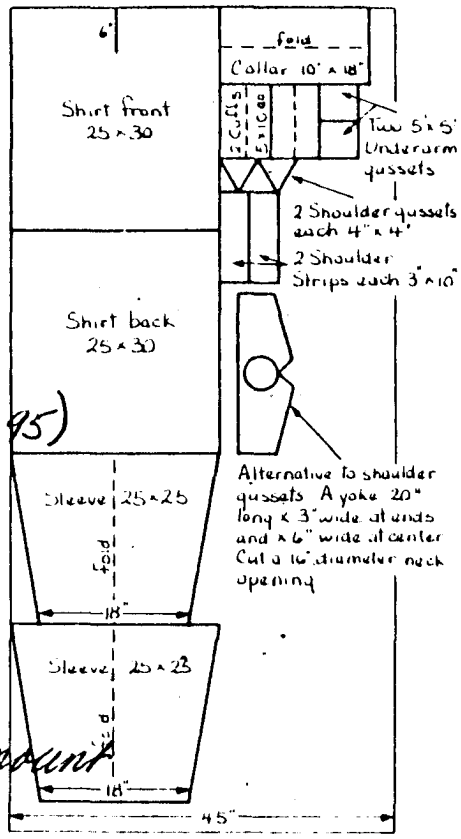

Describe the steps to use to solve the problem. The pattern calls for $3\frac{1}{4}$ to $3\frac{1}{2}$ yards of pure linen or white, muslin fabric 45" wide.

1. If $3\frac{1}{2}$ yd are bought, how many square inches would the whole pieces of fabric measure?
   Step 1. Change 3½ yd to inches
   Step 2. Multiply by 45

2. If linen cost $3.95 a yard, how much would be saved by buying $3\frac{1}{4}$ rather than $3\frac{1}{2}$ yards?
   Step 1. Multiply 3¼ yd by $3.95 + (3½ x $3.95)
   Step 2. Subtract costs

3. Cotton muslin costs $2.25 a yard. How much less would $3\frac{1}{2}$ yards of it rather than linen cost?
   Step 1. 3½ yd x $2.25
   Step 2. 3½ yd x $3.95
   Step 3. Subtract lesser from greater amount

4. What is the area of the shirt front and the shirt back together?
   Step 1. 25 in x 30 in Step 2. Double answer

5. How many square inches of fabric are left from the two 25" x 25" pieces after the two sleeves are cut out?
   Step 1. 25 in x 25 in Step 2. 18 in x 25 in
   Step 3. Subtract areas Step 4. double the difference

6. How much fabric is needed to make the cuffs for 10 shirts?
   Step 1. 5 in x 10 in = area of one cuff Step 2. double the area Step 3. multiply by 10

7. How much material is cut out for a 16" diameter neck opening?
   Step 1. find the radius Step 2. $r^2 \times 3.14$

Read the story below. The paragraphs are numbered in the order in which things happened. Look at the cartoons at the bottom of the page. Each paragraph describes one of the cartoons. Number each cartoon to match the paragraph that tells about it.

1. Once a boy named Harold moved into an apartment building. Soon everyone knew Harold because he was so awkward. He was always bumping into something or falling over things.

2. The first day Harold lived in the building, he got trapped in an elevator. It took five men and a lot of tools to get him out.

3. The next week Harold fell down some steps, pulling with him some old boxes full of trash. Trash was all over the steps, and Harold broke his leg. Everyone hoped that would keep him out of trouble.

4. But soon something more happened. While walking on crutches, Harold lost his balance. His crutch flew out and hit a woman who was walking in the hall. She was so upset that she went straight to the manager about Harold.

5. Within a few weeks, seventeen other people had gone to the building manager about Harold.

6. The building manager had quite a talk with Harold and his parents. If anything more happened, they would have to move.

7. Everything was quiet for one week. Then Harold was walking carefully in the hall on his crutches when a man ran out of an apartment. Harold had just put one crutch forward and the man fell over it, knocking himself out. As the man lay on the floor, Harold felt very upset. Now his family would have to move.

8. Someone called the police. When they came, they arrested the man on the floor. One policeman shook Harold's hand. Harold had caught a burglar! For once, the right thing had happened to him. Harold became the hero of the building.

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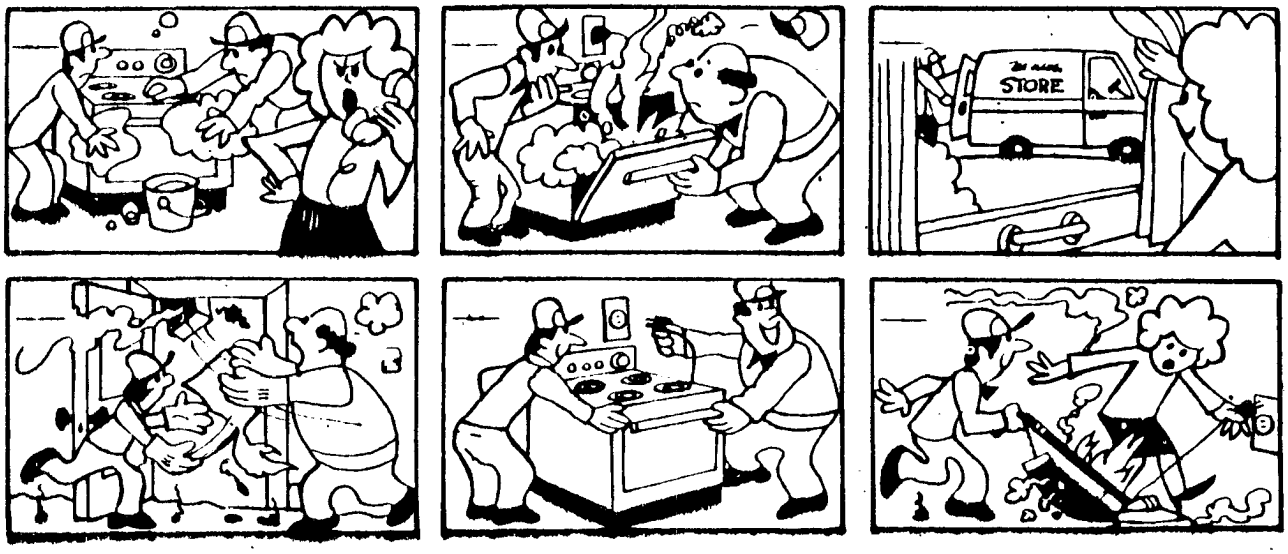
Read the story below. The paragraphs are numbered in the order in which things happened. Look at the cartoons at the bottom of the page. Each paragraph describes one of the cartoons. Number each cartoon to match the paragraph that tells about it.

1. Judy saw the delivery truck in her driveway. Her new electric stove had finally arrived. She went out and told the two men to bring it in through the back door that led into the kitchen.
2. The two men, one short and thin, the other tall and husky, carried the stove into the kitchen. They tore off the outer carton, pushed the stove against the wall, and plugged it in. The tall man smiled and told Judy he was going to make sure that everything was working.
3. He then turned on every burner and the oven to the hottest setting. The stove hadn't been on for long when smoke began to pour out the tops of the burners. The man immediately turned off everything. When he opened the oven door, flames leapt out. He was shocked to see that they had forgotten to remove the heavy cardboard inside the oven.
4. Both men hurriedly put on their heavy gloves, and yanked the flaming pieces out of the oven. They opened the kitchen door and tossed the burning pieces outside. As they were doing this, small burning bits fell on the carpet. Soon the carpet was spotted with hot, smoldering ashes.
5. Judy rushed to call the fire department, but the men said that everything was under control. Then one of the men noticed the vacuum cleaner in the corner. Before Judy could stop him, he was cleaning up the hot, ashy pieces. The machine started smoking. Judy angrily yanked the plug out.
6. The men spent two hours cleaning the blackened stove. Judy called the store. After all that had happened, the manager told her that she would get another stove. And of course Judy got a new vacuum cleaner and carpet.



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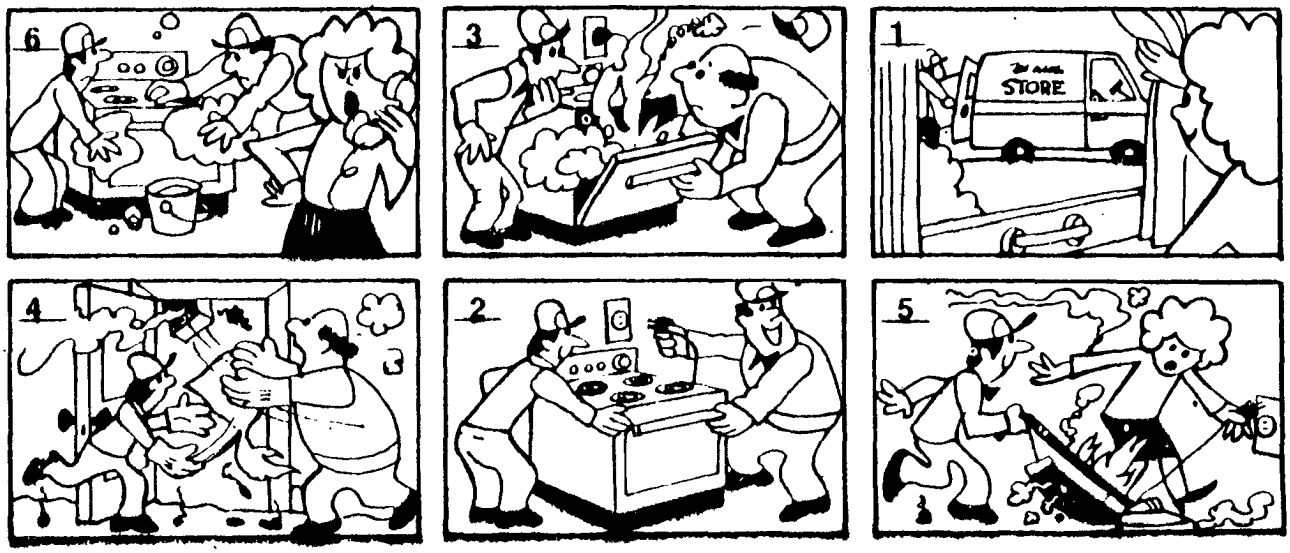

Read each set of paragraphs and the statements that follow. Then number the statements in the order in which the events actually happened.

1. Jane was baby-sitting for the first time in her life. Though it was July, the night was cold and wet. Jane got up to go into the baby's room. She was going to put some covers over him.

   Earlier that night, Jane had fed the baby. Then she had sat down to watch TV. Now she was afraid that if she did not cover the baby, he might catch cold. When Jane went into the baby's room, she saw that the window was open.

   ___ She watched TV.
   ___ She fed the baby.
   ___ She went to cover the baby.

2. The Johnson family was on vacation. A day before they'd left, Laura had washed and waxed the car. That night, everyone had packed their suitcases and put them in the car. After the car was loaded, John had taken their dog to a friend's house. The friend was taking care of the dog while the Johnsons were gone.

   The night before they'd left, the Johnsons had gone to bed early. Everyone had had a good night's rest. They'd started on their trip early in the morning.

   ___ The car was waxed.
   ___ The Johnsons left on their trip.
   ___ The suitcases were packed.
   ___ John took the dog to a friend.
   ___ The suitcases were put in the car.

Read each paragraph and the question that follows it. Then read the statements. Put a check on the line in front of the statement that best answers the question.

3. Lucia and Pete Santos lived in the city. Their family owned a hardware store and had to work every day. They never had time to go on trips out of the city.

   Why did the Santos family never go on trips?
   ___ They lived in the city.
   ___ They did not have a car.
   ___ They had to work every day.

4. Lucia and Pete helped in the store most Saturdays. But this Saturday was special. They were going on a camping trip with Pete's class.

   Why were Pete and Lucia not going to work in the store this Saturday?
   ___ They were going camping.
   ___ They did not want to work.
   ___ They were sick.

5. The class went to the woods by bus. Everyone was hungry when they got there. But no one could eat until they had built a fire. Then the food had to be cooked. When lunch was finally ready, Pete and Lucia agreed that hot dogs had never tasted so good.

   Why did the hot dogs taste so good?
   ___ There were not enough hot dogs.
   ___ Everyone was hungry.
   ___ No one liked hot dogs.

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Read each set of paragraphs and the statements that follow. Then number the statements in the order in which the events actually happened.

1. After Kathy ate dinner, she decided to return her overdue books to the library. No one else in the family had to go anywhere, so Kathy got permission to use the car. On her way home from the library, Kathy noticed that the left turn signal wasn't working. When she got to the gas station, she was told that a wire was loose.

___ Kathy stopped at a gas station.

___ Kathy went to the library.

___ Kathy ate dinner.

2. The Kleins were getting ready for their weekend trip. Friday morning, Mike mowed the lawn. That afternoon, Cindy found the suitcases in the attic. After dinner that night, the Kleins packed their suitcases and put them in the car. Then Mr. Klein watered the house plants.

   The Kleins left right after breakfast on Saturday. About five minutes later, Mike remembered his camera. It was still sitting on his desk.

___ The house plants were watered.

___ Cindy found the suitcases.

___ Mike mowed the lawn.

___ They packed their suitcases.

___ Mike remembered his camera.

Read each paragraph and the question that follows it. Then read the statements. Put a check on the line in front of the statement that best answers the question.

3. Carlos got to the airport in plenty of time to meet his father's plane. The plane was due to arrive at three o'clock. Then came the announcement of a two-hour delay. Heavy fog had developed.

   Why was the plane going to be late?

___ It was late in leaving.

___ There was a fuel problem.

___ There was heavy fog.

4. Jane had a baby-sitting job most Saturday afternoons. But this Saturday she was going to her first college football game.

   Why was Jane not going to baby-sit this Saturday?

___ She wanted to stay at home.

___ She was going to a football game.

___ She never worked on Saturdays.

5. Thea usually rode her bicycle to the swimming pool. Today she had to walk. Her bicycle had been stolen during the night.

   Why did Thea walk to the pool?

___ Her bicycle had been stolen.

___ Her bicycle had a flat tire.

___ Her brakes did not work.

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What steps does an inventor take to invent and sell an invention? Write the following events in the order in which they are most likely to occur.

1. patent the invention
2. begin to develop a plan
3. sell the invention
4. build it
5. find a problem to solve
6. decide on solution/idea
7. pick a category of life that interests you
8. refine the idea
9. brainstorm several solutions
10. find needed materials

Write a set of instructions for using a common machine. Have a friend follow your instructions. How exact were they? Were the steps in order?

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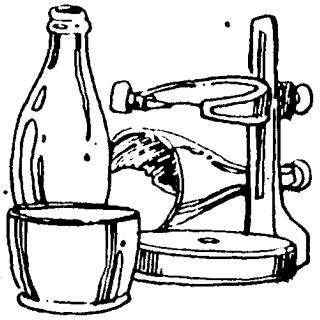
Write a set of instructions for using a common machine. Have a friend follow your instructions. How exact were they? Were the steps in order?

activity 8, key

List all necessary materials at the beginning of the instructions. The instructions or directions should be exact and clear. Write the directions in the order in which they occur.

The following list describes the process of converting used bottles into useful glassware. Number the following events in the order in which they are most likely to occur. **Answers may vary.**

_____ When you have several clean bottles, assemble a bottle cutter.
_____ Wash the bottles.
_____ Wearing gloves, carefully cut around the bottle at that height.
_____ Measure and mark the desired cutting line.
_____ Store, sell, or give away the finished glass objects.
_____ Collect bottles for several weeks.
_____ Carefully sand the cut edge of the bottle until smooth.
_____ Choose an appropriate bottle for the object to be made.



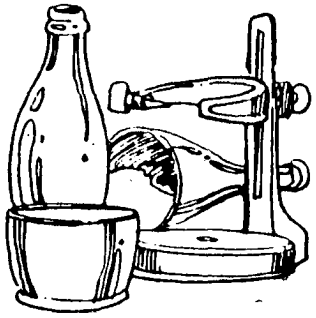
Choose one of the processes listed below. First list the necessary materials, then write a set of instructions for the process in the order the events should occur. **Answers will vary.**

repair a bicycle tire	roll and deliver newspapers	load a dishwasher
make an herb garden	make candles	make a telephone number file
make nachos or pancakes	groom a pet	wax an automobile
change batteries in a radio	decorate a T-shirt	style hair

List all necessary materials at the beginning of the instructions. The instructions or directions should be exact and clear. Write the directions in the order in which they occur.

The following list describes the process of converting used bottles into useful glassware. Number the following events in the order in which they are most likely to occur. **Answers may vary.**

3 When you have several clean bottles, assemble a bottle cutter.
2 Wash the bottles.
6 Wearing gloves, carefully cut around the bottle at that height.
5 Measure and mark the desired cutting line.
8 Store, sell, or give away the finished glass objects.
1 Collect bottles for several weeks.
7 Carefully sand the cut edge of the bottle until smooth.
4 Choose an appropriate bottle for the object to be made.



Choose one of the processes listed below. First list the necessary materials, then write a set of instructions for the process in the order the events should occur. **Answers will vary.**

repair a bicycle tire	roll and deliver newspapers	load a dishwasher
make an herb garden	make candles	make a telephone number file
make nachos or pancakes	groom a pet	wax an automobile
change batteries in a radio	decorate a T-shirt	style hair

Following Directions

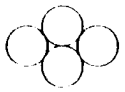
Directions for making a desk organizer are given below. Read the information through rather quickly to get an overview of the materials needed and the procedure. Then read the directions again, much more slowly this time, and make sure you understand not only each direction but also the reason for it. Finally, read the directions once more very slowly, almost as if you were actually making the desk organizer. Then answer the questions at the bottom of the page.

Materials:

Two 11-inch long cardboard tubes from rolls of paper towels; decorated adhesive paper; white liquid glue; a piece of cardboard at least 6 inches by 6 inches; a ruler; a pencil; a sharp knife; a pair of scissors

Procedure:

1. Make a mark 5 inches from one end of the first tube. Use the knife to cut through the tube at that mark to make two shorter sections.
2. On the second tube, make a mark 3½ inches from the end. Then cut through the tube at that mark to make two shorter sections.
3. Use the end of one of the tubes as a pattern, drawing around it and making four circles on the piece of cardboard. Each circle should touch the other circles, like this:



4. Cut along the outside of the circles to form a base for the desk organizer.
5. Wrap the decorated adhesive paper smoothly around each tube. Trim off any excess paper at the tops and bottoms of the tubes.
6. Glue the two tall tubes together side by side, making sure the bottoms are even so that they can stand on a flat surface.
7. Place the tall tubes upright on the table with the seam where they are glued together facing you. Glue a short tube to the long tubes at the seam, keeping the bottom even with the other tubes.
8. Glue the other short tube to the long tubes on the opposite side at the seam, the bottom even with the other tubes.
9. Glue the cardboard base to the tubes.
10. Allow the glue to dry before putting various items into the desk organizer, such as pens, pencils, rulers, paper clips, and so forth.

1. Why should you use a knife instead of scissors in steps 1 and 2? Put an **X** in front of the correct answer.
   ____ Scissors can't cut through cardboard.
   ____ A knife is safer to use.
   ____ Scissors would crush the tubes.
2. In which step or steps would you use the scissors? _____
3. In which step or steps would you use the ruler? _____
4. Following, arranged in incorrect sequence, is a list of steps to follow in making a desk organizer. Write **1** before the first step you should do, **2** before the next, and so on.
   ____ Glue the four tubes together.
   ____ Wrap the tubes in adhesive paper.
   ____ Glue the base to the tubes.
   ____ Divide each tube into two sections.
   ____ Cut out the base for the organizer.
5. What might happen if you didn't follow carefully the directions in step 10?

_____

Following Directions

Directions for making a desk organizer are given below. Read the information through rather quickly to get an overview of the materials needed and the procedure. Then read the directions again, much more slowly this time, and make sure you understand not only each direction but also the reason for it. Finally, read the directions once more very slowly, almost as if you were actually making the desk organizer. Then answer the questions at the bottom of the page.

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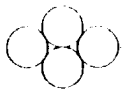

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1. Why should you use a knife instead of scissors in steps 1 and 2? Put an **X** in front of the correct answer.
   ___ Scissors can't cut through cardboard.
   ___ A knife is safer to use.
   X Scissors would crush the tubes.
2. In which step or steps would you use the scissors? 4 and 5
3. In which step or steps would you use the ruler? 1 and 2
4. Following, arranged in incorrect sequence, is a list of steps to follow in making a desk organizer. Write **1** before the first step you should do, **2** before the next, and so on.
   4 Glue the four tubes together.
   3 Wrap the tubes in adhesive paper.
   5 Glue the base to the tubes.
   1 Divide each tube into two sections.
   2 Cut out the base for the organizer.
5. What might happen if you didn't follow carefully the directions in step 10?
   The organizer might fall apart.

Following Directions

The directions for making a pizza are given below. Read the information through rather quickly to get an overview of the ingredients needed and the procedure. Then read the directions again, much more slowly this time, and make sure you understand not only each direction but also the reason for it. Finally, read the directions a third time, again very slowly, as if you were actually making the pizza. Then answer the questions at the bottom of the page.

Ingredients:

1 cup lukewarm water
1 package yeast
1 teaspoon sugar
1 teaspoon salt
1 tablespoon margarine or vegetable shortening
3 cups flour
olive oil
3 cups tomato sauce
½ pound mozzarella cheese that has been sliced into narrow strips
Parmesan cheese, grated
oregano

Procedure:

1. Into a large mixing bowl, put 1 cup of lukewarm water and the package of yeast. Stir the mixture until the yeast dissolves in the water. Let the mixture stand for at least 5 minutes.
2. Add the sugar, salt, and margarine or vegetable shortening. Beat well.
3. Add 1½ cups of flour. Beat the mixture thoroughly.
4. Add the remaining flour in order to form a thick dough.
5. Put dough on a floured surface. Knead (mix by squeezing and pressing) the dough until it feels smooth and elastic.
6. Grease three 9-inch cake or pie pans.
7. Divide dough into 3 balls of about the same size. Flatten each ball. Stretch dough gently until it fits the pans.
8. Let dough rise in pans for 15 minutes.
9. Preheat oven to 425°.
10. Brush dough lightly with olive oil.
11. Spread tomato sauce over dough. Add the strips of mozzarella cheese. Sprinkle lightly with grated Parmesan cheese and oregano.
12. Bake for 25 minutes in the oven.

1. Draw a line under each ingredient or utensil that will be needed to make the pizza.
   double boiler *a cup* *large bowl*
   cake or pie pans *muffin tins* *eggs*
   a tablespoon *flour* *3 cups of milk*
2. In what order are the ingredients listed?

3. Draw a line under the length of time you think it will take to make the pizza before putting it into the oven.
   15 minutes *40 minutes* *three hours*

4. Number the following steps in the correct sequence:
   ___ Knead the dough until smooth.
   ___ Dissolve yeast in water.
   ___ Add sugar, salt, and shortening.
   ___ Stretch dough to fit pans.
   ___ Bake for 25 minutes.
   ___ Add flour and beat mixture well.
   ___ Spread the dough with tomato sauce.
   ___ Let dough rise for 15 minutes.
   ___ Divide dough into 3 balls.

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   [illegible]
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Following Directions

Below are directions for making a leather vest similar to those worn by American Indians of the western plains. As you read these directions, try to notice and remember two kinds of facts: (1) the things you should do, and (2) the order in which to do them.

An American Indian vest is a beautiful and useful garment which you should be able to make with a minimum of complications. Worn over a shirt or blouse, it adds a practical and colorful touch to any casual outfit.

If you want your vest to look authentic, buy any kind of soft leather, preferably in a natural buckskin color. You will need a pattern for it, so borrow a vest that fits you and use it for this purpose. Trace the outlines of the borrowed vest onto a heavy piece of brown wrapping paper, making sure you leave about an extra half inch wherever there is a seam. After you've traced the pattern, lay it on your leather, and carefully cut around it. Then sew the seams.

Now the really creative part starts – decorating your vest. No two Indian vests are exactly alike, so feel free to experiment with your designs. Horses or other animals are good subjects. So are various arrangements of geometric shapes. The back of the vest can have a different pattern from the front, so you'll have a chance to try several motifs.

Begin by using a scrap piece of leather and practice on it before you tackle the real thing. With a soft pencil, sketch out a design on the leather. Then brush clear lacquer within the lines of your design, spreading and smoothing it down with a flat stick or knife. Let the lacquer dry. Next, use colored lacquer to paint the designs. (Be bold – real Indian vests are ornamented in rich, vibrant colors.) Before the lacquer is completely dry, scratch thin lines over it with a needle, keeping the lines about a sixteenth of an inch apart. This technique helps to prevent any irregular cracking of the paint when it is dry. It also gives your finished vest a more ornate and authentic appearance.

Below, arranged in the wrong order, are the steps to follow in making an Indian vest. Write **1** before the thing you should do first, **2** before the next step, and so on. Check your numbering by rereading the directions. If your numbering is wrong, correct it.

____ Use brightly colored lacquer to paint vivid colors on your designs.

____ Trace the outlines of the borrowed vest on a piece of wrapping paper.

____ Sketch out a design on the leather.

____ Lay the pattern on the leather and cut around it carefully.

____ Buy any kind of soft, naturally-colored leather for your vest.

____ Scratch lines in the lacquer to prevent the paint from cracking.

____ Brush clear lacquer within the lines of your design and smooth it down.

____ Sew the seams.

____ Make a pattern from a borrowed vest that fits you.

____ Use a scrap piece of leather to practice your designs.

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1 Buy any kind of soft, naturally-colored leather for your vest.

10 Scratch lines in the lacquer to prevent the paint from cracking.

8 Brush clear lacquer within the lines of your design and smooth it down.

5 Sew the seams.

2 Make a pattern from a borrowed vest that fits you.

6 Use a scrap piece of leather to practice your designs.

activity 12, key

Read the following background information and carry out the assignment below.

One of the most famous poems about early American colonists is "The Courtship of Miles Standish," by Henry Wadsworth Longfellow. According to the poem, Miles Standish asked his friend John Alden to tell Priscilla Mullen how much he, Standish, cared for her, but Priscilla fell in love with John Alden instead. The poem is fictitious, but its characters, Miles Standish, John Alden, and Priscilla Mullen, were real people.

Study the following list of events in the life of Priscilla Mullen Alden. Then write a paragraph telling about her life, discussing events in the order in which they occurred. Use transition words and phrases, such as **then, next, after that,** and **finally,** to make the paragraph easy to read. Words may be changed if the facts are not altered.

1. born about 1602 in Dorking, in the county of Surrey, England
2. traveled with her father, mother, and brother to America on the *Mayflower*
3. only family member to survive the first winter in New England
4. was placed in the care of the family of Governor John Carver
5. married John Alden
6. lived in Plymouth and had two children
7. settled with her husband in Duxbury
8. had nine more children
9. one daughter married Miles Standish's son, Alexander.
10. date of her death is unknown

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10. date of her death is unknown

Answers may vary.

The six paragraphs below describe the steps that two girls took in planning a trip. The steps are not in the right order. Read all the paragraphs before marking anything. Decide the correct sequence of the steps. Number the paragraphs to show the right order.

____ As soon as they knew how much money they needed for gas and supplies, Sumi called to find out how much it would cost to rent the truck. She added the rental fee to their list of costs. They added up the list and divided the cost between them.

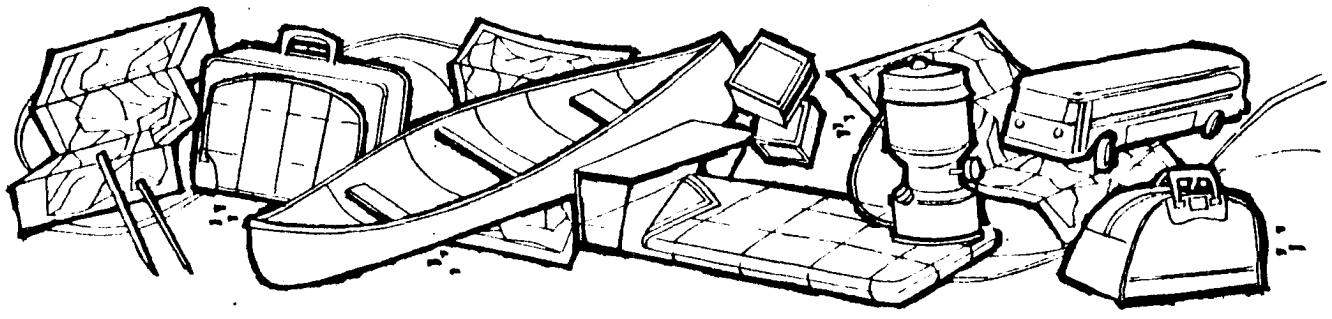
____ As soon as they had finished making their list of supplies, Sumi said they must find out how much everything for the trip would cost. First, the girls figured the number of miles they would drive. That way, they could tell how much money they would need for gas.

____ After Ida and Sumi knew how much the trip would cost, they collected their supplies. They carefully checked what they collected with their list of supplies. They wanted to be sure they had all the food and equipment they would need. The girls had planned well. Everything was there. Now they were ready to pack.

____ Ida and Sumi packed their supplies into canvas bags. They labeled the bags so they would know what was in each. They packed the bags into the car and fastened the canoe on top. They were ready to go.

____ After the girls had planned their route, Ida began to make a list of the food and equipment they would need. The trip on the river would last for seven days. Their canoe would not hold many supplies. They must plan carefully. Now, the route was marked, and the supplies listed.

____ Ida and Sumi planned to drive to a river and travel by canoe for seven days. They would then rent a truck and go back to the place where they left the car. The girls sat down at a table and looked at maps. They traced the possible routes they could take. They figured out how long the trip would take.



These six paragraphs tell about the steps that two girls took in planning a trip. The steps are not in the right order. Read all the paragraphs before marking anything. Decide the correct sequence of the steps. Number the paragraphs to show the right order.

_4_ As soon as they knew how much money they needed for gas and supplies, Sumi called to find out how much it would cost to rent the truck. She added the rental fee to their list of costs. They added up the list and divided the cost between them.

_3_ As soon as they had finished making their list of supplies, Sumi said they must find out how much everything for the trip would cost. First, the girls figured the number of miles they would drive. That way, they could tell how much money they would need for gas.

_5_ After Ida and Sumi knew how much the trip would cost, they collected their supplies. They carefully checked what they collected with their list of supplies. They wanted to be sure they had all the food and equipment they would need. The girls had planned well. Everything was there. Now they were ready to pack.

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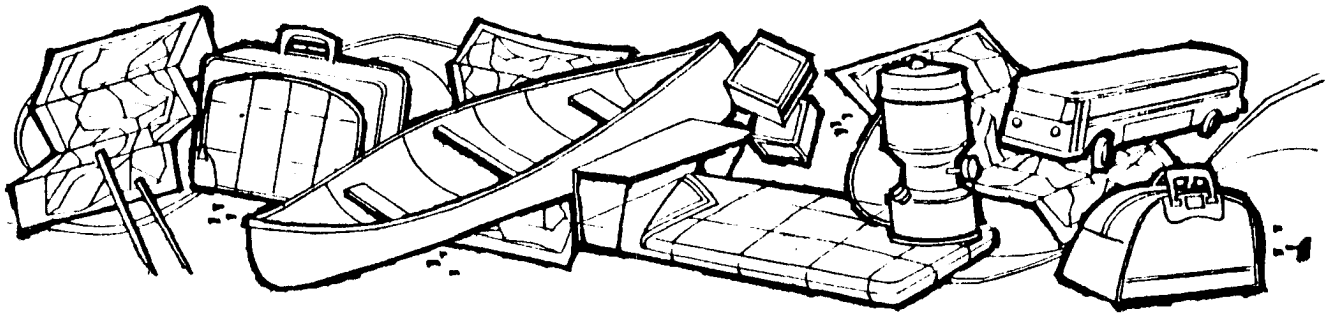

The following numbered paragraphs, when arranged in chronological order, tell a story. Write the numerals of the paragraphs as they would appear in chronological order. The first paragraph of the story has been underlined. On your paper draw a ring around the numeral of the paragraph that you think is the climax of the story.

1. The three frightened animals suddenly collided with Bear. She calmed them down and asked them what was wrong.
2. Badger threw up his paws in dismay and joined Rabbit. The two of them ran to tell Deer the news. Deer promptly joined them, adding her cries to theirs.
3. The three smaller animals led Bear back to the ferns. Although they searched everywhere for the piece of sky, they could not find it.
4. One morning long ago, as timid little Rabbit crouched under some ferns, an acorn happened to drop upon his head.
5. "The world is coming to an end!" Deer cried to Bear. "A piece of sky just hit Rabbit on the head!"
6. "Oh, no!" shrieked Rabbit, fearing the worst, as usual. "The sky is falling and the world is coming to an end!"
7. So poor foolish Rabbit, whose face was as red as a rabbit's can be, settled back into his ferns, after promising the others that in the future he would investigate matters carefully before sounding the alarm.
8. So Rabbit began to run to and fro warning the other beasts of the forest about the end of the world.
9. "Here is your piece of sky," laughed Bear, holding up the tiny acorn. "You'll have to wait a little longer for the end of the world!"
10. The first animal he met was Badger, and Rabbit cried, "The sky is falling, and the world is coming to an end!"
11. "H-m-m-m," growled Bear, who was not easily frightened. "Show me the piece of sky that hit you, Rabbit."

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4
6
8
10
2
1
5
11
3
(9)
7

The six paragraphs below describe events in a fictional story. The paragraphs are not in the right order. Read all the paragraphs before marking anything. Then decide the correct sequence of the paragraphs. Number the paragraphs to show the right order.

___ Before Hannah could stop her, the neighbor had touched the pendulum. It began to swing, back and forth, back and forth. And the clock began to chime: one, two, three . . . ten, eleven, twelve . . . thirteen! "It struck thirteen," Hannah cried. Her face turned pale. Her hands trembled. "Of course it didn't," said the neighbor laughing. But Hannah only gazed at the haunted clock.

___ Hannah was afraid of the clock the moment she saw it. Her father had bought it at an auction. He brought it home and put it on a shelf. Then he wound it and set the pendulum swinging. The hands of the clock stood at twelve o'clock. It began to chime: one, two, three . . . ten, eleven, twelve . . . thirteen!

___ Hannah died that day. She was found sitting in a chair, staring at the clock. The clock, its hands frozen at twelve o'clock, its pendulum still, stared silently back.

___ Only Hannah heard the clock chime thirteen. Her father laughed when she told him. But that same day she found him dead, staring at the clock. The clock stared back silently. But now Hannah knew its secret. The clock was haunted.

___ Then one day a new neighbor paid Hannah a visit. She noticed the silent clock. "Doesn't it work?" she asked. Hannah shook her head. "It's haunted," she said. The neighbor only laughed. "There are no such things as ghosts or hauntings," she said.

___ For many years after the death of Hannah's father, the clock sat on the shelf. Its hands were frozen at twelve o'clock. Hannah feared it. She wanted to be rid of it, but she was afraid to touch it. She was afraid the pendulum would swing and the clock would begin to chime: one, two, three . . . ten, eleven, twelve . . . thirteen.

The six paragraphs below describe events in a fictional story. The paragraphs are not in the right order. Read all the paragraphs before marking anything. Then decide the correct sequence of the paragraphs. Number the paragraphs to show the right order.

_5_ Before Hannah could stop her, the neighbor had touched the pendulum. It began to swing, back and forth, back and forth. And the clock began to chime: one, two, three . . . ten, eleven, twelve . . . thirteen! "It struck thirteen," Hannah cried. Her face turned pale. Her hands trembled. "Of course it didn't," said the neighbor laughing. But Hannah only gazed at the haunted clock.

_1_ Hannah was afraid of the clock the moment she saw it. Her father had bought it at an auction. He brought it home and put it on a shelf. Then he wound it and set the pendulum swinging. The hands of the clock stood at twelve o'clock. It began to chime: one, two, three . . . ten, eleven, twelve . . . thirteen!

_6_ Hannah died that day. She was found sitting in a chair, staring at the clock. The clock, its hands frozen at twelve o'clock, its pendulum still, stared silently back.

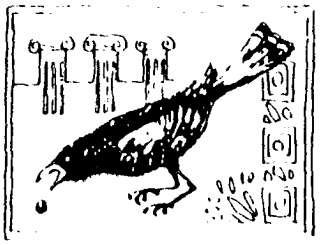
_2_ Only Hannah heard the clock chime thirteen. Her father laughed when she told him. But that same day she found him dead, staring at the clock. The clock stared back silently. But now Hannah knew its secret. The clock was haunted.

_4_ Then one day a new neighbor paid Hannah a visit. She noticed the silent clock. "Doesn't it work?" she asked. Hannah shook her head. "It's haunted," she said. The neighbor only laughed. "There are no such things as ghosts or hauntings," she said.

_3_ For many years after the death of Hannah's father, the clock sat on the shelf. Its hands were frozen at twelve o'clock. Hannah feared it. She wanted to be rid of it, but she was afraid to touch it. She was afraid the pendulum would swing and the clock would begin to chime: one, two, three . . . ten, eleven, twelve . . . thirteen.

Read the sets of sentences. Then write the sentences in chronological order to make a story.

The crow tried and tried to reach the inviting drops of water.
One day a crow thought he would die of thirst.
Then he found a pitcher that contained a small amount of water.
He was so tired of trying that he almost gave up.
He quickly put his beak into the mouth of the pitcher.
But he realized the pitcher was too deep for his short beak.



Then he had a brilliant idea.
Finally the crow was able to quench his thirst.
Then he quickly dropped more and more rocks into the pitcher.
The rock made the water rise, but only slightly.
Soon the water rose all the way to the top.
He picked up a small rock and dropped it into the pitcher.

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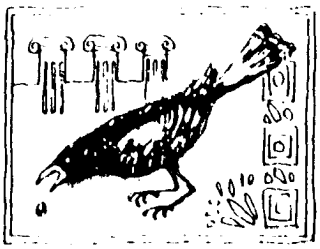

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Noting Correct Sequence

Order of Events

The following article is a short biography of Clifford Milburn Holland, a famous engineer. As you read the biography, notice the order, or sequence, of events in Mr. Holland's life. At the bottom of the page some of these events are arranged in incorrect sequence. Indicate the correct order of these events by writing a number before each one. Write 1 before the first event, and so on. Try to do this without looking back.

On October 27, 1924, Clifford Milburn Holland sat up in his hospital bed after having his tonsils removed and claimed that he felt fine. Moments later, he died of a heart attack. It was only two days later that the official "holing through" occurred for his most important life's work, the first tunnel for motor vehicles to be constructed under a body of water. His coworkers felt his loss deeply, and consequently the tunnel was officially named the Holland Tunnel only a few weeks later.

Mr. Holland was born in Somerset, Massachusetts, in 1883. He entered Harvard University in 1902 and had to help pay his expenses there by doing various jobs such as teaching night school, waiting on tables, and doing summer work. He earned an A.B. degree in 1905 and a B.S. degree (in civil engineering) the following year.

A few months after graduation he moved to New York City, where he worked on various East River subway tunnels. He eventually came to be considered the leading authority on subaqueous construction. In June, 1919, he became chief engineer for the New York State and the New Jersey Interstate Bridge and Tunnel commissions. His job was to connect New York and New Jersey via a tunnel for cars, trucks, and buses to go under the Hudson River. Since such a task had never before been attempted, the engineering problems were numerous, and many were without precedent. One of the main difficulties was properly ventilating a tunnel in which a high level of vehicular exhaust fumes existed. The plan recommended by Mr. Holland was severely criticized by many competent engineers but was nevertheless finally adopted. Mr. Holland died in 1924 after devoting five years of his life to the tunnel. Although he did not live to see his project successfully completed, he was responsible for devising the method and principles used in the design and implementation of the underwater tunnel. These principles are still the basis for all vehicular tunnels being built throughout the world today.

On November 5, 1908, Mr. Holland had married Anna Coolidge Davenport of Watertown, Massachusetts, his high school sweetheart. Upon Mr. Holland's death, his wife moved back to the Boston area with their four daughters. She never remarried and survived her husband by nearly fifty years — she died on July 16, 1973.

_____ His job was to connect New York and New Jersey via a tunnel for vehicles.

_____ Mr. Holland was born in Somerset, Massachusetts.

_____ The tunnel was officially named the Holland Tunnel.

_____ He married Anna Davenport.

_____ He entered Harvard University.

_____ Mr. Holland died of a heart attack.

_____ The official "holing through" occurred for the Holland Tunnel.

_____ He moved to New York City.

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5 The official "holing through" occurred for the Holland Tunnel.

3 He moved to New York City.

activity 18, key

Noting Correct Sequence

Order of Events

The article below tells about an elephant named Jumbo. As you read the article, notice the order, or sequence, of events. At the bottom of the page some of these events are arranged in incorrect sequence. Indicate the correct order of these events by writing a number before each one. Write 1 before the first event, and so on. Try to do this without looking back.

In 1861, a baby male elephant was captured in Central Africa and was sold to the Paris zoo. Four years later, in 1865, he was traded to the Royal Zoological Gardens in London. This animal was the first elephant from Africa (all others were from India, where the elephants are somewhat smaller) to be brought to London alive. The people there grew very fond of their giant-sized elephant who was so gentle with small children. He is reported to have stood nearly 11 feet at the shoulder and to have weighed 6½ tons. The name of this elephant was Jumbo.

For sixteen years, Jumbo was a main attraction at the London zoo. But then, in the seventeenth year, Jumbo's temperament changed as he approached maturity, a time when male elephants commonly become aggressive. Jumbo became irritable and difficult to handle; he even ripped up his cage. The public had to be kept away from their old friend. All the zoo keepers were afraid of the elephant except for Matthew Scott, who had known Jumbo for many years. During this difficult time, Phineas T. Barnum, the great circus operator of the United States, offered to buy the elephant, and a copy of the sale agreement was signed. When the English people found out about the agreement, they were angry and upset. But it was too late, and arrangements were made for Jumbo's trip to the United States.

On the assigned day Jumbo was led from the zoo to the docks, where a boat waited to take him across the Atlantic. But when the gates of the zoo closed behind him, Jumbo stopped, trumpeted, and lay down in the street. He got up again only when the gates were opened 24 hours later. So a special cage was made to take the elephant to the ship.

On April 9, 1882, Jumbo arrived in New York City. He was very popular with the American audiences, even though he performed no tricks but merely strolled around the ring on a lead held by Matthew Scott. He traveled across the United States many times with the Barnum and Bailey circus. Barnum widely proclaimed and advertised his elephant as being the largest elephant in the whole world.

On September 14, 1885, Jumbo was hit by a freight train and died. Eyewitnesses reported that he waved his trunk at Matthew Scott before dying. Although the elephant lived for only three years in the United States, his name may stay in our language for years to come. The word *jumbo* has come to mean "very large size" and appears on items ranging from large-sized boxes of cereal and laundry soap to jumbo jets.

_____ Jumbo was traded to the London zoo.
_____ Jumbo arrived in New York City.
_____ Jumbo traveled with the circus.
_____ Jumbo was captured in Central Africa.
_____ Jumbo was sold to Phineas T. Barnum.
_____ Jumbo was sold to the Paris zoo.
_____ Jumbo was hit by a freight train.
_____ Jumbo sadly left the London zoo.
_____ Jumbo approached maturity and became irritable and difficult to handle.

Noting Correct Sequence

Order of Events

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Noting Correct Sequence

Order of Events

The following article is a short history of the women's suffrage movement. As you read the article, note the order, or sequence, of events. Then follow the directions below.

Women in the United States were governed without representation until they secured the right to vote. In the 1830's and 1840's, a number of articulate women attempted to spark a large-scale women's suffrage movement. These efforts resulted in a meeting that was called in July, 1848, by Elizabeth Cady Stanton and Lucretia Mott and held in Seneca Falls, New York, Mrs. Stanton's home town. The meeting was attended by the new movement's most active and vocal supporters, and they adopted a *Declaration of Principles,* patterned after the Bill of Rights of the Constitution. It was signed by 68 women and 32 men, and it began, "We hold these truths to be self-evident: that all men and women are created equal. . . ."

In the following years, more conventions were held in other states, and the first national convention with delegates from nine states was held in Worcester, Massachusetts, in 1850. The movement continued to gain momentum until after the Civil War, but in May, 1869, the members split over tactics. One group, under the leadership of Elizabeth Cady Stanton and Susan B. Anthony, wanted to get an amendment to the national constitution passed that would make woman suffrage (the right to vote) a federal law. The other group, under Lucy Stone and Julia Ward Howe, believed that a series of state laws would accomplish their goal more quickly.

The first victory came when the Territory of Wyoming wrote woman suffrage into its constitution. When Wyoming became a state in 1890, it was the first state in which women could vote. By coincidence, 1890 was also the year in which the two factions of the movement reunited and decided to follow both groups' tactics at the same time.

In 1887, a bill entitled the Anthony Amendment was introduced by Congressman Aaron Sargent of California. It was this bill that called for full voting rights for women. It was firmly defeated, 16-34, and was allowed to rest awhile. Then in 1914, as a result of some hard pressure from the movement, it was reconsidered. Again, it was defeated, but by a very close margin, 34-35.

Meanwhile, other states added woman suffrage amendments to their constitutions, including Colorado in 1893 and Utah and Idaho in 1896.

During World War I many men went overseas, leaving a great many home industries in the hands of women. This helped change people's image of women, and the durable Anthony Amendment finally became law in 1919.

The statements below are given in incorrect sequence. Number them to show the sequence as it should be.

____ Anthony Amendment passed.

____ First national women's suffrage meeting held in Worcester, Massachusetts.

____ Anthony Amendment introduced by Congressman Aaron Sargent.

____ Wyoming became the first state in which women could vote.

____ *Declaration of Principles* adopted.

____ Colorado adopted suffrage amendment.

____ Members split over tactics.

Noting Correct Sequence

Order of Events

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___ Colorado adopted suffrage amendment.

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activity 20, key

Noting Correct Sequence

Clue Words

In each of the sentences below, two events take place. In some sentences, you will note that the events take place at the same time; in others, one event happens before the other. Read each sentence carefully. Then draw a circle around the clue word that indicates the order in which the events happen. If the events take place at different times, draw a line under the event that happens first.

1. After Ingrid opened the oven door, the cake fell.
2. Jeremy let the paint dry on the canvas before he applied the finishing touches to his picture.
3. Mamie embarrassed her parents by yawning and fidgeting as they listened to the fascinating lecture on gardening.
4. Until you removed that ghastly mask, I had absolutely no idea who or what you were.
5. Francis washed the dog while his best friend cheerfully cleaned out the doghouse.
6. Marion and Chester decided to get married before Chester found out that his firm had transferred him to Japan.
7. We waited patiently until Walter opened our oddly shaped package and got the surprise of his life.
8. Abraham Lincoln was fatally shot while he attended a theater performance with his wife.
9. The kitten mewed piteously until it occured to Ellen to give it a dish of warm milk.
10. Alice felt a huge sneeze coming on just as she stood up to sing her solo in the talent show.
11. After Sid said he had bad news to tell me, my heart began to pound in fearful anticipation of what it might be.
12. Hal went to the movies after he grudgingly cleared every last article of clothing off his bedroom floor.
13. Before I went ahead and lost my temper completely, I took your advice and slowly counted up to ten.
14. As the sun slowly sank behind the mountains, a nightingale piped a peaceful song into the still evening air.
15. An unexpected gust of wind hit the sail and nearly tipped the boat over before Wilma was able to grab the tiller.
16. Willard and Helena danced a jaunty polka while the rest of us stood around and cheered them on.
17. Mrs. Wigglesworth remained bound and gagged until the mail carrier peered through the window and came to her rescue.
18. Ruth made an appointment to see her counselor after she decided to change her schedule of courses.
19. Minutes before the show went on the air, the contestants sat nervously under the hot lights and mopped their brows.
20. Alex shouted insults at his sister in the next room until he remembered she was wearing earplugs.
21. The children alternately argued and played on the long car trip until they reached their grandmother's house.
22. Lucy was a dedicated ballet student before she decided to study law.

Noting Correct Sequence

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1. (After) Ingrid opened the oven door, the cake fell.
2. Jeremy let the paint dry on the canvas (before) he applied the finishing touches to his picture.
3. Mamie embarrassed her parents by yawning and fidgeting (as) they listened to the fascinating lecture on gardening.
4. (Until) you removed that ghastly mask, I had absolutely no idea who or what you were.
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Note: Accept any minor variations in the underlining.

Noting Correct Sequence

Order of Events

As you read the article below, think about the order in which events happen. Beneath the article, arranged in incorrect sequence, are some of the things told about in the article. Write **1** before the first thing that happened, **2** before the second, and so on. Try to do this without looking back at the article.

The Montgolfier Brothers' Balloons

According to history, the first balloon flight made with passengers can be credited to Joseph and Jacques Montgolfier of France. These brothers became interested in the idea of human flight when they observed and puzzled over the fact that when smoke rises, it tends to float in the air. Intrigued by this notion, they experimented with paper bags. When filled with smoke, the bags became airborne.

In 1783, the Montgolfiers devised a more complicated bag, thirty-five feet in diameter, made of cloth, and again filled with smoke. This experiment led them to the theory that smoke was able to lift balloons because it contained heated air.

Next, the brothers added a charcoal burner to their balloon design. It sat on a platform beneath the balloon and produced the necessary hot air. Three months later, they proudly sent up the first balloon ever to carry living creatures. With the king of France witnessing the event, a sheep, a rooster, and a duck sailed aloft in a basket attached beneath the balloon. They landed unharmed and in good spirits after an unheard-of flight of eight full minutes.

This success led at once to a plan to substitute a human being for the previous cargo of livestock. The king suggested using a criminal who had been sentenced to death (just in case the attempt failed) but later, his court historian volunteered his services. If the venture was successful, he explained, the human guinea pig ought to be someone far more worthy of the honor and prestige that was sure to follow the event.

A month later, preparations had been completed for this flight. Rozier, a fearless court historian, ascended to the height of eighty feet for about five minutes in a balloon that was tethered to the ground to prevent an excessive leap in altitude. Later that year, he and a friend made a daring untethered ascent, this time reaching a height of 300 feet while floating over the city of Paris for a full twenty-five minutes.

The following year, 1784, marked a climax in the Montgolfier brothers' aerial efforts. An enormous hot-air balloon carrying seven passengers soared 3,000 feet over the city of Lyons, proving conclusively to the amazed citizens below that air travel had indeed become a reality.

____ Plans were made for a human ascent.
____ They made a smoke-filled cloth balloon.
____ The king suggested using a criminal.
____ They discovered the heated air theory.
____ Rozier and a friend ascended 300 feet.
____ Seven people made a 3,000 foot ascent.
____ Rozier made his historic flight.
____ They experimented with paper bags.
____ Living creatures made an ascent.
____ The brothers added a charcoal burner.

Noting Correct Sequence

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This success led at once to a plan to substitute a human being for the previous cargo of livestock. The king suggested using a criminal who had been sentenced to death (just in case the attempt failed) but later, his court historian volunteered his services. If the venture was successful, he explained, the human guinea pig ought to be someone far more worthy of the honor and prestige that was sure to follow the event.

A month later, preparations had been completed for this flight. Rozier, a fearless court historian, ascended to the height of eighty feet for about five minutes in a balloon that was tethered to the ground to prevent an excessive leap in altitude. Later that year, he and a friend made a daring untethered ascent, this time reaching a height of 300 feet while floating over the city of Paris for a full twenty-five minutes.

The following year, 1784, marked a climax in the Montgolfier brothers' aerial efforts. An enormous hot-air balloon carrying seven passengers soared 3,000 feet over the city of Lyons, proving conclusively to the amazed citizens below that air travel had indeed become a reality.

6 Plans were made for a human ascent.
2 They made a smoke-filled cloth balloon.
7 The king suggested using a criminal.
3 They discovered the heated air theory.
9 Rozier and a friend ascended 300 feet.
10 Seven people made a 3,000 foot ascent.
8 Rozier made his historic flight.
1 They experimented with paper bags.
5 Living creatures made an ascent.
4 The brothers added a charcoal burner.

Noting Correct Sequence

Clue Words

In each of the sentences below, two events take place. In some sentences, you will note that the events take place at the same time; in others, one event happens before the other. Read each sentence carefully. Then draw a circle around the clue word that indicates the order in which the events happen. If the events take place at different times, draw a line under the event that happens first. The first one has been done for you:

1. Long (before) my sleepy self was ready to leave my bed, the bitter winter air jolted me awake.
2. As Edwina gave the signal from across the room, the school band started to play "Happy Birthday."
3. After months of staring at the painting in my living room, I noticed that there was a famous signature in the corner.
4. You and I were much better off before we foolishly made the decision to hike up the rocky side of the tallest mountain in the state.
5. While I had to stay in the hospital, my friends came to visit me, bringing words of encouragement, books, flowers, and many amusing gifts.
6. After I looked out of the window, I knew there was entirely too much snow for me to be able to go to school.
7. We were able to continue the discussion much more courteously after we had a nice hot cup of tea.
8. I will phone Emily and ask her to take care of the cats; then we can leave on our trip to the city.
9. After we mow the grass and trim the hedge, we can relax and enjoy the aroma of spring in the air.
10. Before the traffic was able to move smoothly again, all of the wrecked cars had to be towed to the garage.
11. The hammering continued for hours into the night until one angry head peered out a window and screamed, "Stop that infernal noise!"
12. After the huge ship poked out of the harbor, the friends and relatives left on shore sadly pulled themselves together and went home.
13. After the American colonies overthrew Great Britain's rule, the revolutionary fever spread quickly through much of Europe and Asia.
14. My poor geranium plant never recovered after I carelessly forgot to water it for a week.
15. Until Alice became an overnight success, she was only another hopeful, struggling starlet.
16. After Marjorie gently twisted and prodded the key to open the lock, she gave up, turned the key violently, and winced as half of it broke off in her hands.
17. Before the pioneer work of Dr. Joseph Lister became known, sterilized, antiseptic operating equipment was not considered important.
18. The female wolf digs a small cave with a very narrow opening before she gives birth to her pups.
19. Before the two men faced each other in the early morning duel, they selected the weapons they would use.

Noting Correct Sequence

Clue Words

In each of the sentences below, two events take place. In some sentences, you will note that the events take place at the same time; in others, one event happens before the other. Read each sentence carefully. Then draw a circle around the clue word that indicates the order in which the events happen. If the events take place at different times, draw a line under the event that happens first. The first one has been done for you.

1. Long (before) my sleepy self was ready to leave my bed, the bitter winter air jolted me awake.
2. (As) Edwina gave the signal from across the room, the school band started to play "Happy Birthday."
3. (After) months of staring at the painting in my living room, I noticed that there was a famous signature in the corner.
4. You and I were much better off (before) we foolishly made the decision to hike up the rocky side of the tallest mountain in the state.
5. (While) I had to stay in the hospital, my friends came to visit me, bringing words of encouragement, books, flowers, and many amusing gifts.
6. (After) I looked out of the window, I knew there was entirely too much snow for me to be able to go to school.
7. We were able to continue the discussion much more courteously (after) we had a nice hot cup of tea.
8. I will phone Emily and ask her to take care of the cats; (then) we can leave on our trip to the city.
9. (After) we mow the grass and trim the hedge, we can relax and enjoy the aroma of spring in the air.
10. (Before) the traffic was able to move smoothly again, all of the wrecked cars had to be towed to the garage.
11. The hammering continued for hours into the night (until) one angry head peered out a window and screamed, "Stop that infernal noise!"
12. (After) the huge ship poked out of the harbor, the friends and relatives left on shore sadly pulled themselves together and went home.
13. (After) the American colonies overthrew Great Britain's rule, the revolutionary fever spread quickly through much of Europe and Asia.
14. My poor geranium plant never recovered (after) I carelessly forgot to water it for a week.
15. (Until) Alice became an overnight success, she was only another hopeful, struggling starlet.
16. (After) Marjorie gently twisted and prodded the key to open the lock, she gave up, turned the key violently, and winced as half of it broke off in her hands.
17. (Before) the pioneer work of Dr. Joseph Lister became known, sterilized, antiseptic operating equipment was not considered important.
18. The female wolf digs a small cave with a very narrow opening (before) she gives birth to her pups.
19. (Before) the two men faced each other in the early morning duel, they selected the weapons they would use.

Note: Accept any minor variations in the considerations.

SELECTING INFORMATION ACTIVITIES

SELECTING INFORMATION ACTIVITIES OVERVIEW

This section of curriculum materials is composed of Activities numbered twenty-four through twenty-eight. Each activity is accompanied by an answer key. Skills are stressed in this section that will foster the ability to select and eliminate details that are in keeping with a given topic.

OBJECTIVE FOR THE SECTION

Students will demonstrate the ability to select factual information associated with given topics. Students will complete the activities with 90% accuracy.

SUGGESTED USES

1. Activities 24-26 are in the easy to moderate difficulty range. They should be used for those students who need practice with selecting information skills that have been previously introduced.
2. Activities 26-28 are more difficult and should be used by those students who need to be challenged in their uses of selecting information skills.

Things can be grouped according to the qualities they share.

Read through the list of money-making activities. Then list each job under the proper classification on each of the three charts below. Two have been done for you.

sweep the sidewalk of a business area
make and sell bottle-cap doormats
collect and sell night crawlers as fish bait
get rid of gophers from gardens
trim shrubs
supervise children on playground
make and sell hot pads
clean oil spots off garage floors

Perform a Service	**Sell a Product**

Primarily Indoor Jobs	**Primarily Outdoor Jobs**

Know How to Do It Now	**Need to Learn How to Do It**

Now choose a money-making activity that you like. Write the name of this activity below. List any equipment and supplies that would be needed. (Equipment includes tools that can be used again, such as a hammer. Supplies are used up as you make things or perform services.)

Money-making activity: _____

Equipment needed: _____

Supplies needed: _____

Things can be grouped according to the qualities they share.

Read through the list of money-making activities. Then list each job under the proper classification on each of the three charts below. Two have been done for you. **Answers may vary.**

sweep the sidewalk of a business area
make and sell bottle-cap doormats
collect and sell night crawlers as fish bait
get rid of gophers from gardens
trim shrubs
supervise children on playground
make and sell hot pads
clean oil spots off garage floors

Perform a Service	**Sell a Product**
sweep the sidewalk of a business area	make and sell hot pads
trim shrubs	collect and sell night crawlers as fish bait
get rid of gophers from gardens	make and sell bottle-cap doormats
clean oil spots off garage floors	
supervise children on playground	

Primarily Indoor Jobs	**Primarily Outdoor Jobs**
clean oil spots off garage floors	sweep the sidewalk of a business area
make and sell hot pads	trim shrubs
make and sell bottle-cap doormats	get rid of gophers from gardens
	supervise children on playground
	collect and sell night crawlers as fish bait

Know How to Do It Now	**Need to Learn How to Do It**
(Answers will vary.)	(Answers will vary.)

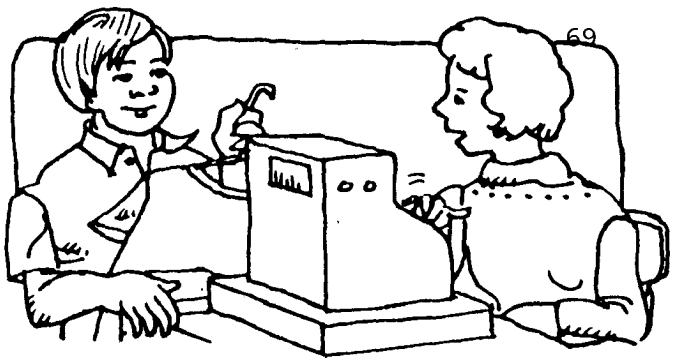
Now choose a money-making activity that you like. Write the name of this activity below. List any equipment and supplies that would be needed. (Equipment includes tools that can be used again, such as a hammer. Supplies are used up as you make things or perform services.)

Money-making activity: (Answers will vary.)

Equipment needed: (Answers will vary.)

Supplies needed: (Answers will vary.)

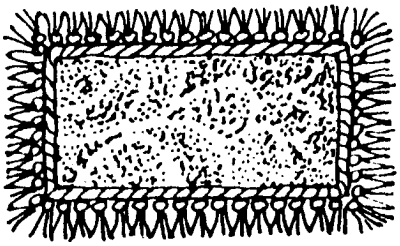
Choosing Information



Circle T (true), F (false), or NEI (not enough information).

Mark bought the following items at the department store: a cassette tape for $6.99, a book for $\frac{1}{3}$ the price of the tape, a pen for $1.89 less than the book, and a T-shirt for over $5.00. There was no tax.

1. The book and pen cost more than the cassette tape. T F NEI
2. The T-shirt cost at least $2.68 more than the book. T F NEI
3. The T-shirt cost $3.00 more than the book. T F NEI
4. The bill was more than $14.76. T F NEI



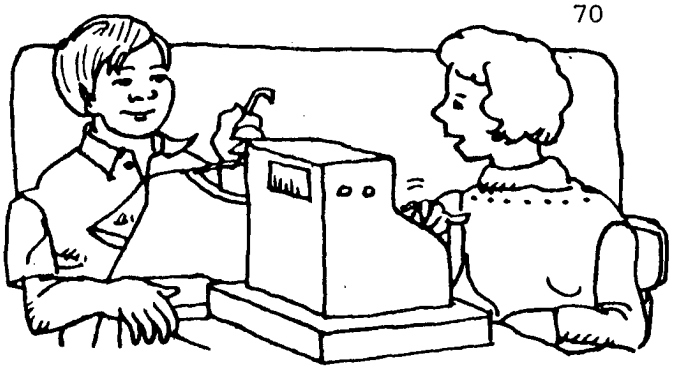
Sue has 4.2 m of green yarn. She has 0.36 m less red yarn than green yarn. The amount of yellow yarn she has is 1.009 m more than the amount of green yarn. She plans to use half the yarn to finish a rug.

5. Sue has 5.569 m of yarn all together. T F NEI
6. Sue plans to use 7.1 m of the yarn to finish the rug. T F NEI
7. Sue has 1.369 m more yellow yarn than red yarn. T F NEI
8. Sue will have 2.1 m of green yarn left after finishing the rug. T F NEI

Karen has $2.25 in quarters, $0.85 in nickels, $3.80 in dimes, and the same number of pennies as nickels.

9. Karen has 19 pennies. T F NEI
10. Karen has $6.90 all together. T F NEI
11. Karen has 81 coins. T F NEI
12. If Karen spends $1.00 she will have 5 quarters left. T F NEI

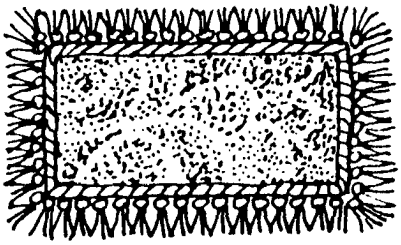
Choosing Information



Circle T (true), F (false), or NEI (not enough information).

Mark bought the following items at the department store: a cassette tape for $6.99, a book for $\frac{1}{3}$ the price of the tape, a pen for $1.89 less than the book, and a T-shirt for over $5.00. There was no tax.

1. The book and pen cost more than the cassette tape.	T	(F)	NEI
2. The T-shirt cost at least $2.68 more than the book.	(T)	F	NEI
3. The T-shirt cost $3.00 more than the book.	T	F	(NEI)
4. The bill was more than $14.76.	(T)	F	NEI



Sue has 4.2 m of green yarn. She has 0.36 m less red yarn than green yarn. The amount of yellow yarn she has is 1.009 m more than the amount of green yarn. She plans to use half the yarn to finish a rug.

5. Sue has 5.569 m of yarn all together.	T	(F)	NEI
6. Sue plans to use 7.1 m of the yarn to finish the rug.	T	(F)	NEI
7. Sue has 1.369 m more yellow yarn than red yarn.	(T)	F	NEI
8. Sue will have 2.1 m of green yarn left after finishing the rug.	T	F	(NEI)

Karen has $2.25 in quarters, $0.85 in nickels, $3.80 in dimes, and the same number of pennies as nickels.

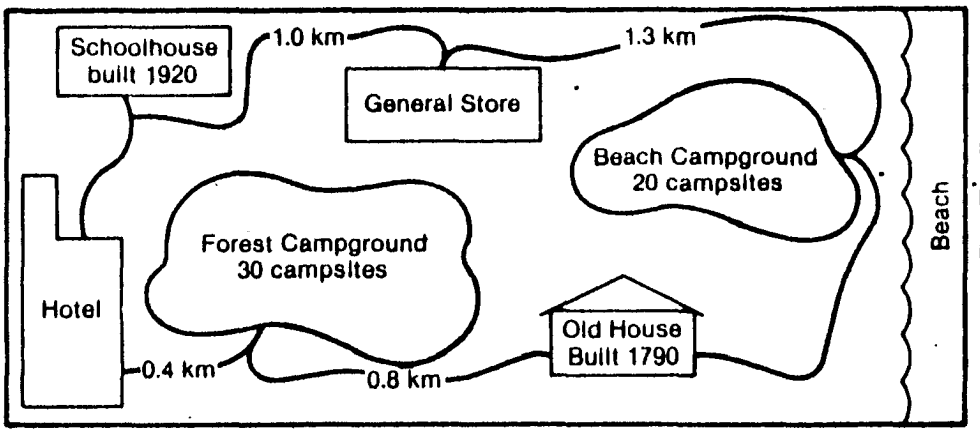
9. Karen has 19 pennies.	T	(F)	NEI
10. Karen has $6.90 all together.	T	(F)	NEI
11. Karen has 81 coins.	(T)	F	NEI
12. If Karen spends $1.00 she will have 5 quarters left.	T	F	(NEI)

When you solve word problems, sometimes there are too many facts, and sometimes there are not enough facts.

Use this map and information to solve the problems. If there is not enough information, tell which facts you need.

1 Understand
2 Plan
3 Work
4 Answer

Scenic Area



Hotel: $24.00 double room; $18.00 single room — per night
Beach Campground: $4.00 per campsite per day
Forest Campground: $3.50 per campsite per day

1. How much does a double room in the Hotel cost for 2 nights? _____
2. If 27 rooms are taken, how many vacant rooms does the Hotel have? _____
3. How many more campsites does the Forest Campground have than the Beach Campground? _____
4. How much would you save if you spent 3 nights at the Forest Campground rather than the Beach Campground? _____
5. For 1 night, how much more does a single room at the Hotel cost than a campsite at the Forest Campground? _____
6. How many years passed between the time the Old House was built and the time the Schoolhouse was built? _____
7. How far is it from the Beach Campground to the Schoolhouse? _____
8. How far is it from the Hotel to the General Store by the shortest way? _____
9. How much closer to the Old House is the Beach Campground than the Forest Campground? _____
10. How much closer is the General Store to the Schoolhouse than to the Beach Campground? _____

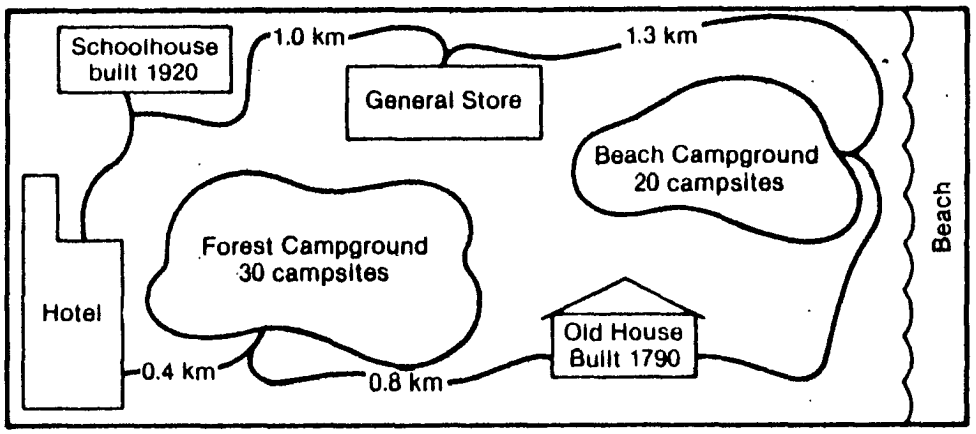
When you solve word problems, sometimes there are too many facts, and sometimes there are not enough facts.

Use this map and information to solve the problems. If there is not enough information, tell which facts you need.

1 Understand
2 Plan
3 Work
4 Answer

72

Scenic Area



Hotel: $24.00 double room; $18.00 single room — per night
Beach Campground: $4.00 per campsite per day
Forest Campground: $3.50 per campsite per day

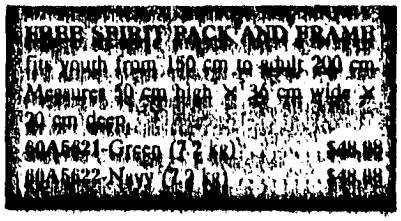
1. How much does a double room in the Hotel cost for 2 nights? $48.00
2. If 27 rooms are taken, how many vacant rooms does the Hotel have? Need total number of hotel rooms
3. How many more campsites does the Forest Campground have than the Beach Campground? 10 more campsites
4. How much would you save if you spent 3 nights at the Forest Campground rather than the Beach Campground? $1.50
5. For 1 night, how much more does a single room at the Hotel cost than a campsite at the Forest Campground? $14.50
6. How many years passed between the time the Old House was built and the time the Schoolhouse was built? 130 years
7. How far is it from the Beach Campground to the Schoolhouse? 2.3 km
8. How far is it from the Hotel to the General Store by the shortest way? Need to know distance from Hotel to Schoolhouse
9. How much closer to the Old House is the Beach Campground than the Forest Campground? Need to know distance from Old House to campground
10. How much closer is the General Store to the Schoolhouse than to the Beach Campground? 0.3 km

Problem Solving · CHOOSING INFORMATION

Paul Novak works at The Sports Place. A customer asks him, *What is the sale price for this pack? The tag is missing.*

Backpacks are on sale for $5 less than the regular price. He needs to find the sale price of the green pack.

Paul often uses a catalog to find information. The catalog has more information than he needs.



First Paul finds the regular price. Then he subtracts $5 to find the sale price.

Catalog Price:	$48.98
$5 Off	− 5.00
Sale Price:	$43.98

Use the catalog description to answer the question. If there is not enough information, write *Missing Fact.*

1. What is the catalog number for the green pack?
2. How much longer will the packs be on sale?
3. How high is the Free Spirit pack and frame?
4. What is the tax on the Free Spirit pack and frame?
5. Will the Free Spirit pack and frame fit a person 180 cm tall?
6. When the pack is empty, will the Free Spirit pack and frame be less than 10 kg?

Problem Solving • CHOOSING INFORMATION

Paul Novak works at The Sports Place. A customer asks him, *What is the sale price for this pack? The tag is missing.*

Backpacks are on sale for $5 less than the regular price. He needs to find the sale price of the green pack.

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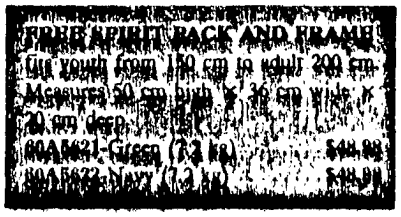

First Paul finds the regular price. Then he subtracts $5 to find the sale price.

Catalog Price: $48.98
$5 Off − 5.00
Sale Price: $43.98

Use the catalog description to answer the question. If there is not enough information, write *Missing Fact*.

1. What is the catalog number for the green pack? 60A5621
2. How much longer will the packs be on sale? Missing Fact
3. How high is the Free Spirit pack and frame? 50 cm
4. What is the tax on the Free Spirit pack and frame? Missing Fact
5. Will the Free Spirit pack and frame fit a person 180 cm tall? Yes
6. When the pack is empty, will the Free Spirit pack and frame be less than 10 kg? Yes

4-PIECE RAFT OUTFIT includes raft, 2 oars, pump.
60A53470 . . . . . only **$44.99**

INFLATABLE RAFT can hold up to 140 kg. Wood-grain look.
60A53472A — (48 kg) **$19.99**

FOOT PUMP has 120-cm hose.
60A53473 — (7.5 kg) **$14.99**

PAIR RAFT OARS for small inflatable boats. 110-cm aluminum shaft.
60A53471 — (5.2 kg) pr. **$12.99**

Solve. If there is not enough information, describe the facts you need in order to solve the problem.

6. There is a sales tax of $2.25 on the raft outfit. How much must a customer pay in all to buy the raft outfit?

7. How much does it cost to buy the raft, pump, and two oars separately instead of buying the outfit?

8. How much can you save by buying the raft outfit instead of buying the 4 pieces separately?

9. The Sports Place will put the raft outfit on sale in October. How much can you save by buying the raft outfit at the sale price?

10. The raft outfit is sometimes packaged for shipping in a 1.2 kg box. What is the total mass of the raft outfit and box?

11. How much will it cost to ship the raft outfit to Helena, Montana?

Three friends, Carlo, Jan, and Kim, decide to buy the raft outfit together.

12. Carlo can pay $18 and Kim can pay $13.50. Jan says she will pay the rest. How much will Jan pay? How much change will she receive from a $20-bill?

13. Carlo, Jan and Kim want to know how many of them can go out in the raft at the same time. Will the raft hold all three friends? Which of the friends may safely go out in the raft together?
Carlo: 67 kg Jan: 79 kg Kim: 56 kg

4-PIECE RAFT OUTFIT includes raft, 2 oars, pump.
60A53470 . . . . . only **$44.99**

INFLATABLE RAFT can hold up to 140 kg. Wood-grain look.
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60A53473 — (7.5 kg) **$14.99**

PAIR RAFT OARS for small inflatable boats. 110-cm aluminum shaft.
60A53471 — (5.2 kg) pr. **$12.99**

Solve. If there is not enough information, describe the facts you need in order to solve the problem.

6. There is a sales tax of $2.25 on the raft outfit. How much must a customer pay in all to buy the raft outfit? $ 47.24

7. How much does it cost to buy the raft, pump, and two oars separately instead of buying the outfit? $ 47.97 without the sales tax

8. How much can you save by buying the raft outfit instead of buying the 4 pieces separately? $ 2.98

9. The Sports Place will put the raft outfit on sale in October. How much can you save by buying the raft outfit at the sale price?
Need sale price of the outfit

10. The raft outfit is sometimes packaged for shipping in a 1.2 kg box. What is the total mass of the raft outfit and box? 61.9 kg

11. How much will it cost to ship the raft outfit to Helena, Montana?
Need cost per kilogram to ship raft

Three friends, Carlo, Jan, and Kim, decide to buy the raft outfit together.

12. Carlo can pay $18 and Kim can pay $13.50. Jan says she will pay the rest. How much will Jan pay? How much change will she receive from a $20-bill? $ 13.49 ; $ 6.51

13. Carlo, Jan and Kim want to know how many of them can go out in the raft at the same time. Will the raft hold all three friends? Which of the friends may safely go out in the raft together?
Carlo: 67 kg Jan: 79 kg Kim: 56 kg
No ; Carlo and Kim ; Jan and Kim

SELECTING DETAILS ACTIVITIES

SELECTING DETAILS ACTIVITIES OVERVIEW

This section of curriculum materials is composed of Activites numbered twenty-nine through forty-four. Each activity is accompanied by an answer key. Skills stressed in this section will assist the student to combine sequencing and information selection activities. This will be accomplished through the use of outlining.

OBJECTIVE FOR THE SECTION

Students will demonstrate the ability to select appropriate details and list them in sequencial order through the use of an outline. Students will complete the activities with 90% accuracy.

SUGGESTED USES

1. Activities 29-33 deal with the selection of major divisions (Roman numerals) and major division within the Roman numeral sections (capital letters).
2. Activities 34-43 provide practice in extending outlining to include details listed under Arabic numerals.
3. Activity 44 challenges the student to construct an entire outline from a given article without any assistance.

Make a concise outline of the material in the paragraphs below. Do not try to include all the material in the outline.

Maurice Herzog led a French team of eight mountain climbers to Annapurna I in 1950. Their goal was to climb a mountain over 8,000 meters high. No one had ever climbed to the top of such a peak before. Permission to climb Annapurna I came from the Maharajah of Nepal in 1949. The French government helped finance the climb, and the rest of the money was raised by mountaineering organizations. Supplies and equipment came from the French army and from special manufacturers.

After the climbers arrived in Nepal, finding their way to the base of Annapurna I was no easy matter. The few available maps were inaccurate. Nepalese people who lived in the valleys knew little about the peaks. After hacking their way through the jungle, the members of the expedition climbed up and down mountain passes. They hiked around lakes and cautiously crossed swollen river gorges.

Finally reaching the base of Annapurna I, the climbers began looking for ways to make the ascent. The mountain rose over three vertical kilometers above them. Steep ridges were covered with snow and ice. The southern, eastern, and western sides looked impossible to climb. All that remained was the mountain's northwest flank. For many days the climbers and porters moved food and equipment up the mountain to a chain of higher camps where the climbers would live before their assault on the summit.

I. Maurice Herzog led a French team of climbers to Annapurna I in 1950.

A. _____

B. _____

C. _____

II. The team had difficulty reaching the base of the mountain.

A. _____

B. _____

C. _____

III. Once at the base of the mountain, the climbers planned the ascent.

A. _____

B. _____

C. _____

Make a concise outline of the material in the paragraphs below. Do not try to include all the material in the outline. **Answers may vary.**

Maurice Herzog led a French team of eight mountain climbers to Annapurna I in 1950. Their goal was to climb a mountain over 8,000 meters high. No one had ever climbed to the top of such a peak before. Permission to climb Annapurna I came from the Maharajah of Nepal in 1949. The French government helped finance the climb, and the rest of the money was raised by mountaineering organizations. Supplies and equipment came from the French army and from special manufacturers.

After the climbers arrived in Nepal, finding their way to the base of Annapurna I was no easy matter. The few available maps were inaccurate. Nepalese people who lived in the valleys knew little about the peaks. After hacking their way through the jungle, the members of the expedition climbed up and down mountain passes. They hiked around lakes and cautiously crossed swollen river gorges.

Finally reaching the base of Annapurna I, the climbers began looking for ways to make the ascent. The mountain rose over three vertical kilometers above them. Steep ridges were covered with snow and ice. The southern, eastern, and western sides looked impossible to climb. All that remained was the mountain's northwest flank. For many days the climbers and porters moved food and equipment up the mountain to a chain of higher camps where the climbers would live before their assault on the summit.

I. Maurice Herzog led a French team of climbers to Annapurna I in 1950.

A. **They wanted to be the first to climb a peak over 8,000 meters high.**

B. **In 1949 the Maharajah of Nepal gave them permission to climb Annapurna.**

C. **Money came from several sources.**

II. The team had difficulty reaching the base of the mountain.

A. **Area maps were inaccurate.**

B. **Valley residents knew little about the mountains.**

C. **The hike to the base was long and arduous.**

III. Once at the base of the mountain, the climbers planned the ascent.

A. **They saw steep ridges covered with ice.**

B. **The northwest flank seemed the only route.**

C. **Food and equipment were moved to camps higher up on the mountain.**

Organize the information below and complete the three-level outline.

A good attendant in a full-service station must be capable of the physical, mental, and personality requirements of the job.

To be physically able for the job, the attendant must be strong enough to lift wheels, tires, and other heavy automobile parts. The attendent must have the energy to work quickly during busy days.

Certain mental abilities are also important for a service station attendant. Listening and attentiveness are important. For instance, if a customer asks for only five gallons of gasoline, the attendant must not fill up the tank.

Other mental requirements of the job include math skills and mechanical aptitude. The attendant must figure and total charges and make change. An understanding of the mechanical workings of automobiles is helpful to the attendant in doing repair work.

The attendant's personality is also important in pleasing customers. An attendant's friendly attitude may be the reason a customer chooses one station instead of another. An attendant's ability to remain pleasant when dealing with conflicts is helpful. Also, when the time allows, an attendant's willingness to do extra service work, such as adding air to tires or pointing out needed repairs, will please the customer.

The job of a service station attendant can lead to opportunities for advancement. Many service station attendants become certified mechanics. Some go into related jobs, such as tank truck driving. Some young attendants may eventually manage or buy a station.

I. General requirements for service station attendant
   A. Physical abilities
      1. Strength to lift heavy objects
      2. Energy to work quickly

   B. _____

      1. _____

      2. _____

      3. _____

   C. _____

      1. _____

      2. _____

      3. _____

II. Opportunities for advancement

   A. _____

   B. _____

   C. _____

Organize the information below and complete the three-level outline. **Answers may vary.**

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I. General requirements for service station attendant
   A. Physical abilities
      1. Strength to lift heavy objects
      2. Energy to work quickly
   B. **Mental abilities**
      1. **Listening and attentiveness**
      2. **Math skills**
      3. **Mechanical aptitude**
   C. **Personality traits**
      1. **Friendly attitude**
      2. **Ability to remain calm**
      3. **Willingness to do extra work**

II. Opportunities for advancement
   A. **Certified mechanic**
   B. **Related jobs**
   C. **Manage or own station**

Choosing Main Topics and Subtopics for an Outline

Read the article below and decide what its main topics and subtopics are. Then complete the outline at the right of the page by using the items listed at the bottom of the page.

Kinds of Cartoons

When you come across a cartoon in a newspaper or a magazine, do you know what basic type it is? Even though artists develop their own highly personal style of expression, they do recognize certain forms and types of cartoons, which you, too, should be able to identify.

One such type is the editorial cartoon. Instead of writing his or her opinion about an issue, the cartoonist tries to influence your opinions through pictures. One way this is done is by making a single drawing that illustrates a newsworthy event. This can appear with or without a caption or title. Another way to deal with editorial issues is to make a caricature. Here, an exaggerated picture of a well-known person is drawn in order to make that person seem slightly ridiculous.

A second kind of cartoon is the comic strip. Often, an artist develops a continuing adventure story that unfolds day after day in a magazine or newspaper. Other comic strips have an unchanging list of characters that appear regularly in different humorous situations each day.

Gag cartoons are another form of pictorial humor. Using a single panel, the cartoonist comes up with a one-line caption to show what the character in the panel is saying. Sometimes, however, no captions are used. Instead, the artist makes a series of pantomime panels. These show the cartoon characters behaving in a way that requires no words to make them seem humorous or entertaining. Both types of gag cartoons appear on a one-time basis, not as a continuing daily feature in a newspaper or magazine.

Kinds of Cartoons

I. Editorial cartoon

A. _____

B. _____

II. _____

A. _____

B. Humorous situations

III. _____

A. _____

B. _____

Comic strip	Editorial cartoon	Caricature
Pantomime panels	Continuing adventure story	Humorous situations
Gag cartoon	Single panel	Single news-event drawing

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Kinds of Cartoons

I. Editorial cartoon
   - A. Single news-event drawing
   - B. Caricature

II. Comic strip
   - A. Continuing adventure story
   - B. Humorous situations

III. Gag cartoon
   - A. Single panel
   - B. Pantomime panels

Comic strip	Editorial cartoon	Caricature
Pantomime panels	Continuing adventure story	Humorous situations
Gag cartoon	Single panel	Single news-event drawing

Choosing Main Topics, Subtopics, and Details for an Outline

Read the following article and think about a title for it and its main topics and subtopics. Then complete the outline at the right by using the items listed at the bottom of the page.

When an animal is being attacked by an enemy, there are various ways in which it can defend itself. Many animals use the defense of fighting the attacker. These animals may be equipped with special weapons such as claws, sharp teeth, tusks, antlers, or beaks, which they use in attacking their predators. Other animals that fight attackers, like the boa constrictor and some other large snakes, have long, muscular bodies that coil tightly around the enemy to cut off its air supply. Still other fighting animals have chemical weapons such as those used by insects, snakes, and the familiar skunk.

Other animals use the defense of having some sort of protective outside covering to hide within. Turtles and clams have shells into which they can withdraw, and the armadillo has an armorlike skin that covers its vulnerable parts when it curls up into a ball. The porcupine has sharp quills as its protection from predators.

Attempting to escape from the enemy is a defense used by many animals under attack. The antelope, horse, deer, and ostrich find that running away is their best defense, because they can usually outrun their predators in both speed and distance. Others, particularly smaller animals, find that their best defense is fleeing to a protected spot, such as a hole in the ground or dense foliage, where the enemy cannot pursue them.

Another defense is playing dead. The opossum is famous for this trick. Often the predator loses interest if it thinks the intended prey is already dead.

One last method of defense is doing nothing at all. If the animal stays very still, it may blend into the background and hence go undetected. Many birds, deer, and toads fall into this last category.

_____

I. _____

A. _____

B. _____

C. _____

II. _____

A. _____

B. _____

C. _____

III. _____

A. _____

B. _____

IV. _____

V. _____

Sharp quills
Running away
Staying still
Long muscular bodies
Animal defenses
Chemical weapons
Attempting to escape
Armorlike skin
Fighting the attacker
Shells
Special weapons such as claws
Fleeing to protected spot
Having protective outside covering
Playing dead

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Animal Defenses

I. Fighting the attacker
   - A. Special weapons such as claws
   - B. Long muscular bodies
   - C. Chemical weapons

II. Having protective outside covering
   - A. Shells
   - B. Armorlike skin
   - C. Sharp quills

III. Attempting to escape
   - A. Running away
   - B. Fleeing to protected spot

IV. Playing dead

V. Staying still

Sharp quills	Chemical weapons	Special weapons such as claws
Running away	Attempting to escape	Fleeing to protected spot
Staying still	Armorlike skin	Having protective outside covering
Long muscular bodies	Fighting the attacker	Playing dead
Animal defenses	Shells	

Read the following selection.

Sharp Cracks a Case

Dr. Greg Barton of Aerospace Company kept a notebook of secret papers. Many people knew that its secrets were worth lots of money if the notebook could be sold to the right people. But no one knew that Barton kept the notebook in a secret place in his desk. Yet one morning, the notebook was gone. Detective Ella B. Sharp was called in.

After being told where the notebook had been hidden, Sharp looked for clues. She noted a window next to Barton's desk. Then she noted a window in a building across the street. Sharp knew that someone could see into Barton's office from that window.

Sharp set a trap. First, she made a notebook like the missing one. Then she started a rumor. The rumor was that a fake notebook had been stolen and the real notebook was still in Barton's office.

Soon a person began watching Barton's office from the window across the street. Sharp had Barton hide the second notebook as he stood in front of the window.

As expected, the thief tried to steal the second notebook. The thief was caught. The first notebook was found in the thief's hotel room.

The following outline lists only the important points of how Sharp cracked the case. They are listed in the order of importance to the case. Fill in the missing parts of the outline.

Sharp Cracks a Case

I. Clues

A. _____

B. _____

II. Trap

A. _____

B. _____

1. _____

2. _____

C. As person watched, Barton hid _____

III. Result

A. Thief tried _____

_____

B. _____

C. _____

_____

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Sharp Cracks a Case

I. Clues
   A. Barton's desk window
   B. Window in nearby building

II. Trap
   A. Made a notebook
   B. Started a rumor
      1. fake notebook stolen
      2. real notebook in office
   C. As person watched, Barton hid the notebook while being watched

III. Result
   A. Thief tried to steal the second notebook
   B. Thief caught
   C. First notebook found in thief's room

Read the selection in the first column. Complete the outline of the selection in the second column.

Yuccas

Yuccas are strange evergreen plants. They have long, sword-like leaves. Their flowers are white or cream-colored. They grow in dry places in North America and Central America.

There are many different kinds of yuccas. One kind is the Spanish Bayonet. It is found in warm, dry places of the southwestern United States. It has one, tall stalk topped with pointed leaves.

Another kind is the Joshua Tree. It is a very tall yucca. It has many branches. It grows only in the desert. Joshua Tree National Monument in California was set up to protect this odd-looking plant.

A third type of yucca is Adam's Needle. It can grow in colder, northern places. It is low. It has almost no stalk. It is often grown in gardens.

Yuccas are useful plants. The American Indians of the Southwest used the yucca for food. They ate the flowers and fruit. The Indians also used the tough fibers (inside parts of the leaves) to make things. They boiled and pounded the leaves to get out the fibers. Then the fibers were made into rope, shoes, mats, and blankets. The underground parts of the yucca were used as soap by the Indians. These parts were pounded to a pulp. When water was added, suds formed. The mixture did a good cleaning job.

Yuccas

I. What they are

A. Evergreen plants

1. _____

2. _____

B. Grow in dry places

II. Some types

A. Spanish Bayonet

1. _____

2. Grows in warm, dry Southwest

B. _____

1. Very tall, many branches

2. _____

C. _____

1. _____

2. _____

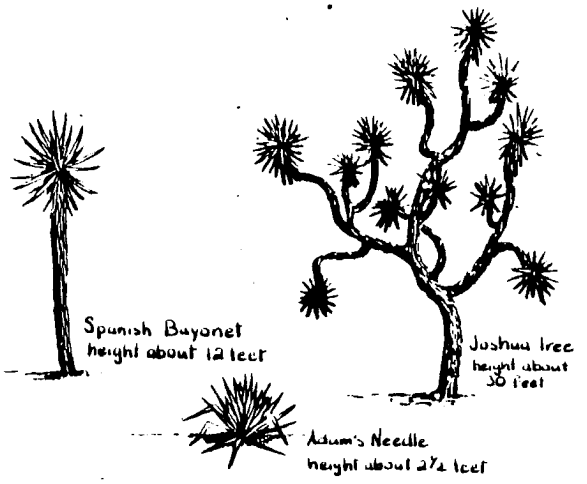
3. Often grown in gardens

III. Uses made of yuccas by Indians

A. _____

B. Things made out of fibers

C. _____



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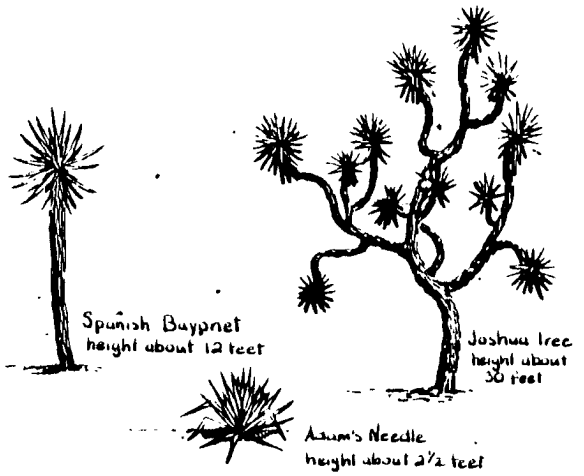
Yuccas

I. What they are
   - A. Evergreen plants
     1. Have long sword-like leaves
     2. Flowers are white
   - B. Grow in dry places

II. Some types
   - A. Spanish Bayonet
     1. One tall stalk
     2. Grows in warm, dry Southwest
   - B. Joshua Tree
     1. Very tall, many branches
     2. Grows in the desert
   - C. Adam's Needle
     1. Grows in colder places
     2. Low growing
     3. Often grown in gardens

III. Uses made of yuccas by Indians
   - A. Used for food
   - B. Things made out of fibers
   - C. Used as soap



Read the selection in the first column. Then complete the outline of the selection in the second column.

The News Story

A news story in a newspaper tells about an event that has just happened or will happen. The story has a lead and a body.

The lead tells the news. A good lead always includes the five *W*'s. These are the who, what, when, where, and why of the event.

The body of the story explains information given in the lead. Or it gives more facts about the event. Each succeeding paragraph of a news story gives information less and less important. This is so that the story can be cut off at any paragraph to make room for a more important story in the next issue.

Here are some news story leads. See if you can find the five *W*'s in each.

A family of five escaped a fire in their home Friday night because a boy, lost in the neighborhood, saw the flames.

Hot school lunches will cost 43 cents beginning in November. The eight cent hike is needed to keep the hot lunch program, said Ms. Joan Sims, principal of Crabb School.

Monday will be the last day drivers can display old city license stickers. Police will begin arresting drivers Tuesday, if their cars do not show new stickers.

The News Story

I. Tells about current events

II. Has two parts

A. _____

1. _____

2. Includes _____

a. _____

b. _____

c. _____

d. _____

e. _____

B. _____

1. _____

2. _____

3. Each paragraph less important

Note that every point made in the article has its place in the outline.

Read the selection in the first column. Then complete the outline of the selection in the second column.

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The News Story

I. Tells about current events

II. Has two parts

A. The lead
   1. Tells the news
   2. Includes the five W's
      a. who
      b. what
      c. when
      d. where
      e. why

B. The body
   1. Explains the lead
   2. Gives more facts
   3. Each paragraph less important

Note that every point made in the article has its place in the outline.

Choosing Main Topics, Subtopics, and Details for an Outline

Read the following article and decide what its main topics, subtopics, and details are. Then complete the outline at the right by using the items listed at the bottom of the page. The first main topic has been filled in for you.

The Bald Eagle

Our national bird, the bald eagle, has some very interesting habits. Its diet is quite varied since it exists on three main sources of food. It may eat carrion (dead and decaying meat), but more often it catches and eats fish. To catch fish, the eagle may use one of several techniques. It may circle in the air until it sees a fish and then dive into the water, just as an osprey does; it may wade into shallow water and spear a fish with its beak, as a heron does; or it may steal a freshly caught fish from another bird. If there are no fish available, the bald eagle may turn to waterfowl (such as ducks and geese) for its meal. Again, the technique used in catching the prey is one of several. It may simply fly down, pounce on its prey, and fly away with it; it may force a duck or other diving bird to keep diving until it becomes exhausted and is easily caught; or it may use the amazing technique of catching a goose on the wing, which means catching the goose in full flight. To do this, the eagle dives under the goose and attacks from underneath, sinking its sharp talons into the breast of the goose.

Another interesting thing about the bald eagle is that it mates for life. The pair will often use the same nest year after year. Moreover, the pair will share in the raising of their family. Both parents help to hatch the two eggs that are laid each year. After the chicks hatch, both parents continue to work together in feeding the chicks.

The Bald Eagle

I. Has varied diet
   A. _____
   B. _____
      1. _____
      2. _____
      3. _____
   C. _____
      1. _____
      2. _____
      3. _____
II. _____
   A. _____
   B. _____
      1. _____
      2. _____

Dives into water	Has varied diet	Both parents feed chicks
Pounces on prey	Both parents hatch eggs	Catches goose on the wing
Mates for life	Catches waterfowl	Uses same nest every year
Catches fish	Spears with beak	Shares in raising family
Eats carrion	Steals from other birds	Forces prey to keep diving

Choosing Main Topics, Subtopics, and Details for an Outline

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The Bald Eagle

I. Has varied diet
   - A. Eats carrion
   - B. Catches fish
     1. Dives into water
     2. Spears with beak
     3. Steals from other birds
   - C. Catches waterfowl
     1. Pounces on prey
     2. Forces prey to keep diving
     3. Catches goose on the wing

II. Mates for life
   - A. Uses same nest every year
   - B. Shares in raising family
     1. Both parents hatch eggs
     2. Both parents feed chicks

Dives into water	Has varied diet	Both parents feed chicks
Pounces on prey	Both parents hatch eggs	Catches goose on the wing
Mates for life	Catches waterfowl	Uses same nest every year
Catches fish	Spears with beak	Shares in raising family
Eats carrion	Steals from other birds	Forces prey to keep diving

Choosing Details for an Outline

When you are outlining an article, you will often want to include the details that are given about some of the subtopics. As you read the article below, decide what its main topics, subtopics, and details are. Then complete the outline at the right by using the items listed at the bottom of the page.

Whales are the largest animals the world has ever known. They are found in every major ocean, and although they resemble huge fish, they are really mammals. One important way whales differ from fish is in their body temperature. They are warm-blooded, so their temperature remains constant despite the surrounding climate. Extra protection is provided by blubber, a thick layer of fat that keeps them warm even in the coldest water. Whales also differ from fish in their manner of breathing. Equipped with lungs instead of gills, they are forced to hold their breath while underwater. When a whale's supply of fresh air runs out, it must surface to breathe; otherwise it would drown. Another difference that sets whales apart from fish is the way they treat their young. Babies are born alive and are nursed on their mother's milk until they are old enough to feed themselves.

For centuries people have hunted whales for a variety of profitable reasons. Although whale products are not as sought-after today, they are still used throughout the world. Whale oil goes into making margarine in many European countries, and it is often found in various kinds of explosives. Some laundry soaps still contain whale oil. The meat of a whale is not as widely valued as the oil, but many manufacturers use it in canned dog and cat food. Whale meat is even eaten by human beings in such countries as Norway and Japan.

I. How whales differ from fish
   - A. Body temperature
     1. _____
     2. Protected by blubber
   - B. _____
     1. _____
     2. _____
   - C. _____
     1. _____
     2. _____

II. Whale products
   - A. _____
     1. _____
     2. _____
     3. _____
   - B. _____
     1. _____
     2. _____

Margarine	Breathing	Explosives
Whale products	Warm-blooded	How whales differ from fish
Lungs instead of gills	Treatment of young	Whale meat
Protected by blubber	Whale oil	Must surface to breathe
Food for animals	Food for humans	Laundry soaps
Babies born alive	Body temperature	Young drink mother's milk

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I. How whales differ from fish
- A. Body temperature
  - 1. Warm-blooded
  - 2. Protected by blubber
- B. Breathing
  - 1. Lungs instead of gills
  - 2. Must surface to breathe
- C. Treatment of young
  - 1. Babies born alive
  - 2. Young drink mother's milk

II. Whale products
- A. Whale oil
  - 1. Margarine
  - 2. Explosives
  - 3. Laundry soaps
- B. Whale meat
  - 1. Food for animals
  - 2. Food for humans

Margarine	Breathing	Explosives
Whale products	Warm-blooded	How whales differ from fish
Lungs instead of gills	Treatment of young	Whale meat
Protected by blubber	Whale oil	Must surface to breathe
Food for animals	Food for humans	Laundry soaps
Babies born alive	Body temperature	Young drink mother's milk

Organizing Notes in Outline Form

Below are notes on the subject *Some Interesting Mammals of Australia*. Read through the notes carefully. Then try to decide which notes should be listed as main topics in an outline. Write those main topics on the lines below. Now decide which notes should be listed as subtopics. Write those subtopics on the proper lines. Lastly, read the notes again, looking for details. Write each detail under the subtopic to which it refers. The outline has been started for you.

1. Wombat and Tasmanian Devil are mammals that have pouches.
2. Wombat is able to dig holes rapidly.
3. Duckbill platypus is a good swimmer and eats worms and grubs.
4. Spiny Anteater can dig very fast.
5. Duckbill platypus and Spiny Anteater are mammals that lay eggs.
6. Wombat may live to be as much as thirty years old.
7. Tasmanian Devil is about three feet long and looks like a small bear.
8. Spiny Anteater has no teeth and eats ants and termites.
9. Wombat eats grass, roots, and the inside bark of trees.

Some Interesting Mammals of Australia

I. Mammals that have pouches

A. _____

1. _____
2. _____
3. _____

B. Tasmanian Devil

1. _____
2. _____

II. Mammals that lay eggs

A. _____

1. _____
2. _____

B. _____

1. _____
2. _____
3. Eats ants and termites

Organizing Notes in Outline Form

Below are notes on the subject *Some Interesting Mammals of Australia*. Read through the notes carefully. Then try to decide which notes should be listed as main topics in an outline. Write those main topics on the lines below. Now decide which notes should be listed as subtopics. Write those subtopics on the proper lines. Lastly, read the notes again, looking for details. Write each detail under the subtopic to which it refers. The outline has been started for you.

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Some Interesting Mammals of Australia

I. Mammals that have pouches
   A. Wombat
      1. Is able to dig holes rapidly
      2. May live to be as much as thirty years old
      3. Eats grass, roots, and the inside bark of trees
   B. Tasmanian Devil
      1. Is about three feet long
      2. Looks like a small bear
II. Mammals that lay eggs
   A. Duckbill platypus
      1. Is a good swimmer
      2. Eats worms and grubs
   B. Spiny Anteater
      1. Can dig very fast
      2. Has no teeth
      3. Eats ants and termites

Note: Accept any minor variations in wording.

Choosing Main Topics, Subtopics, and Details for an Outline

Read carefully the following group of paragraphs, which gives information about some different breeds of swine. As you read, try to decide which items you would use as main topics, subtopics, and details. Then complete the outline at the bottom of the page.

Although there are many different breeds of hogs in the United States, they can be classified into two general groups. These two groups are known as the Old Breeds and the New Breeds.

One of the best known Old Breeds of swine is the Berkshire. It originated and was developed in the Shire of Berks, England, before it was imported into this country. The Berkshire is usually black with a splash of white on its face; it is noted for its meatiness and lack of excess fat.

Another member of the Old Breeds is the Duroc. It originated in the northeastern part of the United States. The Duroc is colored either a light or a dark red, and it is especially noted for its hardiness in different climates.

New methods of crossbreeding have produced the category of hogs called the New Breeds. One of these is the American Landrace. This hog is a descendant of Danish Landrace hogs that were imported into the United States. It is noted for its body length of sixteen or seventeen pairs of ribs. The American Landrace became an officially recorded breed in the year 1950.

Another of the New Breeds is called the Maryland Number One. This breed originated from careful crossbreeding between the Landrace and the Berkshire varieties. The Maryland Number One became officially recorded in 1951.

I. _____
- A. _____
  - 1. _____
  - 2. Usually black with a splash of white on face
  - 3. _____
- B. _____
  - 1. _____
  - 2. _____
  - 3. _____

II. New Breeds
- A. _____
  - 1. _____
  - 2. _____
  - 3. _____
- B. Maryland Number One
  - 1. _____
  - 2. _____

Choosing Main Topics, Subtopics, and Details for an Outline

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Another of the New Breeds is called the Maryland Number One. This breed originated from careful crossbreeding between the Landrace and the Berkshire varieties. The Maryland Number One became officially recorded in 1951.

I. Old Breeds
   - A. Berkshire
     1. Originated and was developed in Shire of Berks
     2. Usually black with a splash of white on face
     3. Noted for its meatiness and lack of excess fat
   - B. Duroc
     1. Originated in the northeastern part of United States
     2. Colored light or dark red
     3. Noted for its hardiness in different climates

II. New Breeds
   - A. American Landrace
     1. Descendant of Danish Landrace hogs
     2. Noted for its body length
     3. Became officially recorded breed in 1950
   - B. Maryland Number One
     1. Originated from cross-breeding
     2. Became officially recorded in 1951

Note: Accept any reasonable variations in wording.

Organizing Notes in Outline Form

Below are notes on the subject *Kinds of Whales*. Read through the notes carefully. Then try to decide which notes should be listed as main topics, subtopics, and details. In the outline below, first write the main topics. Then go on to fill in the subtopics and details. The outline has been started for you.

1. Male Narwhal has spiral ivory tusk.
2. Bottle-Nosed found in North Atlantic and Antarctic; Narwhal in Arctic.
3. Two kinds of whales: without teeth (Baleen) and with teeth (Toothed).
4. Bottle-Nosed and Narwhal are toothed whales.
5. Among Baleen are Blue Whale and Gray Whale.
6. Maximum length of Bottle-Nosed is 30 feet; weight, 10 tons. Narwhal is 18 feet in length; weight, 2 tons.
7. Blue is largest animal that ever lived.
8. Blue found in all oceans; Gray only in North Pacific.
9. Maximum length of Blue is 95–100 feet; weight, 150 tons. Gray is 50 feet in length; weight, 40 tons.

Kinds of Whales

I. Without teeth (Baleen)
   - A. _____
     1. _____
     2. _____
     3. Maximum length is 95 - 100 feet
     4. _____
   - B. Gray Whale
     1. _____
     2. _____
     3. _____

II. _____
   - A. _____
     1. _____
     2. _____
     3. _____
   - B. Narwhal
     1. _____
     2. _____
     3. _____
     4. _____

Organizing Notes in Outline Form

Below are notes on the subject *Kinds of Whales*. Read through the notes carefully. Then try to decide which notes should be listed as main topics, subtopics, and details. In the outline below, first write the main topics. Then go on to fill in the subtopics and details. The outline has been started for you.

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Kinds of Whales

I. Without teeth (Baleen)
- A. Blue Whale
  1. Largest animal that ever lived
  2. Found in all oceans
  3. Maximum length is 95 - 100 feet
  4. Weight, 150 tons
- B. Gray Whale
  1. Found only in North Pacific
  2. Length is 50 feet
  3. Weight, 40 tons

II. With teeth (Toothed)
- A. Bottle-Nosed
  1. Found in North Atlantic and Antarctic
  2. Maximum length is 30 feet
  3. Weight, 10 tons
- B. Narwhal
  1. Male has spiral ivory tusk
  2. Found in Arctic
  3. Length is 18 feet
  4. Weight, 2 tons

Note Accept any minor variations in wording.

Read the selection in the first column. Complete the outline of the selection in the second column.

If You Go to Europe, Sail

There are two good reasons for sailing to Europe. One is to relax as you wish while traveling. The other is to enjoy the fine service given on a big ship.

Sailing has a number of good points. You have a nice cabin. In a cabin, you may be alone, if you wish. You sleep in comfort in a bunk.

Aboard ship, you eat in a large and beautiful dining room. There are many foods to choose from. The food is prepared and served well.

You find good entertainment on a ship. If you want to see a film, you go to a theater. In the main salon, there is music by an orchestra or band. You may dance, if you wish. You can join in many games, such as handball or cards. Many big ships have swimming pools.

If you really wish to rest, you may sit in a deck chair in the sun. But when you want to move about, you can walk around the decks.

Of course, there are some bad points that may be reasons for not sailing. It may cost more than flying. Sailing takes longer than flying by plane—about five days or more to Europe. Sometimes there are storms at sea. And some people get seasick.

But for elegance, sailing can't be beat.

If You Go to Europe, Sail

I. Reasons for sailing
   - A. _____
   - B. _____

II. Good points of sailing
   - A. _____
     1. _____
     2. _____
   - B. _____
     1. _____
     2. _____
   - C. Good entertainment
     1. _____
     2. _____
     3. _____
     4. _____
     5. _____
   - D. May rest or walk around

III. _____
   - A. _____
   - B. _____
   - C. _____
   - D. _____

Read the selection in the first column. Complete the outline of the selection in the second column.

If You Go to Europe, Sail

There are two good reasons for sailing to Europe. One is to relax as you wish while traveling. The other is to enjoy the fine service given on a big ship.

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But for elegance, sailing can't be beat.

If You Go to Europe, Sail

I. Reasons for sailing
   - A. Relaxation
   - B. Service

II. Good points of sailing
   - A. The cabin
     1. May be alone
     2. Sleep in comfort
   - B. The dining room
     1. Food choice
     2. Food preparation and service
   - C. Good entertainment
     1. films
     2. music
     3. dancing
     4. games
     5. swimming
   - D. May rest or walk around

III. Bad points of sailing
   - A. costs more than flying
   - B. takes longer than flying
   - C. storms at sea
   - D. seasickness

Read the following.

Conservation Jobs

We all know that we must work together to save and protect our land, forests, wildlife, air, and water. Conservation, the right care of our surroundings, is important to our very lives.

Many young people become so interested in conservation that they choose it as their life work. They go to college to prepare themselves. But many young people interested in conservation cannot go to college. Yet lots of jobs in the field are open to them.

These people may do work very much like that of college-trained people. They work in fish hatcheries, greenhouses, wildlife refuges, offices, or laboratories. The places belong to federal or state agencies or private companies.

Many jobs are outdoors. People who like the outdoors enjoy such jobs as these: Counting and marking trees. Planting, trimming, and caring for trees. Measuring rainfall. Testing soil. Advising farmers on land use and care. Catching birds and putting bands on their legs. Moving wildlife from one place to another. Working with and caring for machines used in conservation. Firefighting in forests.

To get these jobs, a person must be at least eighteen years old. It is best to have finished high school. For the outdoor jobs, a person must be in good physical shape.

Complete the outline below.

Conservation Jobs

I. Professional

II. Nonprofessional

A. Places to work

1. _____
2. _____
3. _____
4. _____
5. _____

B. Types of businesses

1. Federal agencies
2. _____
3. _____

C. Some types of outdoor work

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____
9. _____

III. Qualifications

A. _____

B. _____

C. _____

Read the following.

Conservation Jobs

We all know that we must work together to save and protect our land, forests, wildlife, air, and water. Conservation, the right care of our surroundings, is important to our very lives.

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Many jobs are outdoors. People who like the outdoors enjoy such jobs as these: Counting and marking trees. Planting, trimming, and caring for trees. Measuring rainfall. Testing soil. Advising farmers on land use and care. Catching birds and putting bands on their legs. Moving wildlife from one place to another. Working with and caring for machines used in conservation. Firefighting in forests.

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Complete the outline below.

Conservation Jobs

I. Professional

II. Nonprofessional

A. Places to work

1. fish hatcheries
2. green-houses
3. wildlife refuges
4. offices
5. laboratories

B. Types of businesses

1. Federal agencies
2. State agencies
3. Private agencies

C. Some types of outdoor work

1. Counting and marking trees
2. Planting
3. Trimming
4. Caring for trees
5. Measuring rainfall
6. Testing soil
7. Advising farmers
8. Banding birds
9. Firefighting

III. Qualifications

A. Be at least eighteen years old
B. A high school graduate
C. Be in good physical shape

Choosing Main Topics, Subtopics, and Details for an Outline

Read the following article and decide what its main topics, subtopics, and details are. Then complete the outline at the right by using the items listed at the bottom of the page. The first main topic has been filled in for you.

Most performances of today's theater take place on one of three different types of stages. First, there is the proscenium stage, or the traditional *picture frame* stage. The action of any performance is viewed only from the front, and the actors and audience are usually far apart because there is an orchestra pit or forestage area between them. The open stage is the second type of stage and is a raised platform that extends out into the audience. Consequently, the action is viewed from three sides, and the actors and audience are fairly close to each other. The last type of stage is the theater-in-the-round where the action of the play is performed in an open space at floor level. The action of any performance is viewed from all sides, and the actors and audience are very close to each other.

The actors who perform on these three types of stages must adapt their acting somewhat to the kind of stage being used. Actors using the proscenium stage must face to the front at all times, and their gestures are often exaggerated in order to be clear to the far-away audience. Actors using the open stage must turn to three sides often in order to be seen by all people in the audience. More facial expressions are used now because the audience is close enough to see them, and the actors' gestures are less exaggerated. Actors using theater-in-the-round must turn quite frequently in all directions, and every facial expression becomes important.

I. Three types of stages
   - A. _____
     - 1. _____
     - 2. _____
   - B. _____
     - 1. _____
     - 2. _____
   - C. _____
     - 1. _____
     - 2. _____

II. _____
   - A. _____
     - 1. _____
     - 2. _____
   - B. _____
     - 1. _____
     - 2. _____
     - 3. _____
   - C. _____
     - 1. _____
     - 2. _____

Open stage	Three types of stages	Three types of acting
Viewed from all sides	Using proscenium stage	Every expression important
Turn in all directions	Viewed from three sides	Actors and audience fairly close
Proscenium stage	Gestures less exaggerated	More facial expressions used
Face to front	Viewed only from front	Actors and audience far apart
Using open stage	Turn to three sides	Using theater-in-the-round
Gestures exaggerated	Theater-in-the-round	Actors and audience very close

Choosing Main Topics, Subtopics, and Details for an Outline

Read the following article and decide what its main topics, subtopics, and details are. Then complete the outline at the right by using the items listed at the bottom of the page. The first main topic has been filled in for you.

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I. Three types of stages
   - A. Proscenium stage
     1. Viewed only from front
     2. Actors and audience far apart
   - B. Open stage
     1. Viewed from three sides
     2. Actors and audience fairly close
   - C. Theater-in-the-round
     1. Viewed from all sides
     2. Actors and audience very close

II. Three types of acting
   - A. Using proscenium stage
     1. Face to front
     2. Gestures exaggerated
   - B. Using open stage
     1. Turn to three sides
     2. More facial expressions used
     3. Gestures less exaggerated
   - C. Using theater-in-the-round
     1. Turn in all directions
     2. Every expression important

Open stage	Three types of stages	Three types of acting
Viewed from all sides	Using proscenium stage	Every expression important
Turn in all directions	Viewed from three sides	Actors and audience fairly close
Proscenium stage	Gestures less exaggerated	More facial expressions used
Face to front	Viewed only from front	Actors and audience far apart
Using open stage	Turn to three sides	Using theater-in-the-round
Gestures exaggerated	Theater-in-the-round	Actors and audience very close

Prepare an outline of the selection below. List main headings that have been adapted from the paragraphs in the selection. Add at least two subheadings that develop, describe, and support the idea in each main heading.

"Snowshoe" Thompson

The first pioneers settled on the eastern side of the Sierra Nevada about 1850. The first five winters were very hard for the pioneers. Heavy snows kept anyone from crossing the high Sierra during those months. So from November through April the pioneers received no mail or supplies. They were cut off from the rest of the world all winter.

Late in 1855, an ad appeared in a California newspaper. It said that there was a job open for a mail carrier. This person would have to carry mail across the Sierra Nevada in winter. In spite of the difficulties, a young man named John Thompson applied for the job. He said that he would use "snowshoes" to cross the mountains. Back in those days, Americans called skis "snowshoes." Thompson was given the job. He made his first trip across the Sierra Nevada and back in January of 1856. The snow was deep, but Thompson made the trip easily. His ten-foot-long, four-inch-wide skis helped him glide over the snow.

John Thompson carried the mail across the high Sierra for twelve winters. Many times he had to drive off wolves with his long ski pole. He rescued a number of miners trapped by early snows and took medicine to people who were ill. He even carried part of a printing press for a newspaper. "Snowshoe" Thompson quickly became famous as a result of his accomplishments.

I. For settlers on the east side of the Sierra Nevada, the first five winters were hard.

Prepare an outline of the selection below. List main headings that have been adapted from the paragraphs in the selection. Add at least two subheadings that develop, describe, and support the idea in each main heading. **Answers may vary.**

"Snowshoe" Thompson

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I. For settlers on the east side of the Sierra Nevada, the first five winters were hard.

A. Deep snow prevented travel.

B. No mail or supplies came to them.

II. In 1855 an ad appeared for a mail carrier.

A. The carrier would have to carry mail across the snowy mountains.

B. John Thompson thought he could do it because he knew how to use "snowshoes."

C. He made his first round trip in January of 1856.

III. Thompson was on the job for twelve winters.

A. He drove off wolves with his ski pole.

B. He rescued miners.

C. He took medicine and part of a printing press into the mountains.

D. He gained fame as a result of his exploits.

FLOWCHARTING ACTIVITIES

FLOWCHARTING ACTIVITIES OVERVIEW

This section of curriculum materials is composed of Activities numbered forty-five through sixty-one. Each activity is accompanied by an answer key. Skills stressed in this section will assist the student to gain skills in working with flowcharts in order to solve various types of problems.

OBJECTIVE FOR THE SECTION

Students will demonstrate the ability to solve various types of problems through the use of flowcharts. Students will complete the activities with 90% accuracy.

SUGGESTED USES

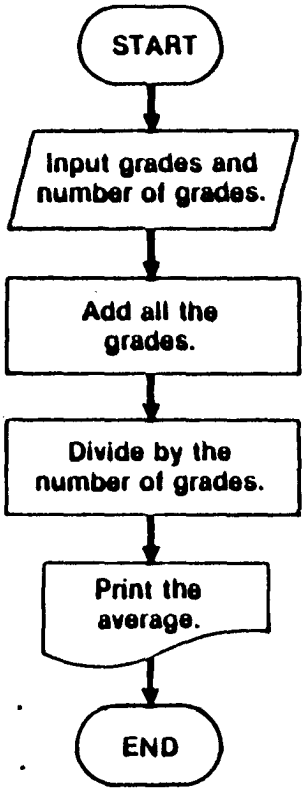
1. Activities 45-48 serve to review the concepts of constructing and using the flowcharts.
2. Activities 49-51 are used to practice the concepts of flowcharting with exercises that are not extremely challenging.
3. Activities 52-61 are more challenging activities that require mathematical thinking on a more advanced level.

Algorithms and Flowcharts

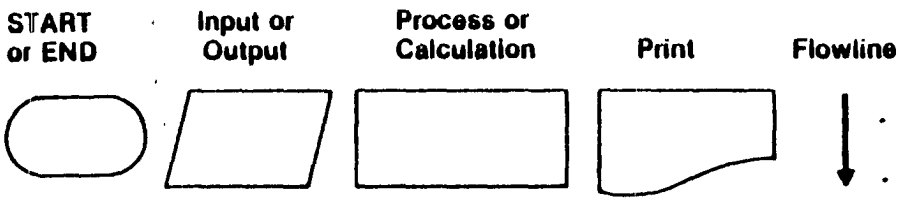
The step-by-step procedure for solving a problem is called an algorithm. The following is an algorithm for averaging students' grades on a math quiz.

1. Input grades and the number of grades.
2. Add all the grades.
3. Divide by the number of grades.
4. Print the average.

A flowchart is a map that describes an algorithm. Each step in the algorithm corresponds with a flowchart symbol. Here is the flowchart that describes the algorithm above.



Some flowchart shapes and what they represent:



On Your Own

1. Rewrite the algorithm and flowchart above using this data: students' grades on a math quiz are 83, 92, 76, 80, 94.

2. Write the algorithm and design the flowchart for raising a number to the third power.

3. Choose a topic that interests you and show the algorithm and flowchart.

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The step-by-step procedure for solving a problem is called an algorithm. The following is an algorithm for averaging students' grades on a math quiz.

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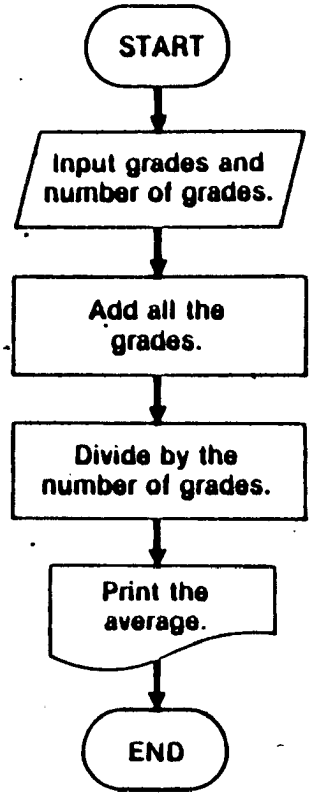


Some flowchart shapes and what they represent:

On Your Own

1. Rewrite the algorithm and flowchart above using this data: students' grades on a math quiz are 83, 92, 76, 80, 94.

Second step should show the sum of 425
Third and fourth steps indicate average of 85

2. Write the algorithm and design the flowchart for raising a number to the third power.

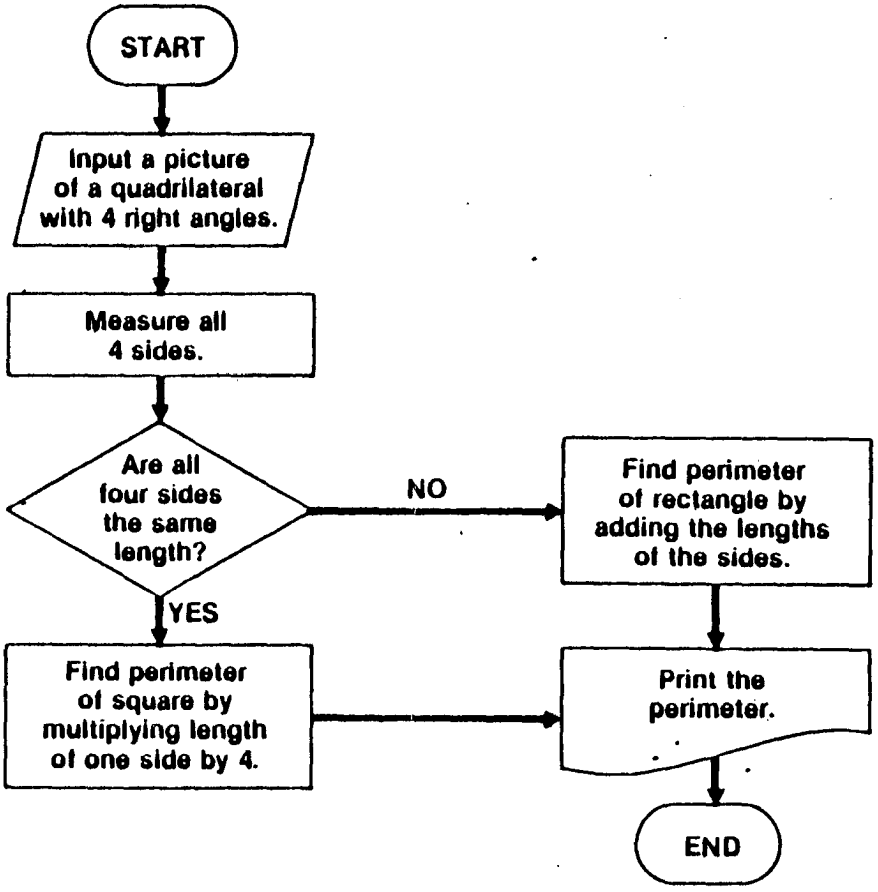
1. Input the number
2. Multiply the number by itself
3. Take answer from #2 and multiply by the original num
4. Print number cubed

3. Choose a topic that interests you and show the algorithm and flowchart. Answers will vary

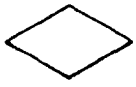
More Flowcharting

The diamond-shaped symbol is called the "decision" symbol. It indicates that a decision must be made. The decision symbol has two different flowlines, one for a "yes" answer and one for a "no" answer.

Here is a flowchart for finding the perimeter of a rectangle or a square.



On Your Own

1. The  in a flowchart is called the _____.

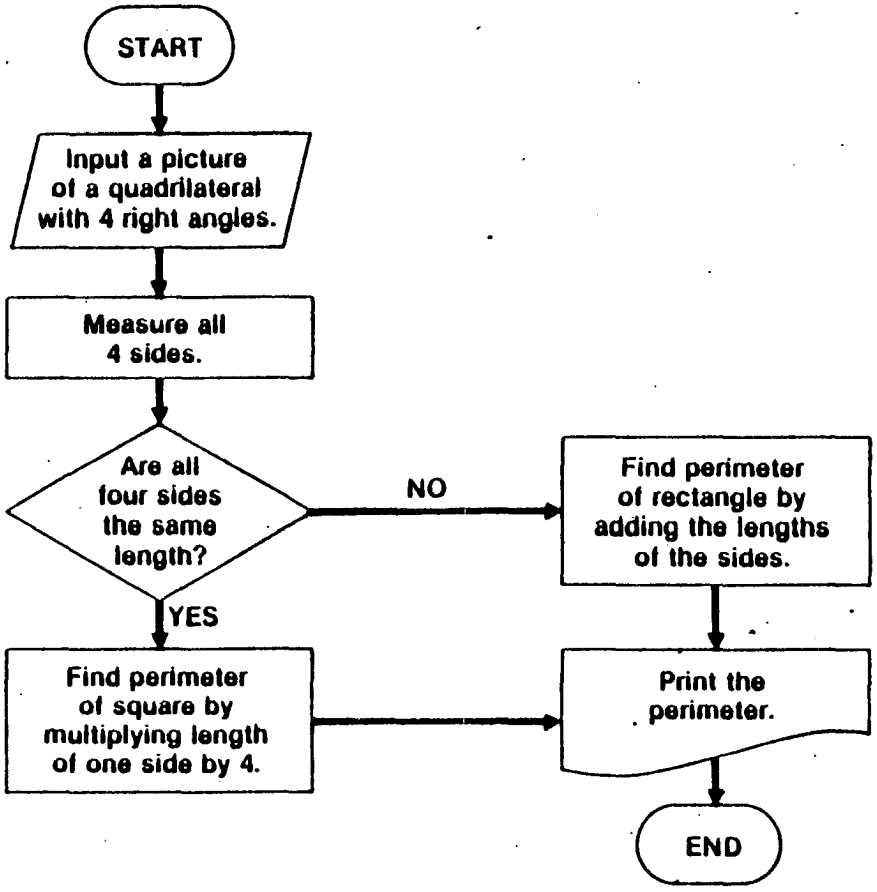
2. Draw the flowchart to show perimeter of a triangle with sides of 3 different lengths.

3. Draw your own flowchart using at least one decision symbol.

More Flowcharting

The diamond-shaped symbol is called the "decision" symbol. It indicates that a decision must be made. The decision symbol has two different flowlines, one for a "yes" answer and one for a "no" answer.

Here is a flowchart for finding the perimeter of a rectangle or a square.



On Your Own

1. The ◇ in a flowchart is called the Decision symbol

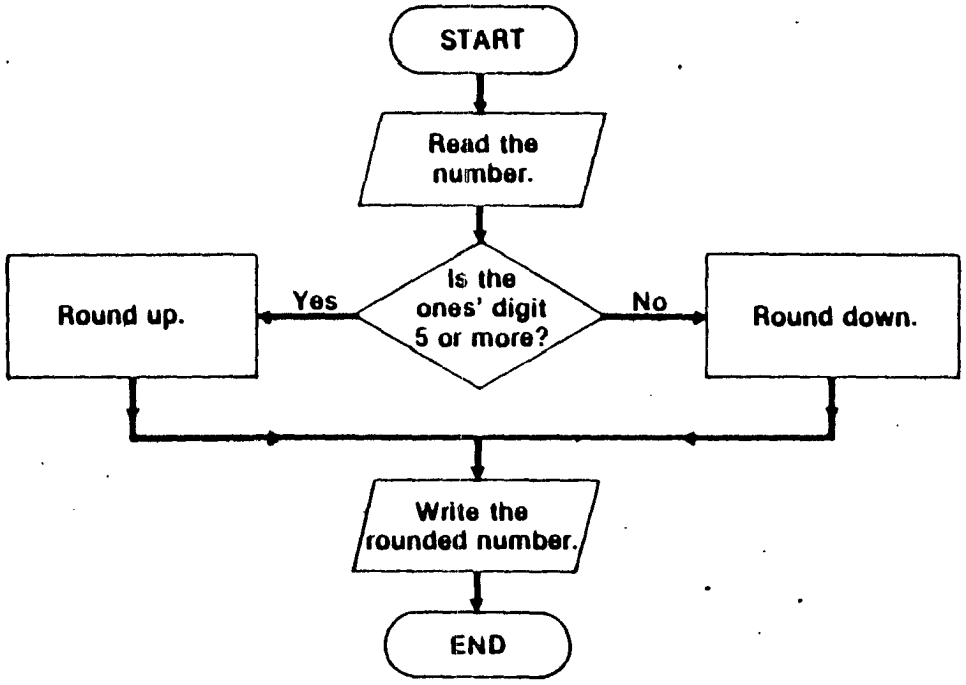
2. Draw the flowchart to show perimeter of a triangle with sides of 3 different lengths. Answers will vary

3. Draw your own flowchart using at least one decision symbol.

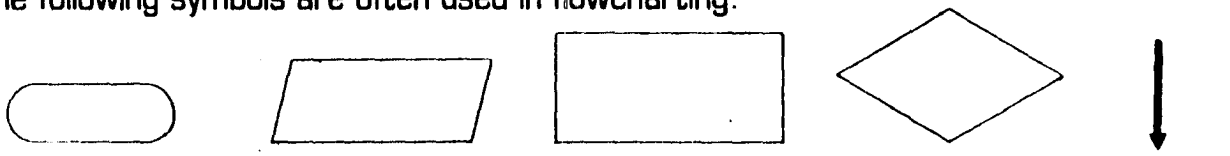
Flowcharts with Decision Symbols

To indicate a question on a flowchart, you use a diamond-shaped symbol called a "decision" symbol. The next step depends on whether the answer to the question is "yes" or "no."

The flowchart below shows the steps needed to round a whole number to the nearest ten.



The following symbols are often used in flowcharting.



START or END | Input or Output | Process or Calculation | Decision | Flowline

On Your Own

1. Use the flowchart above to round the numbers to the nearest ten.

a. 568 _____ **b.** 7093 _____ **c.** 425 _____

2. In a flowchart, a decision is represented by which shape?

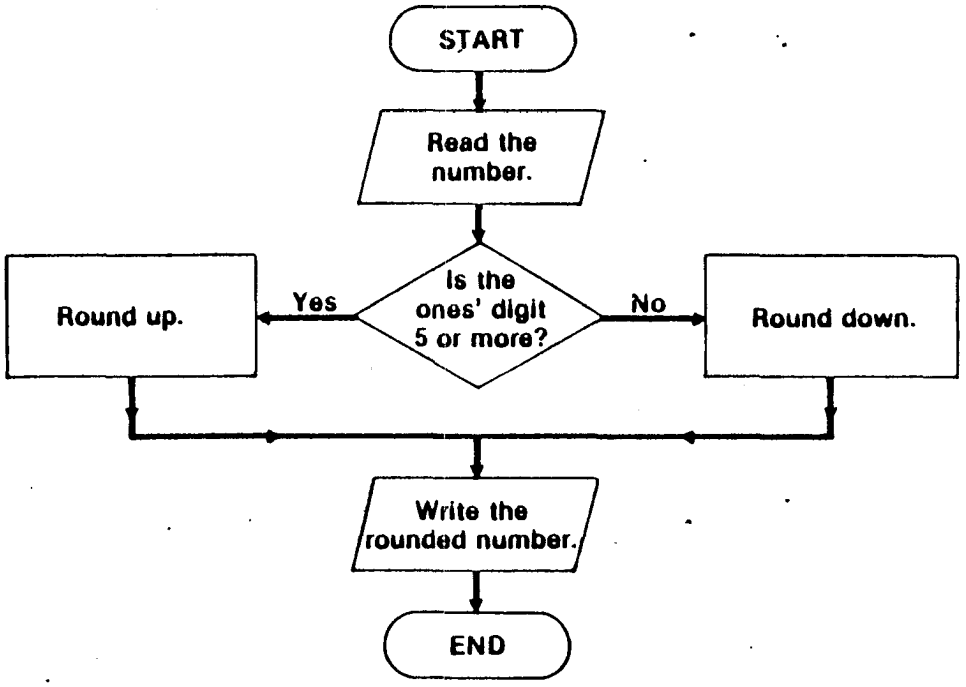
a. oval **b.** rectangle **c.** diamond **d.** parallelogram

3. Design your own flowchart using a decision symbol.

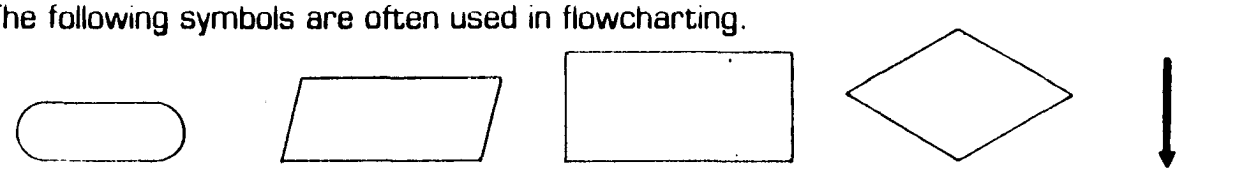
Flowcharts with Decision Symbols

To indicate a question on a flowchart, you use a diamond-shaped symbol called a "decision" symbol. The next step depends on whether the answer to the question is "yes" or "no."

The flowchart below shows the steps needed to round a whole number to the nearest ten.



The following symbols are often used in flowcharting.



START or END | Input or Output | Process or Calculation | Decision | Flowline

On Your Own

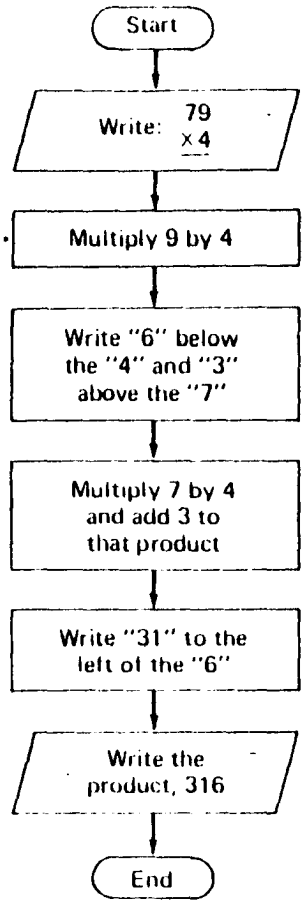
1. Use the flowchart above to round the numbers to the nearest ten.
   a. 568 570 **b.** 7093 7090 **c.** 425 430
2. In a flowchart, a decision is represented by which shape?
   a. oval **b.** rectangle **c.** diamond **d.** parallelogram
3. Design your own flowchart using a decision symbol. Answers will vary.

FLOW CHARTS

The boxes in the diagram at the right contain the instructions that you might use to tell someone how to find the decimal numeral of the product of 4 and 79.

The order in which the instructions are to be carried out is shown by the arrows joining the boxes.

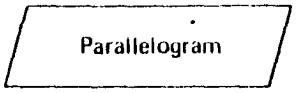
Such a diagram is called a **flow chart.**



Notice that the boxes have different shapes:

"Start" and "End" are in oval boxes.

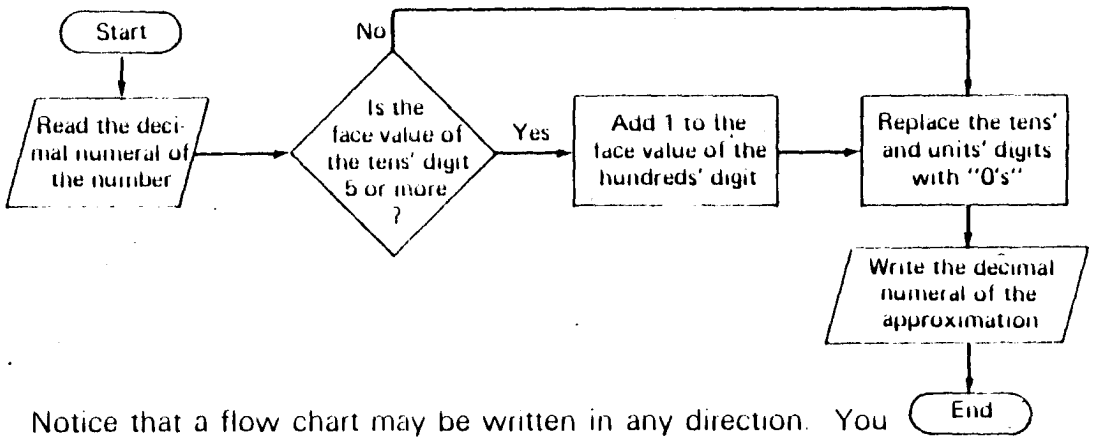
In this flow chart, the first box after "Start" is an "Input" box, and the last box before "End" is an "Output" box. They have the same shape. This figure is called a *parallelogram.*



The boxes between the "Input" and "Output" boxes in this flow chart are "Operation" boxes in which computations and other procedures are described. They all have the same shape. This figure is called a *rectangle.*

The flow chart below shows the steps that you have to take to round a whole number to the nearest hundred. (See page 117.)

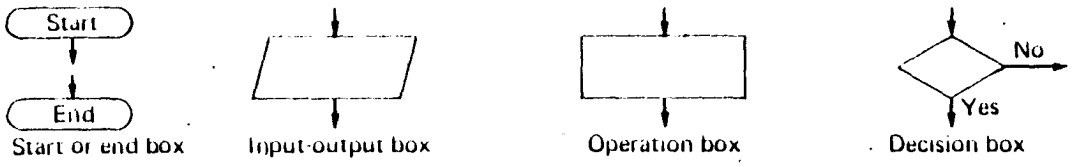
Here another kind of step appears. A question is asked and the steps to be taken depend on whether the answer to the question is Yes or No. This question is written in a diamond-shaped box.



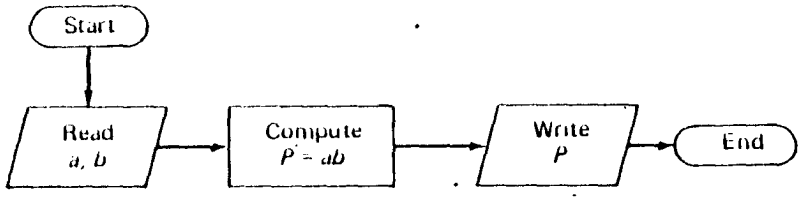
Notice that a flow chart may be written in any direction. You simply read it in the direction of the arrows.

The box shapes that we shall use in flow charts are shown below.

Box Shapes for Flow Charts



You often use variables in making a flow chart. For example:



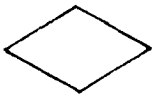
Do you see that if you replace *a* with "4" and *b* with "5," the output will be 20?

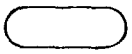
Exercises

State the kind of instruction indicated by the shape of the box.

1.

2.

3. 

4. 

Each step below should be enclosed in one of the shapes shown above. In each case, state the correct box to use

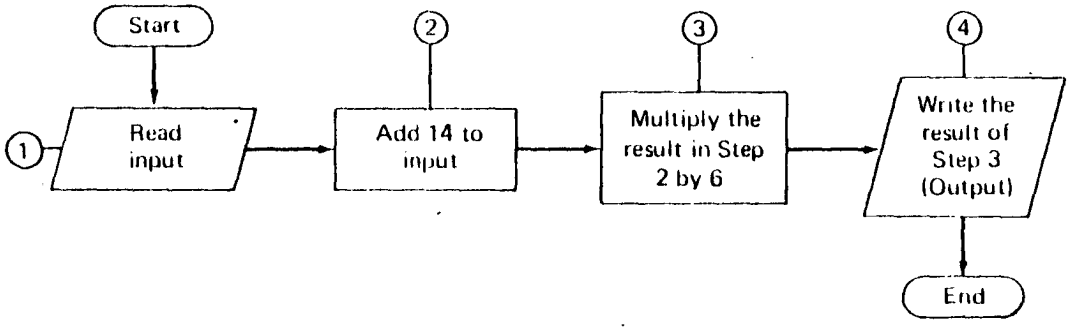
5. Start → 6. Read input number → 7. Multiply input by 7 → 8. Write product (output) → 9. End

10. For the program in Exercises 5–9, state the output if the input is 8

Exercises

For each flow chart, construct a table showing the operation performed at each step with the given input numbers.

Sample 1:



Input: **a.** 3 **b.** 0 **c.** *n*

Solution:

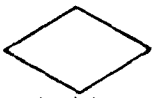
	a.	b.	c.
Step 1	3	0	*n*
Step 2	3 + 14 = 17	0 + 14 = 14	*n* + 14
Step 3	6(17) = 102	6(14) = 84	6(*n* + 14)
Step 4	102	84	6*n* + 84

Exercises

State the kind of instruction indicated by the shape of the box.

1. operation

2. input or output

3.  decision

4. start or end

Each step below should be enclosed in one of the shapes shown above. In each case, state the correct box to use

5. Start — oval (4 above) → 6. Read input number — parallelogram (2 above) → 7. Multiply input by 7 — rectangle (1 above) → 8. Write product (output) — parallelogram (2 above) → 9. End — oval (4 above)

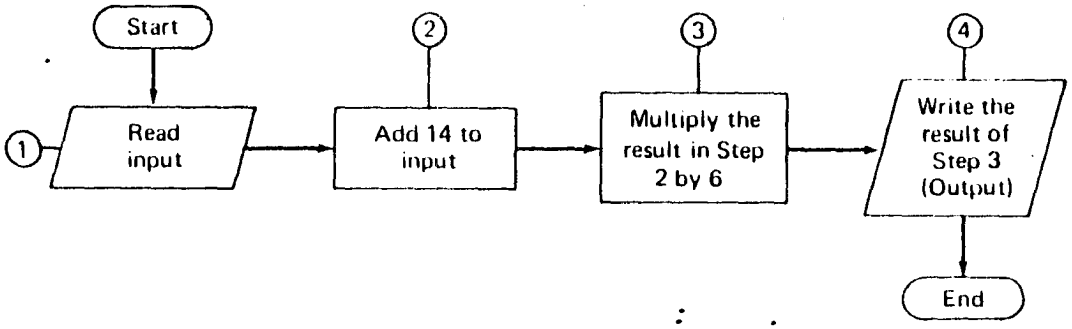
10. For the program in Exercises 5–9, state the output if the input is 8.

56

Exercises

For each flow chart, construct a table showing the operation performed at each step with the given input numbers.

Sample 1:



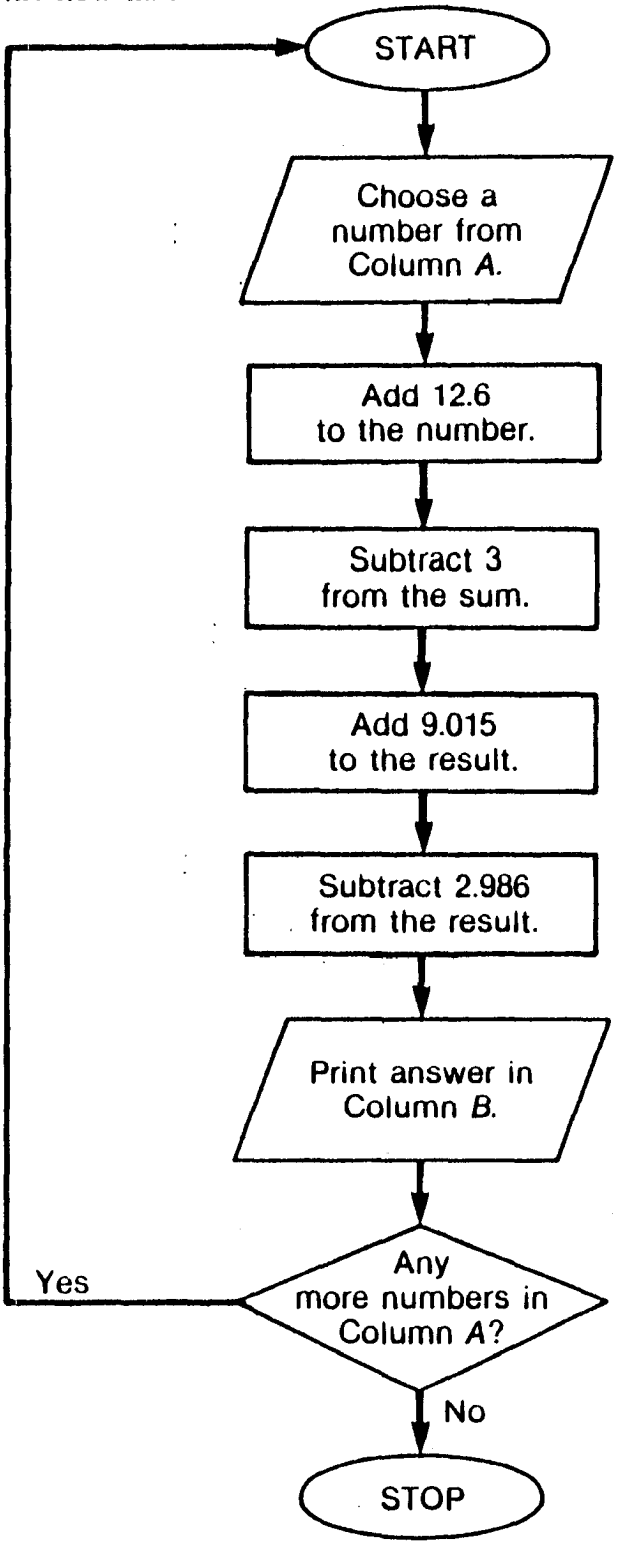
Input: **a.** 3 **b.** 0 **c.** n

Solution:

	a.	b.	c.
Step 1	3	0	n
Step 2	$3 + 14 = 17$	$0 + 14 = 14$	$n + 14$
Step 3	$6(17) = 102$	$6(14) = 84$	$6(n + 14)$
Step 4	102	84	$6n + 84$

Decimal Addition and Subtraction

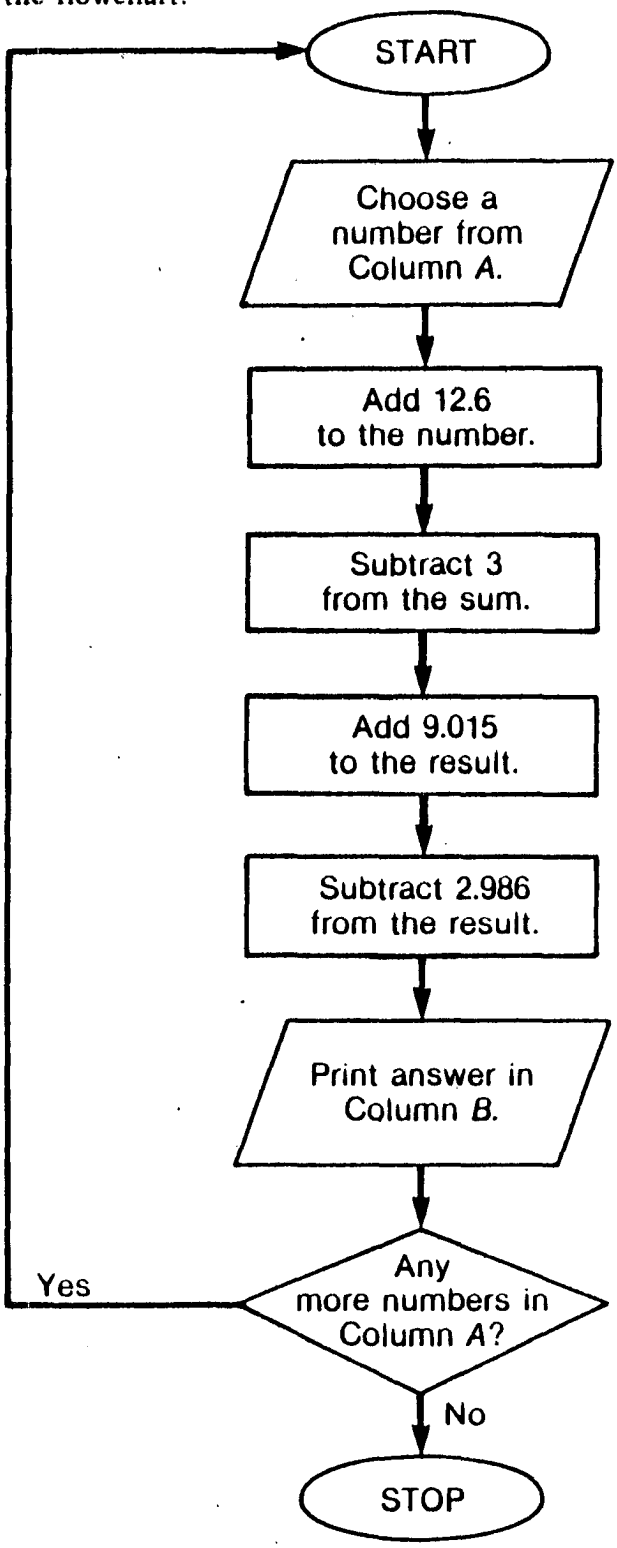
Complete column *B* in the chart by following the steps of the flowchart.



A	B
15	
1.5	
0.8	
32	
8.56	
9.7	
112	
0.09	
215.8	
30.53	
10.6	
0.96	

Decimal Addition and Subtraction

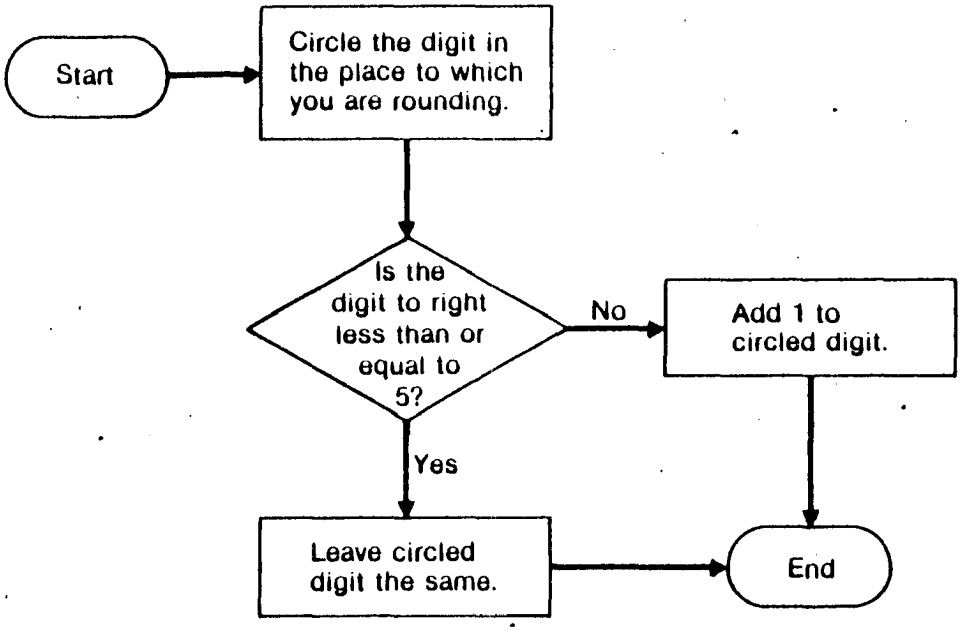
Complete column *B* in the chart by following the steps of the flowchart.



A	B
15	30.629
1.5	17.129
0.8	16.429
32	47.629
8.56	24.189
9.7	25.329
112	127.429
0.09	15.719
215.8	231.429
30.53	46.159
10.6	26.229
0.96	16.589

Rounding with a Flow Chart

Follow the flow chart to round the numbers in the exercises.



Round to the nearest whole number.

1. 3.8 ____	**2.** 6.2 ____	**3.** 8.5 ____	**4.** 7.4 ____
5. 15.39 ____	**6.** 21.72 ____	**7.** 9.59 ____	**8.** 47.25 ____

Round to the nearest tenth.

9. 0.93 ____	**10.** 0.36 ____	**11.** 0.79 ____	**12.** 1.65 ____
13. 0.209 ____	**14.** 0.859 ____	**15.** 1.338 ____	**16.** 7.099 ____

Round to the nearest hundredth.

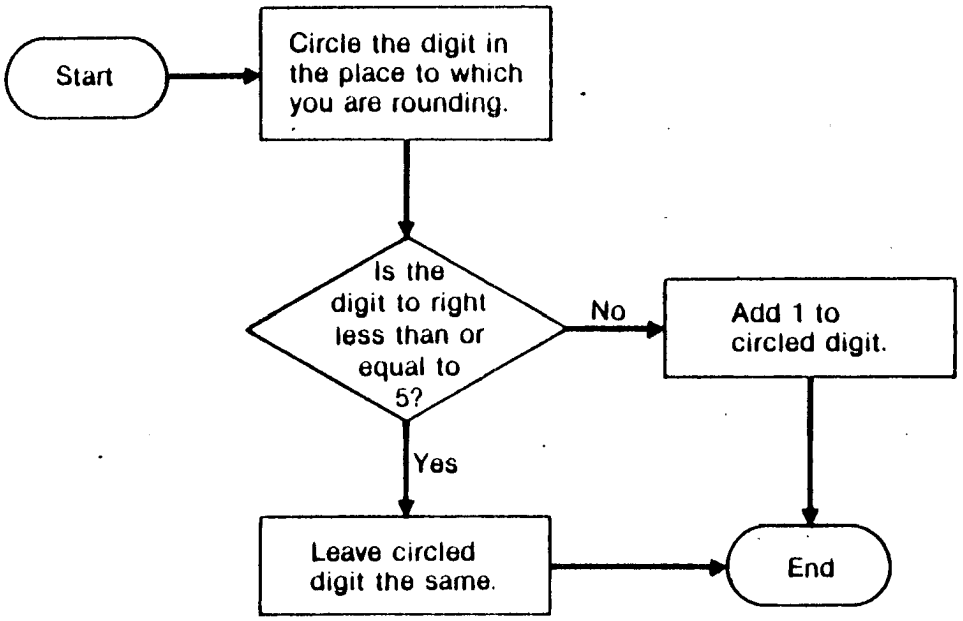
17. 0.317 ____	**18.** 0.845 ____	**19.** 0.753 ____	**20.** 0.199 ____
21. 0.2715 ____	**22.** 0.3082 ____	**23.** 0.6917 ____	**24.** 0.5038 ____

Round to the nearest thousandth.

25. 0.1518 ____	**26.** 0.0032 ____	**27.** 0.5927 ____	**28.** 0.1795 ____

Rounding with a Flow Chart

Follow the flow chart to round the numbers in the exercises.



Round to the nearest whole number.

1. 3.8 4	**2.** 6.2 6	**3.** 8.5 9	**4.** 7.4 7
5. 15.39 15	**6.** 21.72 22	**7.** 9.59 10	**8.** 47.25 47

Round to the nearest tenth.

9. 0.93 0.9	**10.** 0.36 0.4	**11.** 0.79 0.8	**12.** 1.65 1.7
13. 0.209 0.2	**14.** 0.859 0.9	**15.** 1.338 1.3	**16.** 7.099 7.1

Round to the nearest hundredth.

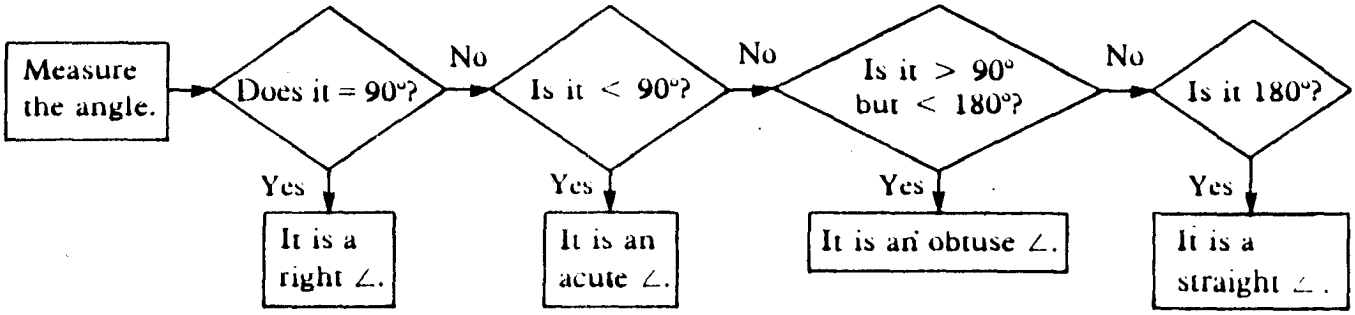
17. 0.317 0.32	**18.** 0.845 0.85	**19.** 0.753 0.75	**20.** 0.199 0.20
21. 0.2715 0.27	**22.** 0.3082 0.31	**23.** 0.6917 0.69	**24.** 0.5038 0.50

Round to the nearest thousandth.

25. 0.1518 0.152	**26.** 0.0032 0.003	**27.** 0.5927 0.593	**28.** 0.1795 0.180

Use a protractor to measure angles. Be sure to place the center of the protractor at the vertex of the angle.

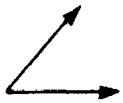
Naming Angles



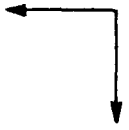
Adjacent angles share a vertex and a side.

Measure the angle. Give the measurement. Name the angle.

1.

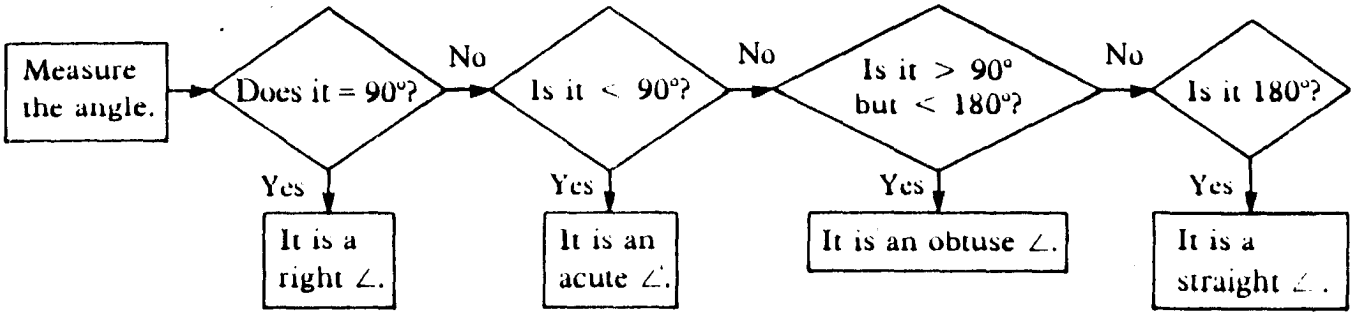
2. 

3.

4. 

Use a protractor to measure angles. Be sure to place the center of the protractor at the vertex of the angle.

Naming Angles

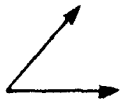


Adjacent angles share a vertex and a side.

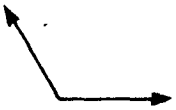
Measure the angle.

1.

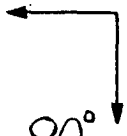
85° = obtuse

2. 

50° = acute

3. 

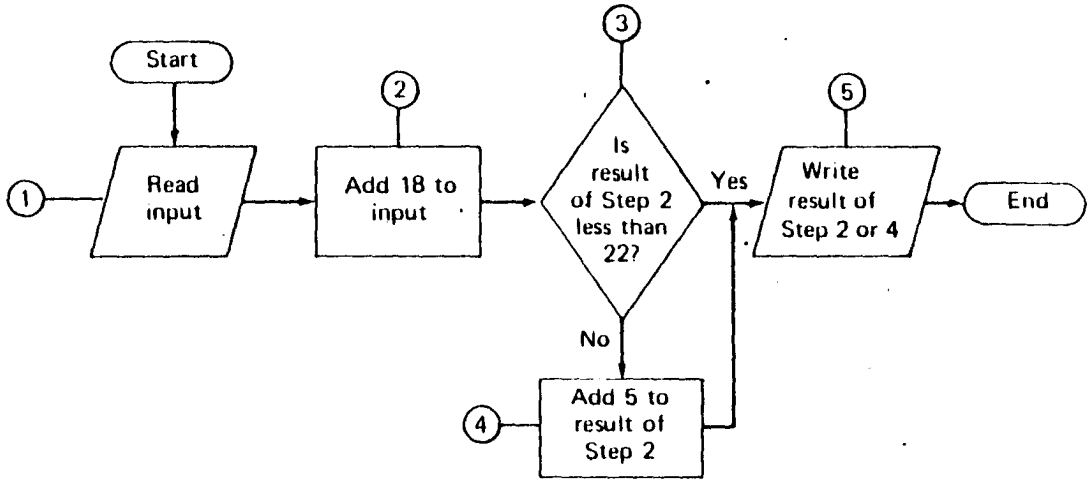
120° = obtuse

4. 

90° = right

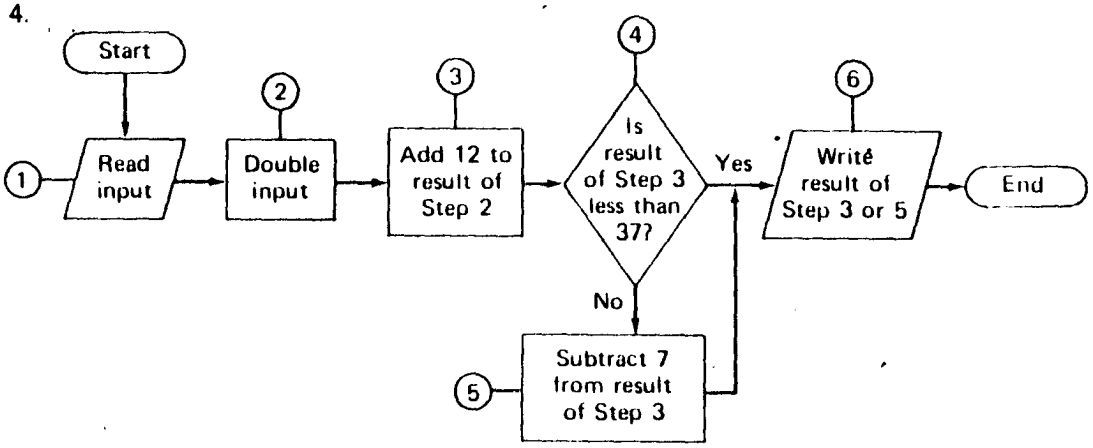
Solution: **a.** $4 \times 8 = 32$ and $32 < 40$. The output is 32. ***Answer***
b. $6 \times 8 = 48$, but $48 > 40$. Compute $48 \div 4 = 12$. The output is 12. ***Answer***
c. $8 \times 8 = 64$, but $64 > 40$. Compute $64 \div 4 = 16$. The output is 16. ***Answer***

3.



Input: **a.** 3 **b.** 5 **c.** 7

4.



Input: **a.** 6 **b.** 12 **c.** 18

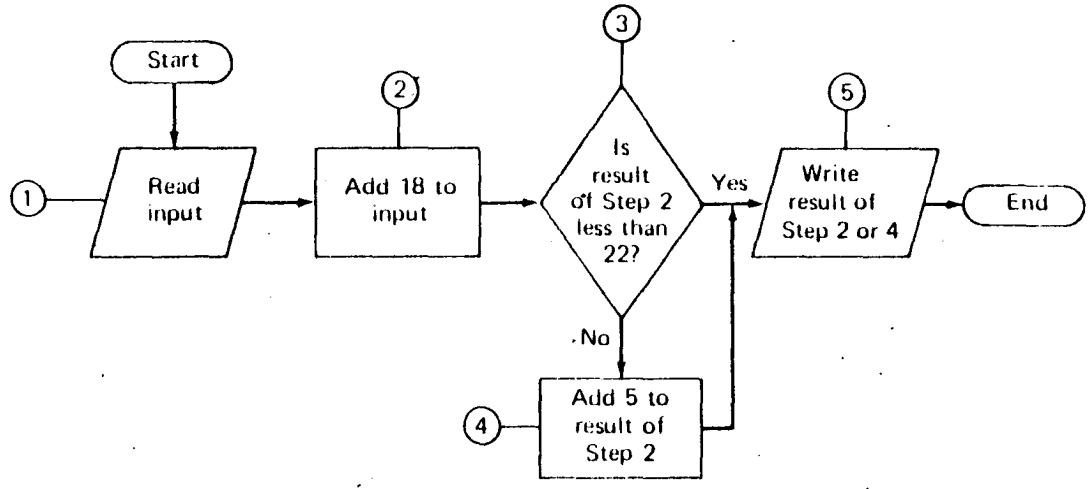
Solution: **a.** $4 \times 8 = 32$ and $32 < 40$. The output is 32. ***Answer***

b. $6 \times 8 = 48$, but $48 > 40$. Compute $48 \div 4 = 12$. The output is 12. ***Answer***

c. $8 \times 8 = 64$, but $64 > 40$. Compute $64 \div 4 = 16$. The output is 16. ***Answer***

3.

a.	b.	c.
3	5	7
3 + 18 = 21	5 + 18 = 23	7 + 18 = 25
21	23 + 5 = 28	25 + 5 = 30
	28	30

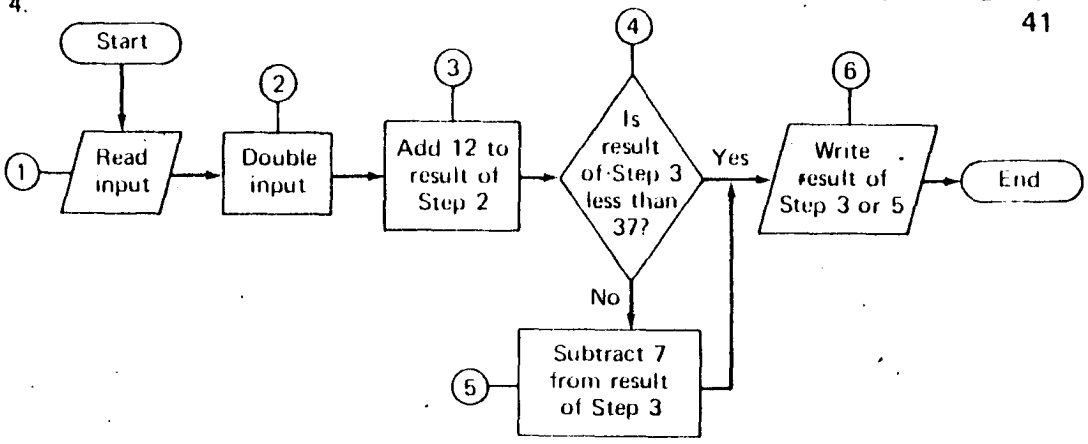


Input: **a.** 3 **b.** 5 **c.** 7

21 28 30

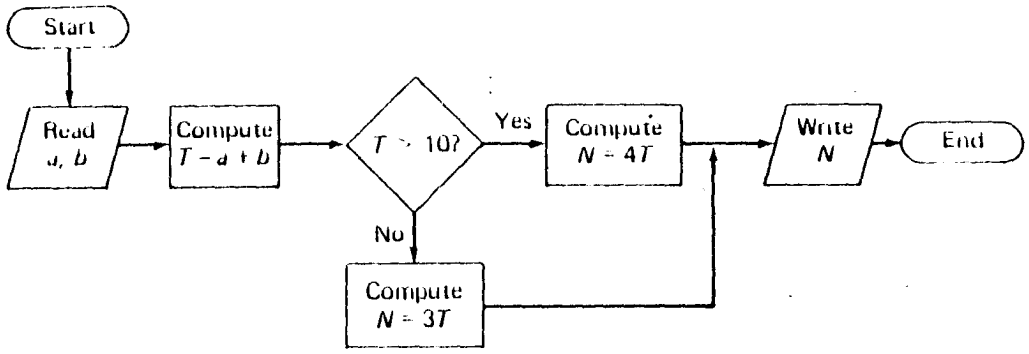
a.	b.	c.
6	12	18
2(6) = 12	2(12) = 24	2(18) = 36
12 + 12 = 24	24 + 12 = 36	36 + 12 = 48
24	36	48 − 7 = 41
		41

4.



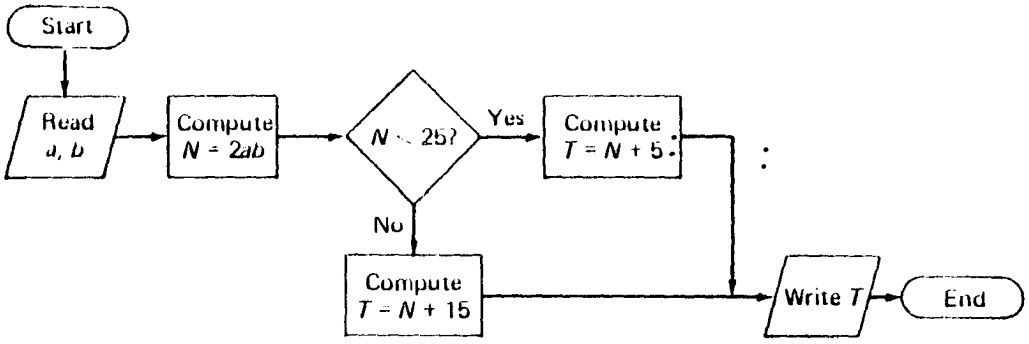
Input: **a.** 6 24 **b.** 12 36 **c.** 18 41

5.



Input: **a.** "3" for *a*, "4" for *b* **b.** "4" for *a*, "5" for *b* **c.** "5" for *a*, "7" for *b*

6.



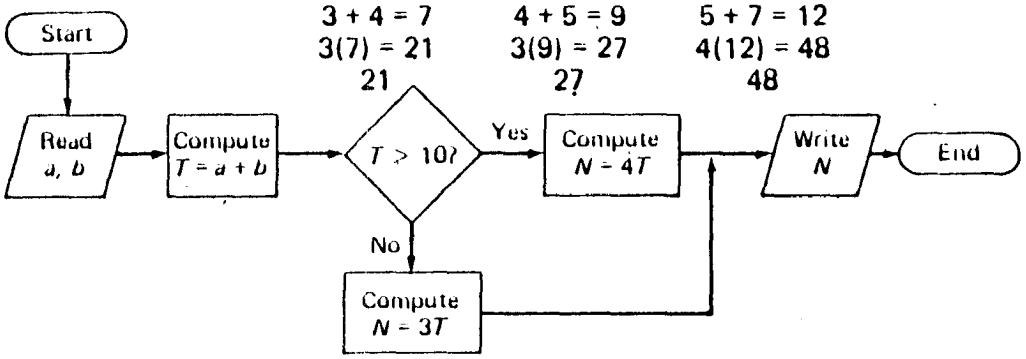
Input: **a.** "2" for *a*, "4" for *b* **b.** "3" for *a*, "5" for *b* **c.** "2" for *a*, "6" for *b*

5.

a. $a = 3, b = 4$
$3 + 4 = 7$
$3(7) = 21$
21

b. $a = 4, b = 5$
$4 + 5 = 9$
$3(9) = 27$
27

c. $a = 5, b = 7$
$5 + 7 = 12$
$4(12) = 48$
48



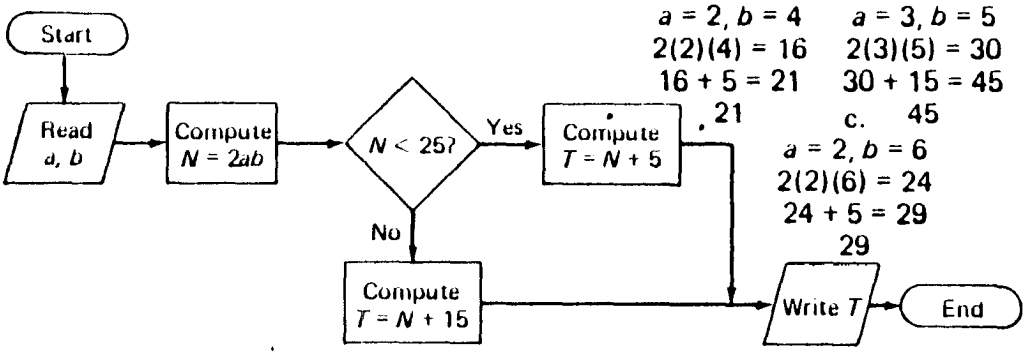
Input: a. "3" for *a*, "4" for *b* b. "4" for *a*, "5" for *b* c. "5" for *a*, "7" for *b*
21 27 48

6.

a. $a = 2, b = 4$
$2(2)(4) = 16$
$16 + 5 = 21$
21

b. $a = 3, b = 5$
$2(3)(5) = 30$
$30 + 15 = 45$
45

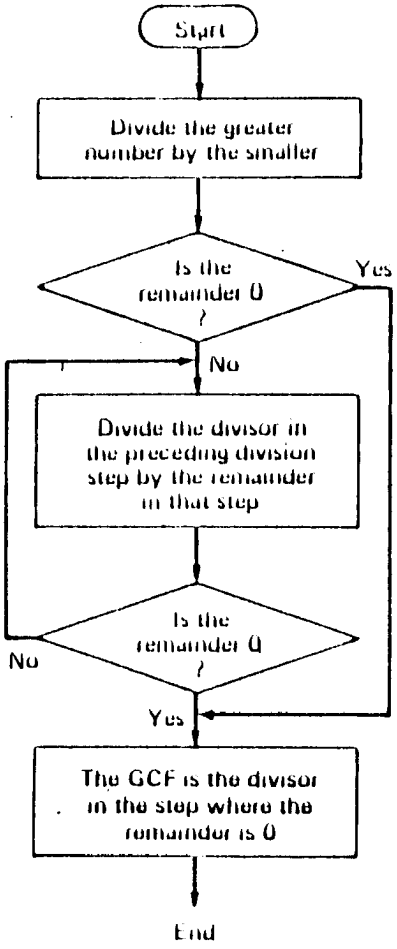
c. $a = 2, b = 6$
$2(2)(6) = 24$
$24 + 5 = 29$
29



Input: a. "2" for *a*, "4" for *b* b. "3" for *a*, "5" for *b* c. "2" for *a*, "6" for *b*
21 45 29

The Euclidean Algorithm

There is a very efficient way to find the greatest common factor of two numbers whose complete factorization may not be easy. For example, to find GCF (817, 17329), follow the instructions in the flow chart

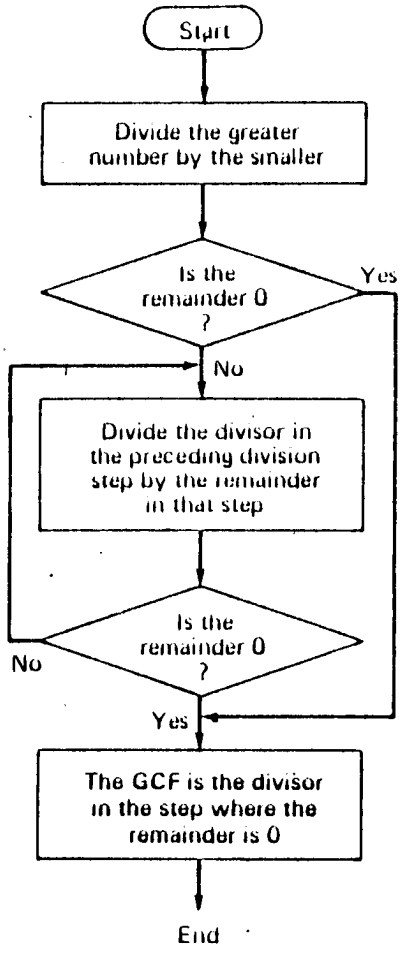


817)17329

GCF (817, 17329) =

activity 54

There is a very efficient way to find the greatest common factor of two numbers whose complete factorization may not be easy. For example, to find GCF (817, 17329), follow the instructions in the flow chart.



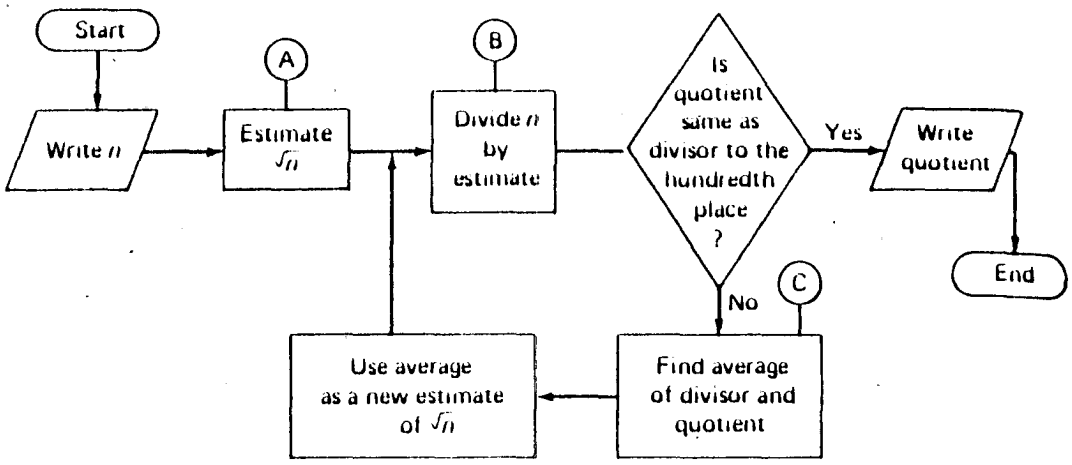
$$\begin{array}{r} 21 \\ 817\overline{)17329} \\ 1634 \\ \hline 989 \\ 817 \\ \hline 172 \end{array} \neq 0$$

$$\begin{array}{r} 4 \\ 172\overline{)817} \\ 688 \\ \hline 129 \end{array} \neq 0$$

$$\begin{array}{r} 1 \\ 129\overline{)172} \\ 129 \\ \hline 43 \end{array} \neq 0$$

$$\begin{array}{r} 3 \\ 43\overline{)129} \\ 129 \\ \hline 0 \end{array} \checkmark$$

GCF (817, 17329) = 43



Example: Find $\sqrt{5}$ to the tenths place.

Solution: A Estimate $\sqrt{5}$.

$\sqrt{4} = 2$, $\sqrt{9} = 3$, and $\sqrt{4} < \sqrt{5} < \sqrt{9}$. Since 5 is nearer to 4 than to 9, you might try a number closer to 2 than to 3, say 2.3, as a *first estimate* of $\sqrt{5}$.

B Divide 5 by the estimate.

$$\begin{array}{r} 2.10 \\ 2.3\overline{)5.0.00} \\ 4\,6 \\ \hline 40 \\ 23 \\ \hline 17 \end{array}$$

C Average.

$\frac{2.3 + 2.10}{2} = 2.20$. This is the new estimate of $\sqrt{5}$.

B (again)
$$\begin{array}{r} 2.27 \\ 2.20\overline{)5.00.00} \\ 4\,40 \\ \hline 60\,0 \\ 44\,0 \\ \hline 16\,00 \\ 15\,40 \\ \hline 60 \end{array}$$

Now the quotient and divisor agree to the tenths place, so $\sqrt{5} \doteq 2.2$.

Answer

Exercises

State the square root.

1. $\sqrt{4}$ 2. $\sqrt{9}$ 3. $\sqrt{16}$ 4. $\sqrt{25}$ 5. $\sqrt{49}$ 6. $\sqrt{64}$

State the first digit in the decimal numeral for each square root.

7. $\sqrt{3}$ 8. $\sqrt{65}$ 9. $\sqrt{105}$ 10. $\sqrt{93}$ 11. $\sqrt{47}$ 12. $\sqrt{230}$

State the next estimate for the square root of the dividend in each exercise.

Sample:
$$2\overline{)7.3}\quad 3.6$$

Solution: The average of 2 and 3.6 is $\frac{2 + 3.6}{2} = 2.8$.

Therefore, the next estimate is 2.8. ***Answer***

13. $3\overline{)10.8}\quad 3.6$ 14. $5\overline{)28.5}\quad 5.7$ 15. $12\overline{)154.0}\quad 12.8$ 16. $15\overline{)235.0}\quad 15.6$

Exercises

State the whole number named by each expression.

1. $\sqrt{100}$ 2. $\sqrt{1}$ 3. $\sqrt{36} - \sqrt{9}$ 4. $\sqrt{169 - 144}$

Find each of the following to the tenths place.

5. $\sqrt{91}$ 7. $\sqrt{125}$ 9. $\sqrt{89}$ 11. $\sqrt{9.9}$
6. $\sqrt{20}$ 8. $\sqrt{56}$ 10. $\sqrt{99}$ 12. $\sqrt{19.9}$

Use the Pythagorean Property to find the measure of the missing side of the right triangle, with c the measure of the hypotenuse.

13. $a = 3, b = \_?\_, c = 5$
14. $a = 12, b = 5, c = \_?\_$
15. $a = \_?\_, b = 15, c = 17$
16. $a = 21, b = \_?\_, c = 29$
17. $a = 11.4, b = \_?\_, c = 19.2$
18. $a = \_?\_, b = 6.3, c = 9.2$
19. $a = 4.6, b = 11.5, c = \_?\_$
20. $a = \_?\_, b = 10.4, c = 26.2$

Exercises

State the square root.

1. $\sqrt{4}$ 2 2. $\sqrt{9}$ 3 3. $\sqrt{16}$ 4 4. $\sqrt{25}$ 5 5. $\sqrt{49}$ 7 6. $\sqrt{64}$ 8

State the first digit in the decimal numeral for each square root.

7. $\sqrt{3}$ 1 8. $\sqrt{65}$ 8 9. $\sqrt{105}$ 10 10. $\sqrt{93}$ 9 11. $\sqrt{47}$ 6 12. $\sqrt{230}$ 15

State the next estimate for the square root of the dividend in each exercise.

Sample:
$$2\overline{)7.3}\quad 3.6$$

Solution: The average of 2 and 3.6 is $\frac{2 + 3.6}{2} = 2.8$.

Therefore, the next estimate is 2.8. ***Answer***

13. $3\overline{)10.8}$ 3.6 3.3 14. $5\overline{)28.5}$ 5.7 5.35 15. $12\overline{)154.0}$ 12.8 12.4 16. $15\overline{)235.0}$ 15.6 15.3

Exercises

State the whole number named by each expression.

1. $\sqrt{100}$ 10 2. $\sqrt{1}$ 1 3. $\sqrt{36} - \sqrt{9}$ 3 4. $\sqrt{169 - 144}$ 5

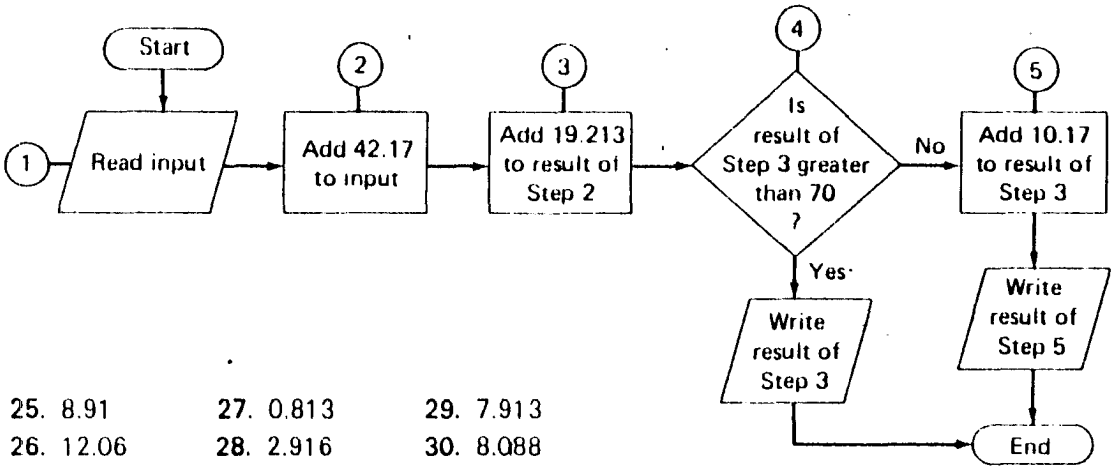
Find each of the following to the tenths place.

5. $\sqrt{91}$ 9.5 6. $\sqrt{20}$ 4.4 7. $\sqrt{125}$ 11.1 8. $\sqrt{56}$ 7.4 9. $\sqrt{89}$ 9.4 10. $\sqrt{99}$ 9.9 11. $\sqrt{9.9}$ 3.1 12. $\sqrt{19.9}$ 4.4

Use the Pythagorean Property to find the measure of the missing side of the right triangle, with c the measure of the hypotenuse.

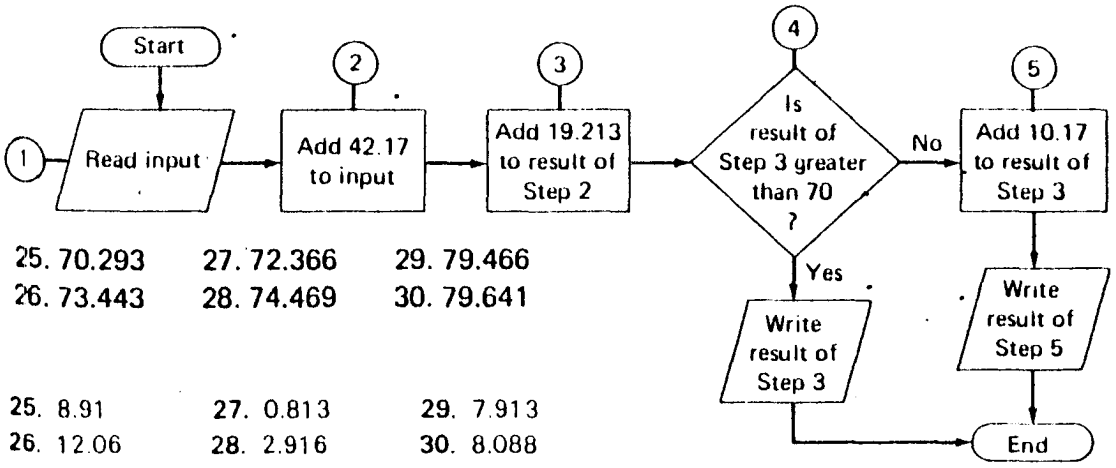
13. $a = 3, b = \underline{?}, c = 5$ 4
14. $a = 12, b = 5, c = \underline{?}$ 13
15. $a = \underline{?}, b = 15, c = 17$ 8
16. $a = 21, b = \underline{?}, c = 29$ 20
17. $a = 11.4, b = \underline{?}, c = 19.2$ 15.4
18. $a = \underline{?}, b = 6.3, c = 9.2$ 6.7
19. $a = 4.6, b = 11.5, c = \underline{?}$ 12.4
20. $a = \underline{?}, b = 10.4, c = 26.2$ 24.0

In Exercises 25-30, for the flow chart shown below give the output for the given input.



25. 8.91
26. 12.06
27. 0.813
28. 2.916
29. 7.913
30. 8.088

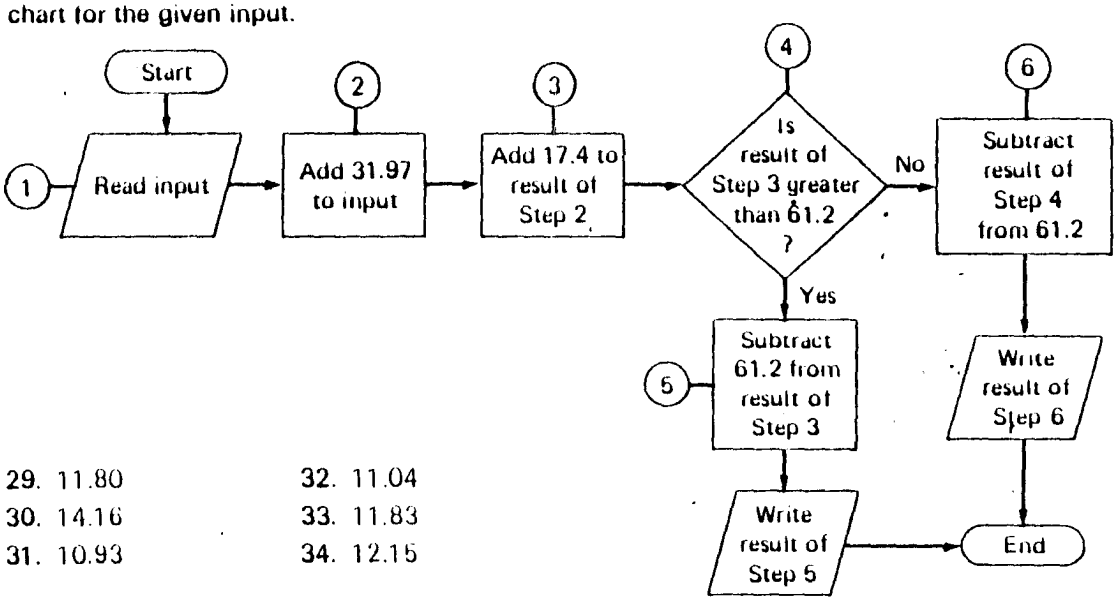
In Exercises 25–30, for the flow chart shown below give the output for the given input.



25. 70.293
26. 73.443
27. 72.366
28. 74.469
29. 79.466
30. 79.641

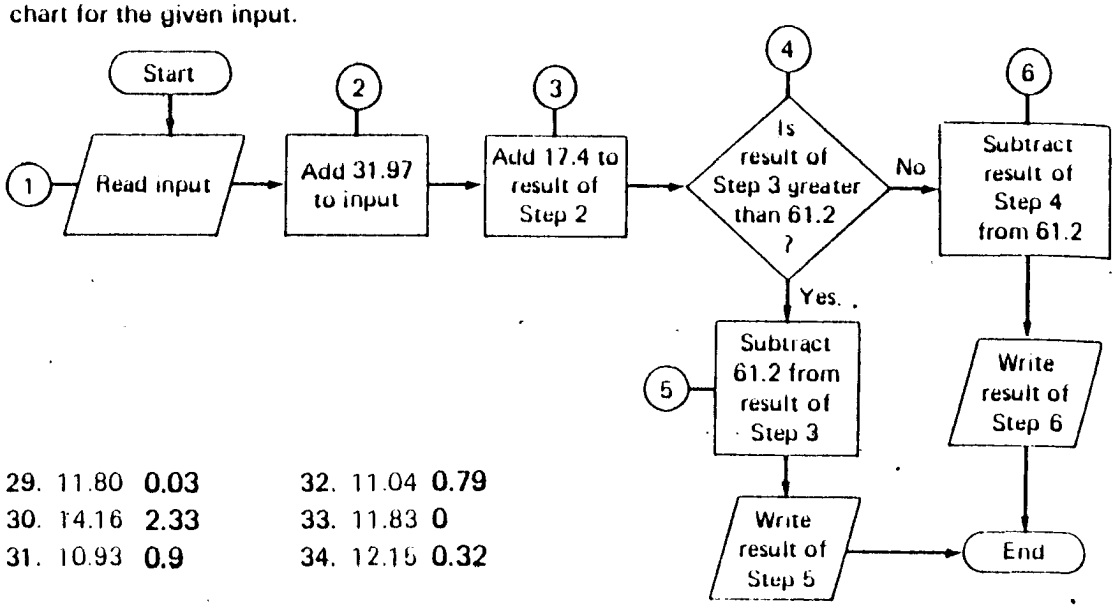
25. 8.91
26. 12.06
27. 0.813
28. 2.916
29. 7.913
30. 8.088

In Exercises 29–34, state the output from the process shown in this flow chart for the given input.



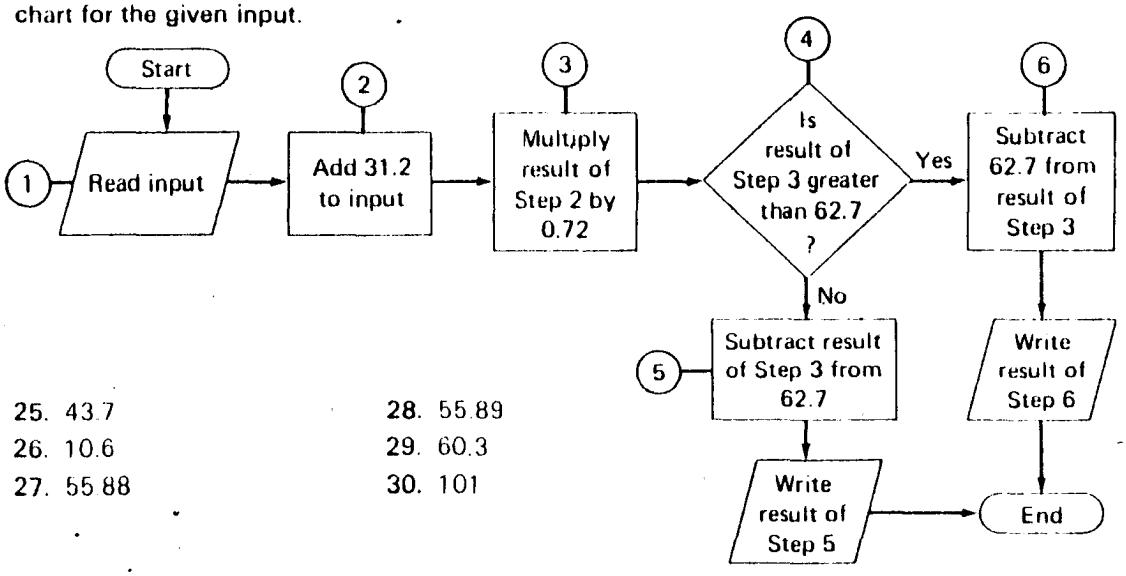
29. 11.80
30. 14.16
31. 10.93
32. 11.04
33. 11.83
34. 12.15

In Exercises 29–34, state the output from the process shown in this flow chart for the given input.



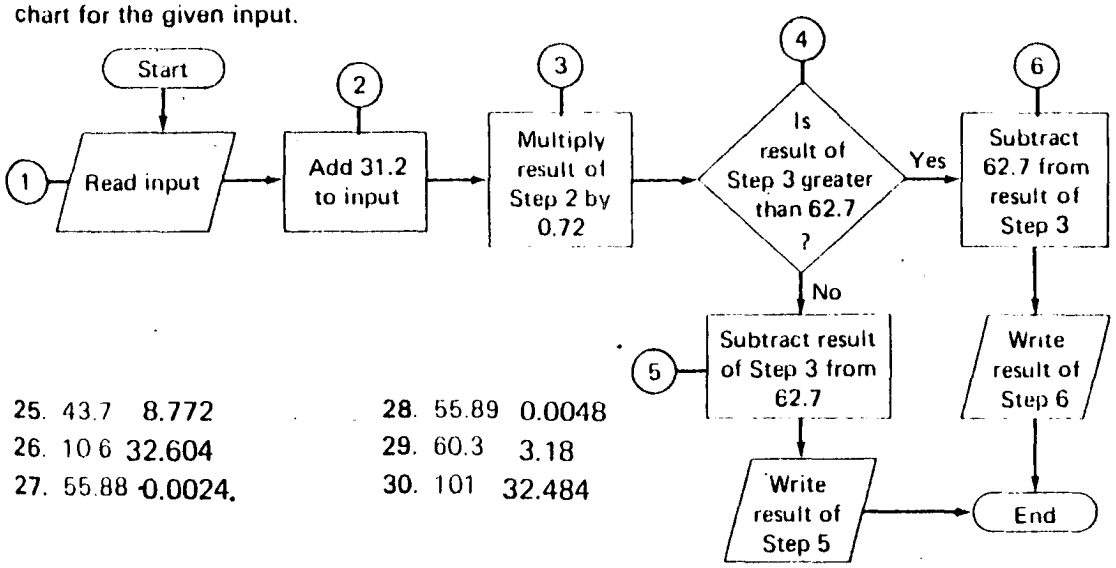
29. 11.80 **0.03**
30. 14.16 **2.33**
31. 10.93 **0.9**
32. 11.04 **0.79**
33. 11.83 **0**
34. 12.15 **0.32**

In Exercises 25–30, state the output from the process shown in the flow chart for the given input.

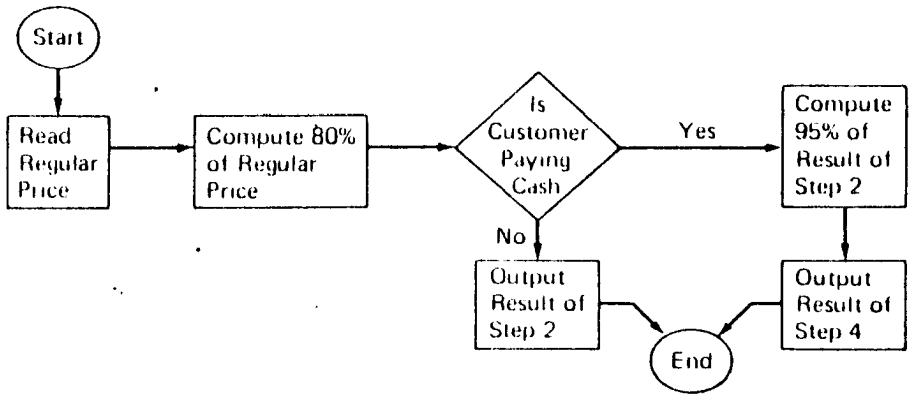


25. 43.7
26. 10.6
27. 55.88
28. 55.89
29. 60.3
30. 101

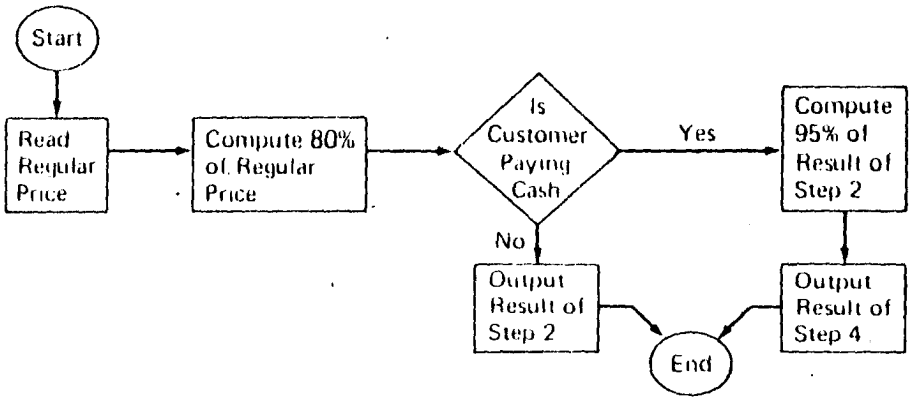
In Exercises 25–30, state the output from the process shown in the flow chart for the given input.



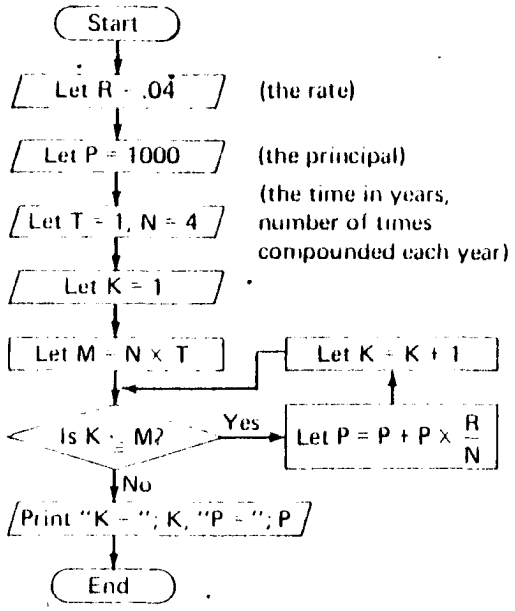
25. 43.7 8.772
26. 106 32.604
27. 55.88 -0.0024.
28. 55.89 0.0048
29. 60.3 3.18
30. 101 32.484



1. If an article is priced at a discount of 30% and then an additional discount of 20% is given on the discounted price, what percent of the regular price is the final price?
2. If the price of an article is raised 20% and a 20% discount is given on the increased price, what percent of the original price is the final price?



1. If an article is priced at a discount of 30% and then an additional discount of 20% is given on the discounted price, what percent of the regular price is the final price? 56%
2. If the price of an article is raised 20% and a 20% discount is given on the increased price, what percent of the original price is the final price? 96%




```
10  LET R = .04
20  LET P = 1000
30  LET T = 1
40  LET N = 4
50  LET M = N*T
60  FOR K = 1 TO M
70  LET P = P + P*R/N
80  PRINT "K = "; K, "P = "; P
90  NEXT K
100 END
```

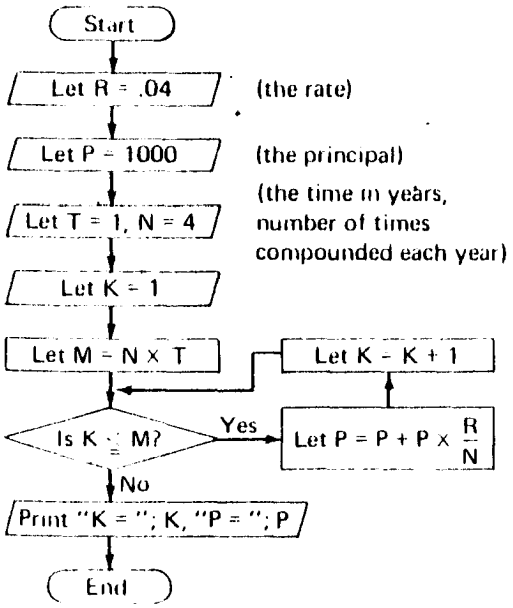
To find the principal after 2 years, type in the step shown at the right. The print-out is shown below.

```
30 LET T = 2
```

```
K =  1      P =  1010
K =  2      P =  1020.1
K =  3      P =  1030.3
K =  4      P =  1040.6
K =  5      P =  1051.01
K =  6      P =  1061.52
K =  7      P =  1072.14
K =  8      P =  1082.86
```

Solve.

1. What will $1800 amount to after 9 months at 4% per year compounded quarterly?
2. At 6% per year, compounded semiannually, how much will $3475 amount to in 2 years?
3. Find the interest, compounded semiannually, on $4750 for 2 years at 4% per year.
4. Find the interest on $375 at compound interest for 4 years at 4% per year, the interest being compounded annually.
5. What is the difference between the simple and compound (compounded semiannually) interest on $250 in 2 years at 4% per year?




```
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30  LET T = 1
40  LET N = 4
50  LET M = N*T
60  FOR K = 1 TO M
70  LET P = P + P*R/N
80  PRINT "K = "; K, "P = "; P
90  NEXT K
100 END
```

If you wish to print only the final answer as in the flow chart, remove 90 NEXT K, add 75 NEXT K.

To find the principal after 2 years, type in the step shown at the right. The print-out is shown below.

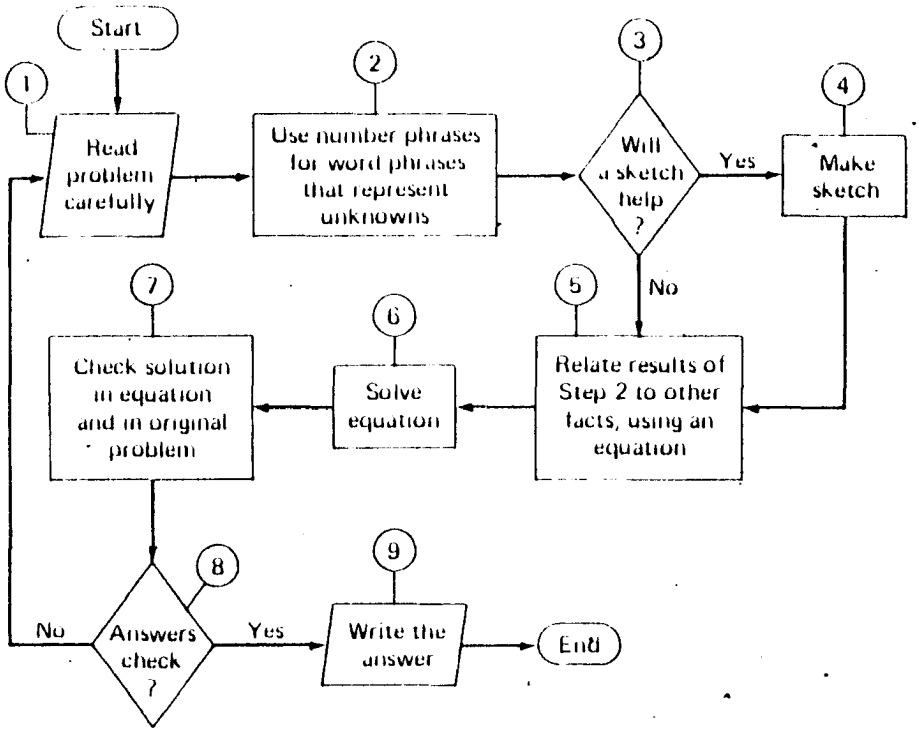
```
30 LET T = 2
```

```
K = 1    P = 1010
K = 2    P = 1020.1
K = 3    P = 1030.3
K = 4    P = 1040.6
K = 5    P = 1051.01
K = 6    P = 1061.52
K = 7    P = 1072.14
K = 8    P = 1082.86
```

Solve.

1. What will $1800 amount to after 9 months at 4% per year compounded quarterly? **$1854.54**
2. At 6% per year, compounded semiannually, how much will $3475 amount to in 2 years? **$3910.92**
3. Find the interest, compounded semiannually, on $4750 for 2 years at 4% per year. **$391.55**
4. Find the interest on $375 at compound interest for 4 years at 4% per year, the interest being compounded annually. **$63.69**
5. What is the difference between the simple and compound (compounded semiannually) interest on $250 in 2 years at 4% per year? **Compound interest is 61¢ more.**

Notice that in the foregoing example there was a number given, 8:00 A.M., that was not used in the solution. Some of the exercises that follow may also contain numerical information that is not needed in the solution of the problem. If so, you should select the necessary information and ignore the rest.



Exercises

15. Joe lives twice as far from school as Mona does. If together they travel 5.4 miles to school, how far from school does Joe live?

16. Karen spent $16.00 on theater tickets. Adult tickets cost twice as much as student tickets. If she bought 2 adult tickets and 4 student tickets, how much does each kind of ticket cost?

17. A metal plate cut in the form of an isosceles triangle weighs 43 pounds. If the triangle has congruent sides that are each 6 in. longer than the base, and the perimeter of the triangle is 57 in., find the length of each side of the triangular plate.

18. Two delivery trucks start from Central City and Pottsdam, which are 39 miles apart, and make deliveries along Route 7. The truck leaving Central City makes 7 stops and the truck leaving Pottsdam makes 9 stops. If, when the trucks meet, the truck from Pottsdam has traveled 11 miles farther than the truck from Central City, how far from Central City do the trucks meet?

19. One number is 3 more than twice a second number, and the second number is $\frac{3}{4}$ of a third number. If the sum of the first two numbers is 30, find the three numbers.

20. One of the angles of a triangle measures 30° more than twice the measure of a second angle, and the second angle measures 10° more than the third angle. Recalling that the sum of the measures of the angles in a triangle is 180°, find the measure of each angle.

15. Joe lives twice as far from school as Mona does. If together they travel 5.4 miles to school, how far from school does Joe live? **3.6 miles**

16. Karen spent $16.00 on theater tickets. Adult tickets cost twice as much as student tickets. If she bought 2 adult tickets and 4 student tickets, how much does each kind of ticket cost? **Adult $4.00**
Student $2.00

17. A metal plate cut in the form of an isosceles triangle weighs 43 pounds. If the triangle has congruent sides that are each 6 in. longer than the base, and the perimeter of the triangle is 57 in., find the length of each side of the triangular plate. **15 in., 21 in., 21 in.**

18. Two delivery trucks start from Central City and Pottsdam, which are 39 miles apart, and make deliveries along Route 7. The truck leaving Central City makes 7 stops and the truck leaving Pottsdam makes 9 stops. If, when the trucks meet, the truck from Pottsdam has traveled 11 miles farther than the truck from Central City, how far from Central City do the trucks meet? **14 miles**

19. One number is 3 more than twice a second number, and the second number is $\frac{3}{4}$ of a third number. If the sum of the first two numbers is 30, find the three numbers. **21, 9, 12**

20. One of the angles of a triangle measures 30° more than twice the measure of a second angle, and the second angle measures 10° more than the third angle. Recalling that the sum of the measures of the angles in a triangle is 180°, find the measure of each angle. **110°, 40°, 30°**

WORKING WITH COMPUTERS ACTIVITIES

WORKING WITH COMPUTERS OVERVIEW

This section of curriculum materials is composed of Activities numbered sixty-two through eighty-four. Each activity is accompanied by an answer key. Activities in this section will provide opportunities for the student to use skills in previous sections in pre-programming activities. All activities may be completed without the use of any hardware. Some activities at the end of this section are of general interest.

OBJECTIVE FOR THE SECTION

Students will demonstrate their readiness to begin working with programming activities by completing lessons from this section with 90% accuracy.

SUGGESTED USES

Activities 62-84 are to be used to create student interest in programming and to introduce students to the various uses of the microcomputer. The activities may be used in any order. There is no level of difficulty associated with this section.

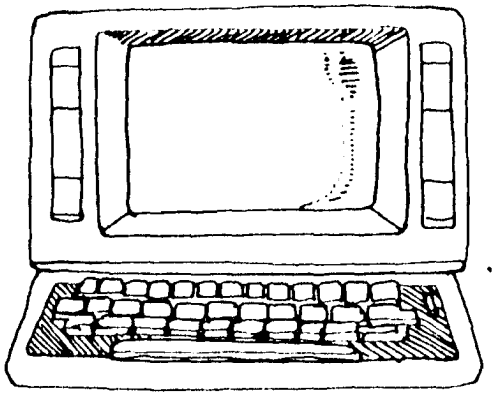
Finding Out About Computers

Microcomputers

A microcomputer is a small machine designed for the input, storage, processing, and output of information. Any microcomputer system consists of machinery, called hardware, and programs, called software. Both parts are needed for a computer to function effectively.

Hardware includes the computer's Central Processing Unit, or CPU, and other parts such as the keyboard, television screen, printer, cassette recorder, cassette tapes, disk drive, floppy disks, and joystick. Sometimes a modem is included to connect the microcomputer and a telephone for communication with other computers.

Software, or computer programs, are step-by-step instructions given to the computer to solve problems. Some computer languages are BASIC, COBOL, and LOGO. Software can consist of programs designed to perform specific tasks such as drilling students on number facts or processing a company's payroll.



On Your Own

1. Name the parts that make up a microcomputer's hardware.

2. Find out the names of four other computer languages.

3. Name three types of tasks you would like to have computer software do for you.

Finding Out About Computers

Microcomputers

A microcomputer is a small machine designed for the input, storage, processing, and output of information. Any microcomputer system consists of machinery, called hardware, and programs, called software. Both parts are needed for a computer to function effectively.

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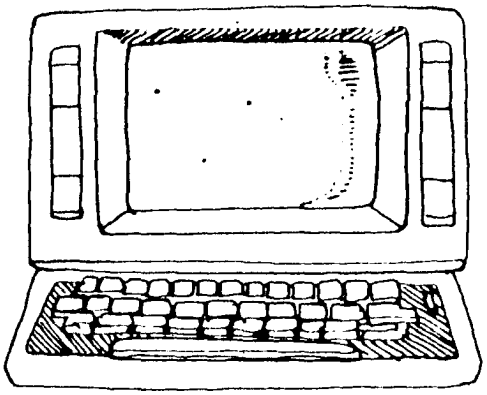


On Your Own

1. Name the parts that make up a microcomputer's hardware.
   CPU, keyboard, television screen, printer, cassette recorder, cassette tapes, disk drive, floppy disks, joysticks, modem
2. Find out the names of four other computer languages.
   Pascal, FORTRAN, APL, SNOBOL, MUMPS, LISP
3. Name three types of tasks you would like to have computer software do for you. Possible answers are
   1. math problems
   2. listing history facts
   3. possible quiz questions for tests

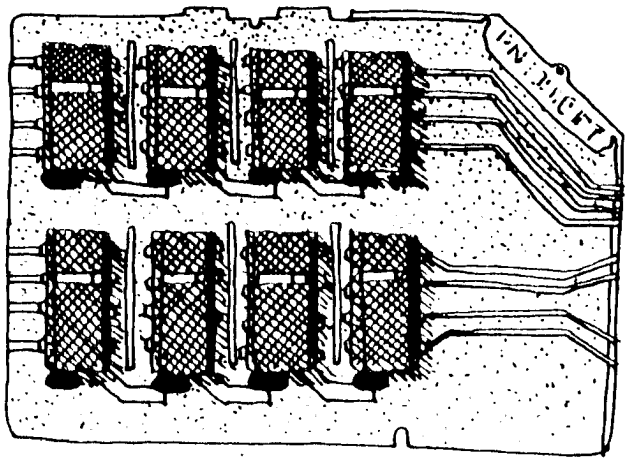
Finding Out About Computers

Computer Memory

In microcomputers, the memory is an electrical part called a chip or integrated circuit (IC). Its size is smaller than 1 square centimeter. There may be many memory chips inside a microcomputer.

The two types of memory are the permanent Read Only Memory, or ROM, and the temporary Random Access Memory, or RAM. ROM is the memory that contains the computer's own operating system. It cannot be changed by a person using the computer. RAM stores programs and data for a short period of time.

A byte is the measure used in describing the computer's memory storage. One byte is the space needed to store one character, such as "A", "*", or "9". Since the number of bytes is in the thousands, the letter "K" is used to denote 1000's. For example, a microcomputer that can store 16,000 bytes is described as having 16K of storage.



On Your Own

1. What is the difference between ROM and RAM?

_____

_____

2. Tell whether each statement is true or false.

a. 64K means 64,000 bytes of storage. _____

b. 1,000,000 bytes of storage is described as 10K. _____

c. 48K of storage can hold 48,000 characters. _____

3. Find out the storage capacity of 3 brands of microcomputers on the market.

_____

_____

_____

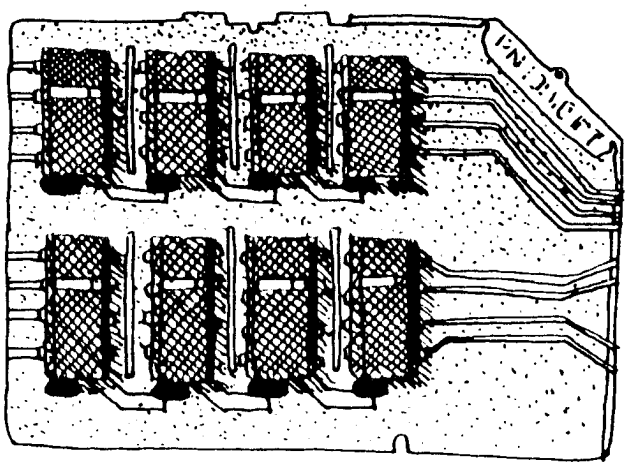
Finding Out About Computers

Computer Memory

In microcomputers, the memory is an electrical part called a chip or integrated circuit (IC). Its size is smaller than 1 square centimeter. There may be many memory chips inside a microcomputer.

The two types of memory are the permanent Read Only Memory, or ROM, and the temporary Random Access Memory, or RAM. ROM is the memory that contains the computer's own operating system. It cannot be changed by a person using the computer. RAM stores programs and data for a short period of time.

A byte is the measure used in describing the computer's memory storage. One byte is the space needed to store one character, such as "A", "*", or "9". Since the number of bytes is in the thousands, the letter "K" is used to denote 1000's. For example, a microcomputer that can store 16,000 bytes is described as having 16K of storage.



On Your Own

1. What is the difference between ROM and RAM?

ROM = permanent and used only by the computer
RAM = temporary and only stores informations

2. Tell whether each statement is true or false.

a. 64K means 64,000 bytes of storage. true

b. 1,000,000 bytes of storage is described as 10K. false

c. 48K of storage can hold 48,000 characters. true

3. Find out the storage capacity of 3 brands of microcomputers on the market.

answers will vary

Finding Out About Computers

Computer Memory

The heart of any computer is the Central Processing Unit, or CPU. In a microcomputer the CPU is a microprocessor chip, a tiny electrical part consisting of thousands of circuits. A chip is smaller than a square centimeter. The computer's "intelligence" is located in the CPU.

By itself, the CPU cannot work. It needs a memory system to hold both information being processed and programs for getting the information. The memory of a microcomputer is located on a chip separate from the CPU chip.

There are two types of memory. Read Only Memory, or ROM, is permanent and remembers only information that was put in at the factory. Random Access Memory, or RAM, stores information for a short period of time. When the computer is turned off, RAM loses its information.

On Your Own

1. Match each term with its description.

CPU _____

chip _____

RAM _____

ROM _____

A. Permanent memory of the computer.

B. The part of the computer where the "intelligence" is located.

C. A tiny computer part consisting of thousands of circuits.

D. Temporary memory of the computer.

2. How can a microcomputer save information for future use?

_____

_____

_____

_____

Finding Out About Computers

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On Your Own

1. Match each term with its description.

CPU B

chip C

RAM D

ROM A

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C. A tiny computer part consisting of thousands of circuits.

D. Temporary memory of the computer.

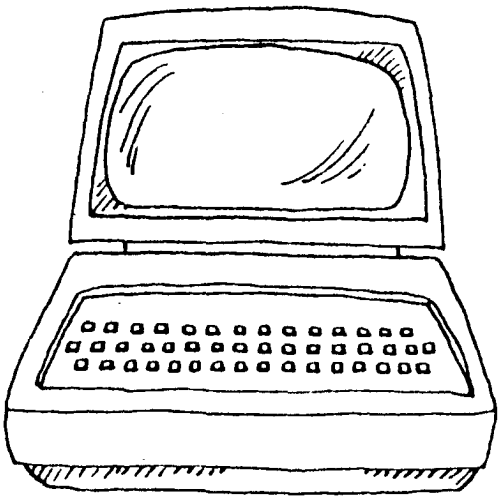
2. How can a microcomputer save information for future use?

Storage devices such as disks and tapes must be used

Finding Out About Computers

Extension of Computer Memory

Since Random Access Memory loses its information when the computer is turned off, storage outside the computer is necessary. Devices, called peripherals, are used with the computer. A computer and its peripherals are called hardware.



Peripherals fall into three groups.

Input Only

Keyboards are devices used to enter programs and data.

Output Only

TV screens, or CRT's, and printers are used to display programs and information. A CRT loses information when the computer is turned off. A printer saves information on paper.

Input and Save Information

Cassette tapes with tape recorders and floppy disks with disk drives both input and save information.

On Your Own

1. List all the parts that make up a computer's hardware.

_____

_____

_____

2. Choose three different models of microcomputers and find out the following information for each:

- **a.** Is the keyboard connected to the screen? _____
- **b.** Which device is offered--cassette tape or disk drive, or both? _____
- **c.** Is a printer available? _____

3. Design your own microcomputer. Draw a diagram and label the peripherals.

Finding Out About Computers

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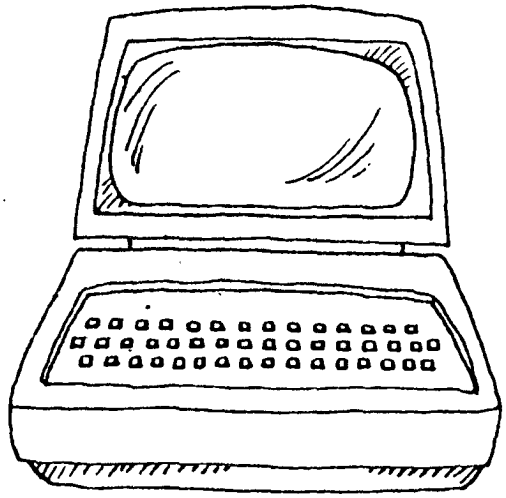

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Input and Save Information

Cassette tapes with tape recorders and floppy disks with disk drives both input and save information.

On Your Own

1. List all the parts that make up a computer's hardware.
   Keyboard, screen, printer, tape recorder, tapes, disk drive, disks, joysticks, modem
2. Choose three different models of microcomputers and find out the following information for each:
   a. Is the keyboard connected to the screen? Answers will vary
   b. Which device is offered--cassette tape or disk drive, or both?
   c. Is a printer available?
3. Design your own microcomputer. Draw a diagram and label the peripherals.

Finding Out About Computers

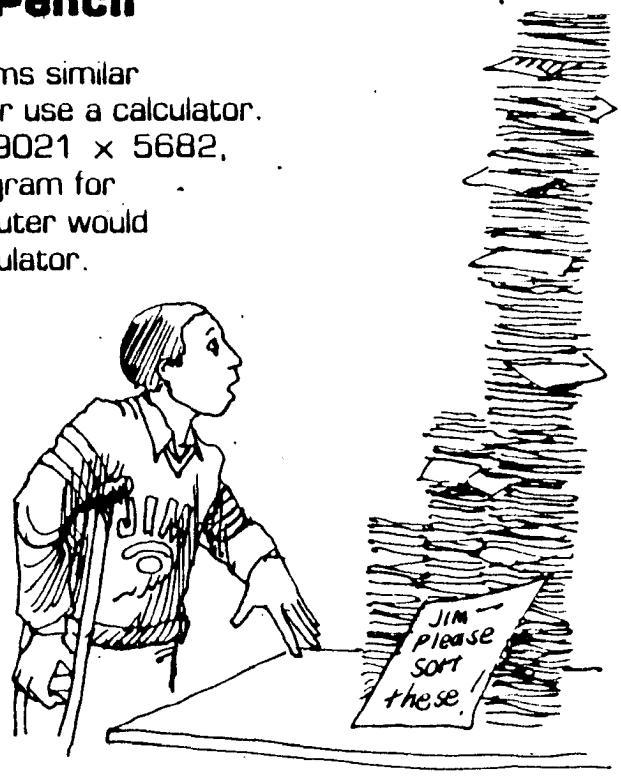
Calculator, Computer or Pencil

If you had to solve ten multiplication problems similar to 35 × 40, you would do them by hand or use a calculator. But if there were fifty problems similar to 9021 × 5682, you would want to consider entering a program for multiplication into the computer. The computer would complete the task much faster than a calculator.

How would you sort the following ten cards into numerical order?

23	7	41	70	10
48	2	34	15	56

The best way to do this job is by hand. However, suppose there were 2000 cards to sort. A computer could do this task very quickly once you provided a program that would tell the computer to compare numbers and arrange them in numerical order.



On Your Own

1. Identify the best method to use in completing these tasks.

- **a.** Solve 5 division problems that have a 4-digit dividend and a 2-digit divisor. _____
- **b.** Put 10 names in alphabetical order. _____
- **c.** Solve 50 addition problems with 10 addends in each problem. _____

2. Name three types of math problems that cannot be done easily by calculator.

_____

_____

3. Most calculators have a memory key. Describe how a calculator's memory works.

_____

_____

Finding Out About Computers

Calculator, Computer or Pencil

If you had to solve ten multiplication problems similar to 35 × 40, you would do them by hand or use a calculator. But if there were fifty problems similar to 9021 × 5682, you would want to consider entering a program for multiplication into the computer. The computer would complete the task much faster than a calculator.

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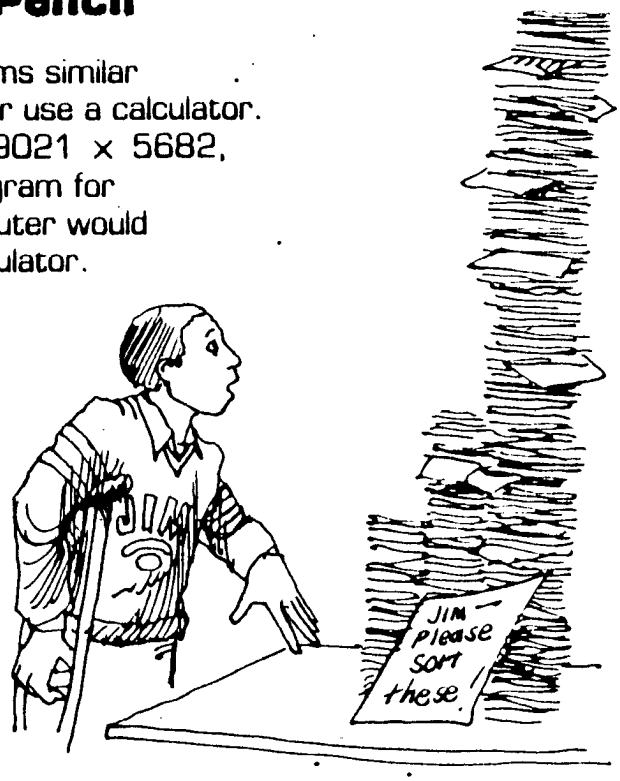


On Your Own

1. Identify the best method to use in completing these tasks.

- **a.** Solve 5 division problems that have a 4-digit dividend and a 2-digit divisor. Calculator
- **b.** Put 10 names in alphabetical order. Hand
- **c.** Solve 50 addition problems with 10 addends in each problem. Computer

2. Name three types of math problems that cannot be done easily by calculator. Possible answers are Classifying polygons, Rounding numbers to different place values, Comparing numbers.

3. Most calculators have a memory key. Describe how a calculator's memory works.
A calculator's memory stores numbers that can be used in subsequent calculations.

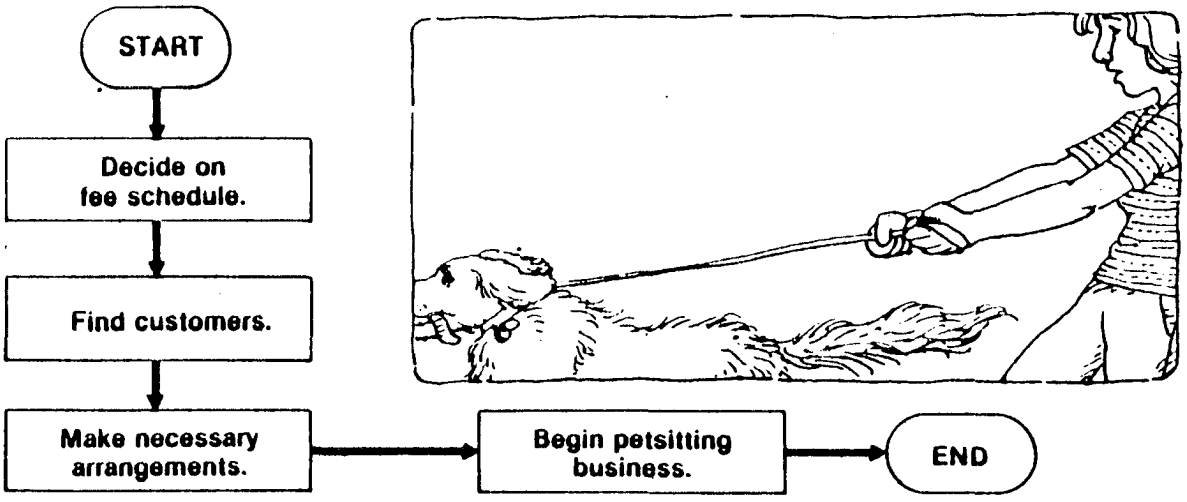
Finding Out About Computers

Algorithms and Flowcharts

An algorithm is a step-by-step procedure for completing a task. Suppose you decide to start a petsitting service to earn some money. Here is how you can organize your plans using an algorithm.

1. Decide on a fee schedule – charge by the day.
2. Find customers – go door-to-door in your neighborhood.
3. Make necessary arrangements with customers – date and time to begin service.
4. Start petsitting – you're in business!

A flowchart is a diagram of an algorithm. Here is the flowchart that describes the petsitting service.



On Your Own

1. Fill in the blanks.
A step-by-step procedure for completing a task is called an _____. Steps must be shown in a logical _____. A _____ is a diagram explaining an algorithm.

2. What shapes are used in the flowchart above? _____

_____

3. Write the algorithm and design the flowchart for a topic that interests you.

Finding Out About Computers

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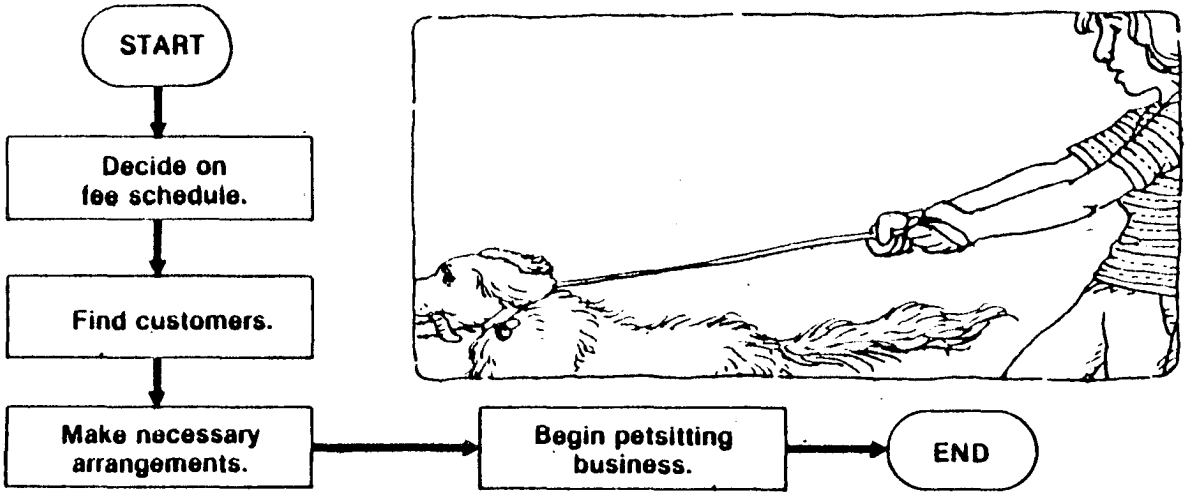

On Your Own

1. Fill in the blanks.
A step-by-step procedure for completing a task is called an Algorithm. Steps must be shown in a logical order. A flowchart is a diagram explaining an algorithm.

2. What shapes are used in the flowchart above? ovals and rectangles

3. Write the algorithm and design the flowchart for a topic that interests you. Answers will vary

Finding Out About Computers

Computer Programs

A program is a set of directions given to the computer. Some of the most popular program languages are BASIC, COBOL, FORTRAN, LOGO and Pascal. The computer language used here is BASIC, which stands for Beginner's All-purpose Symbolic Instruction Code.

The computer does arithmetic in order from left to right, with multiplication [*] or division [/] performed before addition [+] and subtraction [–]. Here are some arithmetic expressions in computer symbols and how the computer would evaluate them.

Expression	Computed Value
2*5 – 4	10 – 4 = 6
4 + 3*6	4 + 18 = 22
10/5 + 8*7	2 + 56 = 58
12 – 9/3 + 6	12 – 3 + 6 = 15

The program below would have the computer print answers to the expressions above. Each instruction must go on a separately numbered line. The PRINT statement tells the computer to print the answer. The END statement lets the computer know that the program is complete.

```
10  PRINT 2*5 – 4
20  PRINT 4 + 3*6
30  PRINT 10/5 + 8*7
40  PRINT 12 – 9/3 + 6
50  END
```

Here is what the computer would print on the screen for answers.

```
RUN
6
22
58
15
```

On Your Own

1. For each program, show what the computer would print.

10 PRINT 20 – 6/2 _____

20 PRINT 9*7 + 7 _____

30 END _____

5 PRINT 3/4 + 1/5 _____

10 PRINT 5 + 1/8 + 1/2 _____

15 END _____

2. Write a program to print the answers to two math problems.

Finding Out About Computers

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20 PRINT 4 + 3*6
30 PRINT 10/5 + 8*7
40 PRINT 12 - 9/3 + 6
50 END
```

Here is what the computer would print on the screen for answers.

```
RUN
 6
 22
 58
 15
```

On Your Own

1. For each program, show what the computer would print.

```
10 PRINT 20 - 6/2     Run
20 PRINT 9*7 + 7      17
30 END                10
```

```
5  PRINT 3/4 + 1/5    Run
10 PRINT 5 + 1/8 + 1/2  .95
15 END                5.625
```

2. Write a program to print the answers to two math problems. Answers will vary

Finding Out About Computers

Programming in BASIC

There are many languages to use when communicating with computers. The program shown is in BASIC which stands for Beginners All-Purpose Symbolic Instruction Code. Notice that the symbols for addition [+], and subtraction [–] are the same. Multiplication is shown by * and division is shown by /.

This program tells the computer to print the answers to four math problems.

```
10  PRINT 58 + 92
20  PRINT 125 - 83
30  PRINT 60 * 12
40  PRINT 625 / 25
99  END
```

When you type the word RUN, this is what will appear on the screen.

```
RUN
150
42
720
25
```

Every instruction is called a statement. Every statement is given a number, usually a multiple of ten. Programs usually have an END statement for the last step.

On Your Own

1. For each program, show what the computer would print on the screen.

```
 5  PRINT 15 + 15 + 15      _____
10  PRINT 3 * 15            _____
15  END                     _____
20  PRINT 1000 / 8          _____
40  PRINT 8 / 1000          _____
60  END                     _____
10  PRINT 5000 - 99         _____
40  END                     _____
30  PRINT 1001 / 13         _____
20  PRINT 52 * 11           _____
```

2. Find and correct the errors in the program.

```
10  PRINT 80 ? 2            _____
15  PRUNT 16 * 3            _____
20  PRINT 34 + + 7          _____
 5  END                     _____
```

3. Write a program to print the answers to two math problems.

Finding Out About Computers

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Every instruction is called a statement. Every statement is given a number, usually a multiple of ten. Programs usually have an END statement for the last step.

On Your Own

1. For each program, show what the computer would print on the screen.

```
5   PRINT 15 + 15 + 15        Run
10  PRINT 3 * 15              45
15  END                       45
20  PRINT 1000 / 8            Run
40  PRINT 8 / 1000            125
60  END                       .008
10  PRINT 5000 - 99           Run
40  END                       4901
30  PRINT 1001 / 13           572
20  PRINT 52 * 11             77
```

2. Find and correct the errors in the program.

```
10  PRINT 80 ? 2      10 PRINT 80/2
15  PRUNT 16 * 3      15 PRINT 16*3
20  PRINT 34 + + 7    20 PRINT 34+7
 5  END               25 END
```

3. Write a program to print the answers to two math problems.

Finding Out About Computers

PRINT and LET Statements

Let's look at the BASIC program for the grade averaging problem in Unit 3. Five grades on a math quiz are 83, 92, 76, 80, 94. Here is the BASIC program for finding the average.

```
10  PRINT "THIS PROGRAM FINDS THE AVERAGE OF FIVE GRADES."
20  LET S = 83 + 92 + 76 + 80 + 94
30  LET A = S/5
40  PRINT "THE AVERAGE GRADE IS" ; A;"."
50  END
```

When you type RUN, the computer would print the following.

```
RUN
THIS PROGRAM FINDS THE AVERAGE OF FIVE GRADES.
THE AVERAGE GRADE IS 85.
```

The computer prints any words, numbers, or symbols that are put in quotation marks.

The following program shows how the LET statement can be used.

```
 5  LET A = 20
10  LET B = 5
15  PRINT A+B, A-B, A*B, A/B
20  END
```

Here is what the computer will print when you type RUN.

```
RUN
25        15        100       4
```

On Your Own

1. Describe what the LET statement does in a BASIC program.

_____

_____

2. In each program below, write what the computer would print for answers.

```
10  LET A = 72
20  LET B = 6
30  PRINT A*B
40  PRINT A/B
99  END
```

_____

_____

```
30  LET X = 50
60  LET Y = X - 10
90  PRINT X, Y
120 END
```

_____

_____

```
 5  LET C = 10
10  LET D = 20
15  LET E = C*D
20  LET F = E - D
25  PRINT E, F
30  END
```

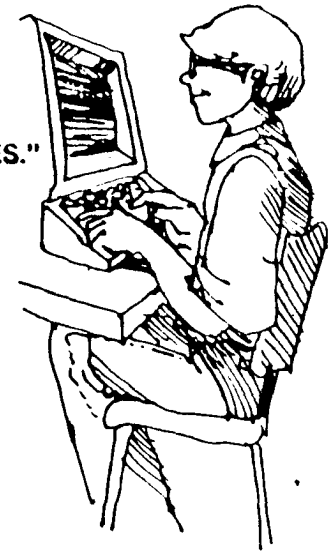
_____

_____

3. Write your own BASIC program using LET, PRINT, and END statements.

Finding Out About Computers

PRINT and LET Statements



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30  LET A = S/5
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50  END
```

When you type RUN, the computer would print the following.

```
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THIS PROGRAM FINDS THE AVERAGE OF FIVE GRADES.
THE AVERAGE GRADE IS 85.
```

The computer prints any words, numbers, or symbols that are put in quotation marks.

The following program shows how the LET statement can be used.

```
 5  LET A = 20
10  LET B = 5
15  PRINT A+B, A-B, A*B, A/B
20  END
```

Here is what the computer will print when you type RUN.

```
RUN
25        15        100       4
```

On Your Own

1. Describe what the LET statement does in a BASIC program.

It tells the computer to store a number in memory labeled by a letter and tells the computer to do calculations.

2. In each program below, write what the computer would print for answers.

```
10  LET A = 72
20  LET B = 6
30  PRINT A*B
40  PRINT A/B
99  END
```

432
12

```
30  LET X = 50
60  LET Y = X - 10
90  PRINT X, Y
120 END
```

40

```
 5  LET C = 10
10  LET D = 20
15  LET E = C*D
20  LET F = E - D
25  PRINT E, F
30  END
```

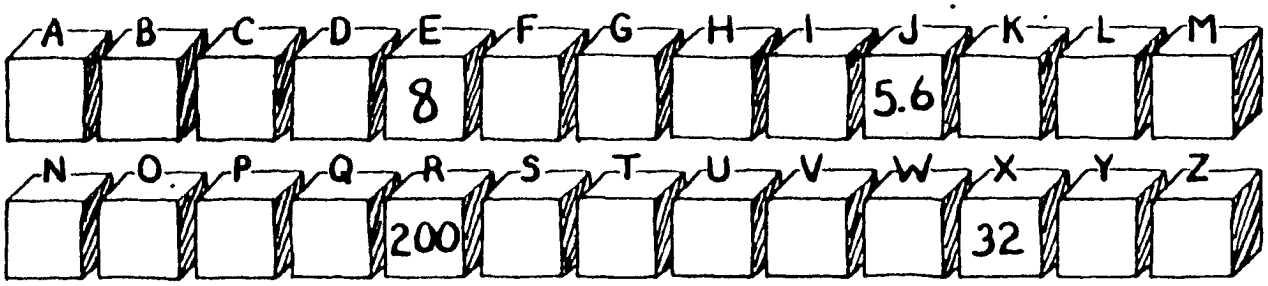
200
180

3. Write your own BASIC program using LET, PRINT, and END statements. Answers will vary.

Finding Out About Computers

PRINT and LET Statements

Imagine that there are 26 little boxes inside the computer. Each box can contain only one number at any one time.



The LET statement is used to tell the computer to assign a value to a letter. Look at the program and the answers that the computer would print.

```
10  LET E = 8.2
20  LET J = 5.6
30  PRINT E + J
40  END
```

```
13.8
```

```
 5  LET A = 21
10  LET B = 7
15  PRINT A*B, A/B
20  END
```

```
147      3
```

Here are three BASIC statements and what the computer would show as output. Notice the differences. Assume R 200.

STATEMENT	OUTPUT
10 PRINT R	200
20 PRINT "R"	R
30 PRINT "R = ";R	R = 200

The computer will print anything inside quotation marks.

On Your Own

1. Describe what the LET statement does in a BASIC program.

_____

_____

2. Show what the computer would print for the following program.

```
 5  LET P = 72                    _____
10  LET Q = 12                    _____
15  PRINT P + Q, P - Q, P*Q, P/Q  _____
20  END                           _____
```

3. A "bug" is a mistake in a computer program. Find the "bugs" in this program.

```
10  LET 27 = S    _____
20  LET 18 = T    _____
40  PRINT S - T   _____
30  END           _____
```

Finding Out About Computers

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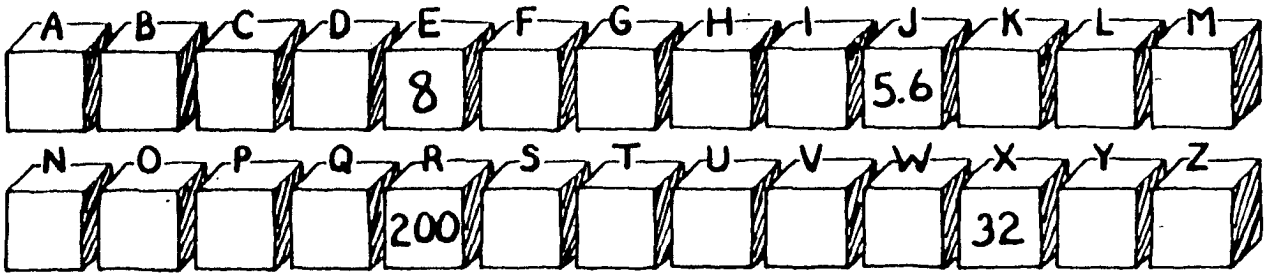

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STATEMENT	OUTPUT
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On Your Own

1. Describe what the LET statement does in a BASIC program.

Tells the computer to store a number in a box

2. Show what the computer would print for the following program.

```
5   LET P = 72                    84
10  LET Q = 12                    60
15  PRINT P + Q, P - Q, P*Q, P/Q  84 4
20  END                           6
```

3. A "bug" is a mistake in a computer program. Find the "bugs" in this program.

```
10  LET 27 = S      10 Let S = 27
20  LET 18 = T      20 Let T = 18
40  PRINT S - T     30 Print S-T
30  END             40 End
```

Finding Out About Computers

INPUT and GOTO Statements

Computer programs get more interesting when you introduce statements such as INPUT and GOTO. The INPUT statement allows you to enter different values for variables each time a program is run.

```
 5  LET A = 20
10  LET B = 5
15  PRINT A+B, A-B, A*B, A/B
20  END
```

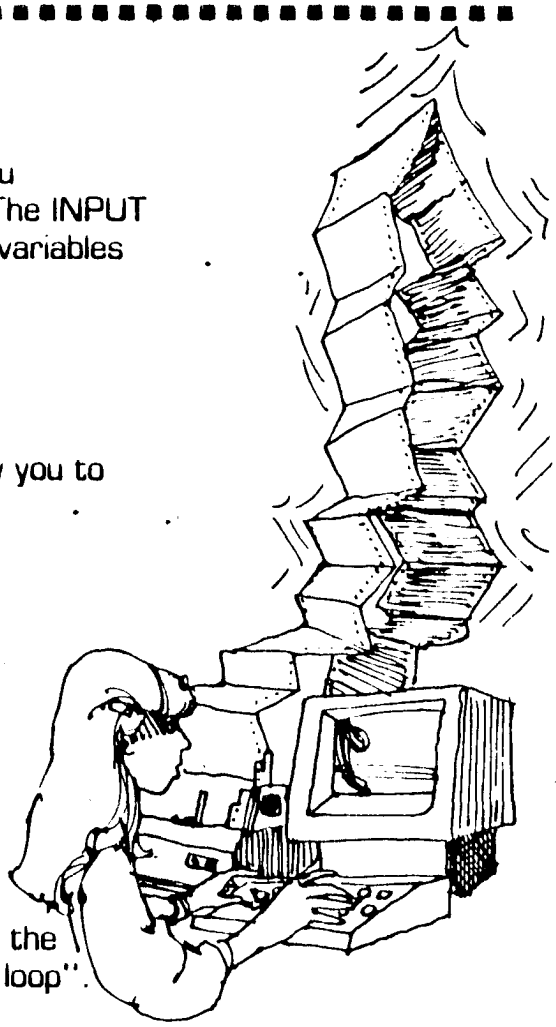
Here is how the program can be rewritten to allow you to enter any values of A and B.

```
 5  PRINT "WHEN THE ? APPEARS, ENTER
    TWO NUMBERS, SEPARATED BY A COMMA."
10  INPUT A, B
15  PRINT A+B, A-B, A*B, A/B
20  END
```

If you want to use this program for several values of A and B, you can insert a GOTO statement like the one below.

```
18  GOTO 10
```

Another type of statement must be added to keep the computer from running the program in an "infinite loop".



On Your Own

1. Show what the computer would print if the input numbers are 12, 15, 20, 25.

```
10  INPUT N
20  PRINT N; "SQUARED IS"; N*N
30  END
```

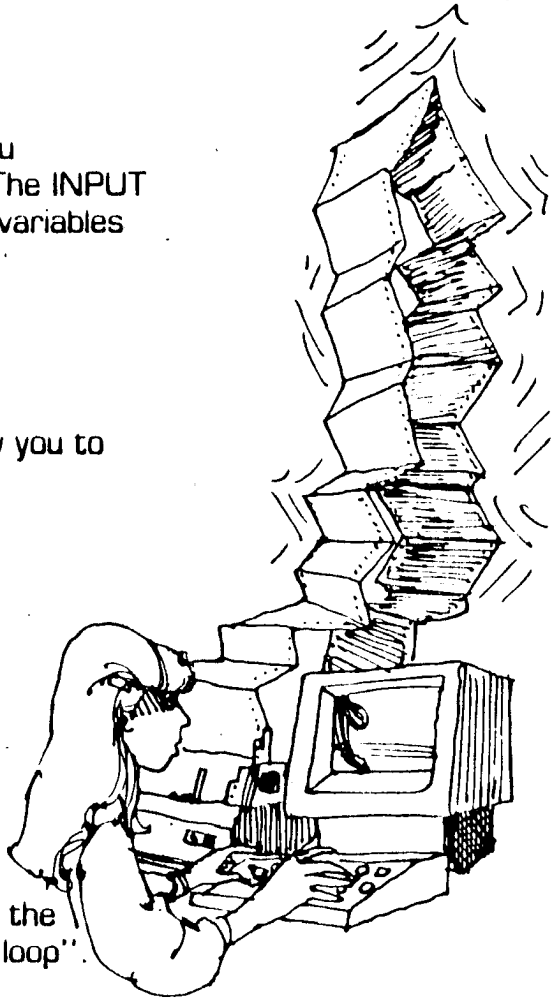
2. Add a GOTO statement that would make the computer print the design over and over.

```
10  PRINT "XXX"
20  PRINT "XX"
30  PRINT "X"
40  END
```

3. Write your own program using the INPUT statement. Show what the computer would print when the program is run.

Finding Out About Computers

INPUT and GOTO Statements



Computer programs get more interesting when you introduce statements such as INPUT and GOTO. The INPUT statement allows you to enter different values for variables each time a program is run.

```
 5  LET A = 20
10  LET B = 5
15  PRINT A+B, A-B, A*B, A/B
20  END
```

Here is how the program can be rewritten to allow you to enter any values of A and B.

```
 5  PRINT "WHEN THE ? APPEARS, ENTER
    TWO NUMBERS, SEPARATED BY A COMMA."
10  INPUT A, B
15  PRINT A+B, A-B, A*B, A/B
20  END
```

If you want to use this program for several values of A and B, you can insert a GOTO statement like the one below.

```
18  GOTO 10
```

Another type of statement must be added to keep the computer from running the program in an "infinite loop".

On Your Own

1. Show what the computer would print if the input numbers are 12, 15, 20, 25.

```
10  INPUT N
20  PRINT N; "SQUARED IS"; N*N
30  END
```

12 Squared is 144
15 Squared is 225
20 Squared is 400
25 Squared is 625

2. Add a GOTO statement that would make the computer print the design over and over.

```
10  PRINT "XXX"
20  PRINT "XX"
30  PRINT "X".
40  END
```

35 GOTO 10

3. Write your own program using the INPUT statement. Show what the computer would print when the program is run. Answers will vary

Finding Out About Computers

INPUT and GOTO Statements

The INPUT statement allows you to enter different values for variables each time a program is run. When the computer comes to an INPUT statement, it types a question mark and waits for you to enter a value.

Look at the following example of how the INPUT statement works. You can change the values of A and B each time you run the program.

```
10 INPUT A
20 INPUT B
30 PRINT A + B
40 END
```

```
RUN
?5
?12
17
```

By using the GOTO statement in the same program, you can tell the computer to continue the program over and over again.

```
10 INPUT A
20 INPUT B
30 PRINT A + B
35 GOTO 10
40 END
```

```
RUN
?10
?23
33
?26
?52
78
```

Another type of statement must be added to keep the computer from running the program in an "infinite loop".

On Your Own

1. Show what the computer would print for the average of these numbers: 78, 92, 81, 93.

```
10 PRINT "THIS PROGRAM FINDS THE AVERAGE OF FOUR NUMBERS."
20 INPUT W, X, Y, Z
30 LET A (W + X + Y + Z)/4
40 PRINT "THE AVERAGE IS"; A
50 GOTO 20
60 END
```

2. In the program in Exercise #1, what does the GOTO statement cause the computer to do?

3. Rewrite the program in Exercise #1 so that it finds the average of six numbers.

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35  GOTO 10
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?10
?23
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?26
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 78
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Another type of statement must be added to keep the computer from running the program in an "infinite loop".

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1. Show what the computer would print for the average of these numbers: 78, 92, 81, 93.

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20  INPUT W, X, Y, Z
30  LET A (W + X + Y + Z)/4
40  PRINT "THE AVERAGE IS"; A
50  GOTO 20
60  END
```

86

2. In the program in Exercise #1, what does the GOTO statement cause the computer to do?

Repeat program over and over again in a loop.

3. Rewrite the program in Exercise #1 so that it finds the average of six numbers.

Change lines 10, 20 and 30 to accomodate six numbers

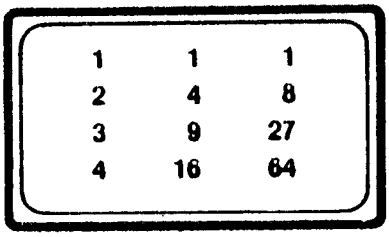
Finding Out About Computers

FOR and NEXT Statements

The FOR and NEXT statements allow you to accomplish a lot of work with a simple program. Here is an example of how these statements work.

```
10  FOR S = 1 TO 4
20  PRINT S, S*S, S*S*S
30  NEXT S
40  END
```

The computer would show these answers on the screen.



1	1	1
2	4	8
3	9	27
4	16	64

Statement 20 is repeated 4 times as indicated by S = 1 to 4. This is called "looping".

Suppose you wanted the computer to print out the following array of numbers.

2	4	6	8
10	12	14	16
18	20	22	24

You would use the FOR and NEXT statements in this way.

```
 5  FOR E = 2 TO 24 STEP 2
10  PRINT E,
15  NEXT E
20  END
```

In line 5, "STEP 2" tells the computer to print every other number starting with 2 and ending with 24.

On Your Own

1. Show what the computer would print for each program.

```
10  FOR X = 1 TO 10 STEP 1
20  PRINT X,
30  NEXT X
40  END
```

```
10  FOR N = 100 TO 5 STEP -5
20  PRINT N,
30  NEXT N
99  END
```

```
30  FOR A = 1 TO 3
40  PRINT "HELLO"
50  NEXT A
60  PRINT "GOOD-BYE"
70  END
```

2. Write a program to tell the computer to print the following array of numbers.

8	16	24	32	40
48	56	64	72	80

Finding Out About Computers

FOR and NEXT Statements

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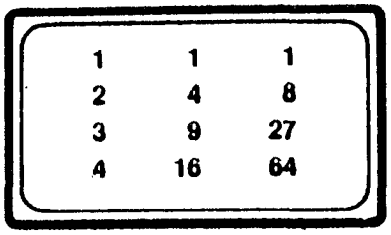

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1. Show what the computer would print for each program.

```
10  FOR X = 1 TO 10 STEP 1
20  PRINT X,
30  NEXT X
40  END
```

1 2 3 4 5
6 7 8 9 10

```
10  FOR N = 100 TO 5 STEP -5
20  PRINT N,
30  NEXT N
99  END
```

100 95 90 85 80 75
70 65 60 55 50 45
40 35 30 25 20 15
10 5

```
30  FOR A = 1 TO 3
40  PRINT "HELLO"
50  NEXT A
60  PRINT "GOOD-BYE"
70  END
```

HELLO
HELLO
HELLO
GOOD-BYE

2. Write a program to tell the computer to print the following array of numbers.

8	16	24	32	40
48	56	64	72	80

```
10 For C=8 TO 80 Step 8
20 Print C
30 Next C
99 End
```

Finding Out About Computers

FOR and NEXT Statements

The FOR-NEXT loop always begins with a FOR statement, ends with a NEXT statement, and includes one or more statements in between.

Here is an example of how these statements work.

```
 5  FOR X = 1 TO 4
10  PRINT "X = "; X
15  NEXT X
20  END
```

```
X = 1
X = 2
X = 3
X = 4
```

Each time the computer comes to the NEXT X statement, it increases the value of X by one. When all four values of X are used, the program ends.

Now suppose we change only line 5 in the program above so it reads:

```
5 FOR X = 1 TO 7 STEP 2
```

Here is what the computer would print.

```
X = 1
X = 3
X = 5
X = 7
```

The STEP 2 part of the statement tells the computer to print every other number starting with 1 and ending with 7. The increment number can also be negative.

On Your Own

1. Show what the computer would print for each program.

```
10  FOR N = 4 TO 24 STEP 4
20  PRINT N
30  NEXT N
40  END
```

_____

```
10  FOR P = 50 TO 5 STEP -5
20  PRINT P,
30  NEXT P
40  END
```

_____

```
20  FOR S = 1 TO 4
40  PRINT "****"
60  NEXT S
80  END
```

_____

_____

_____

_____

2. Write a program to tell the computer to print 10 rows of stars (*) with 4 stars in each row.

_____

_____

_____

_____

Finding Out About Computers

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1. Show what the computer would print for each program.

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10  FOR N = 4 TO 24 STEP 4
20  PRINT N
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40  END
```

4, 8, 12, 16, 20, 24

```
10  FOR P = 50 TO 5 STEP -5
20  PRINT P,
30  NEXT P
40  END
```

50, 45, 40, 35, 30, 25, 20, 15, 10, 5

```
20  FOR S = 1 TO 4
40  PRINT "***"
60  NEXT S
80  END
```

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

2. Write a program to tell the computer to print 10 rows of stars (*) with 4 stars in each row.

```
10 For S = 1 TO 10
20 Print "****"
30 Next S
40 End
```

Finding Out About Computers

IF-THEN Statements

The IF-THEN statement in BASIC tells the computer to carry out a specific operation IF a given condition is true. Here is an example.

```
20  IF X     10 THEN PRINT "THE NUMBER IS"; X
```

If the value of X is greater than 10, the computer will print the message. If the value of X is 10 or less, the computer will continue with the next line of the program.

Here is a table of comparison symbols.

BASIC symbol	Comparison	Math symbol
=	is equal to	=
<	is less than	<
>	is greater than	>
< =	is less than or equal to	≤
> =	is greater than or equal to	≥
< >	is not equal to	≠

The following program compares two numbers.

```
10  PRINT "THIS PROGRAM COMPARES TWO NUMBERS."
20  PRINT "WHEN THE ? APPEARS, TYPE IN 2 NUMBERS SEPARATED BY A COMMA".
30  INPUT A, B
40  IF A     B THEN PRINT "A IS GREATER THAN B".
50  IF A   B THEN PRINT "A IS LESS THAN B."
60  IF A = B THEN PRINT "A IS EQUAL TO B".
70  END
```

On Your Own

1. Write each condition in BASIC symbols.

a. E is less than 5. _____

b. P is not equal to Q. _____

c. X is greater than or equal to zero. _____

d. 4 times A is equal to B times C. _____

2. Write an IF-THEN statement for each description.

a. If C is less than 100, then go to line 30. _____

_____

b. If S is greater than T, then print the message S IS GREATER THAN T. _____

c. If the value of X is equal to twice the value of Y, then assign the value of 4 to Y. _____

3. Write your own program using an IF-THEN statement.

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70  END
```

On Your Own

1. Write each condition in BASIC symbols.

a. E is less than 5. E < 5

b. P is not equal to Q. P <> Q

c. X is greater than or equal to zero. X >= 0

d. 4 times A is equal to B times C. 4 * A = B * C

2. Write an IF-THEN statement for each description.

a. If C is less than 100, then go to line 30. If C < 100 Then 30

b. If S is greater than T, then print the message S IS GREATER THAN T. If S > T Then Print "S is Greater than T"

c. If the value of X is equal to twice the value of Y, then assign the value of 4 to Y. If X = 2 * 4 Then Let Y = 4

3. Write your own program using an IF-THEN statement. Answers will Vary

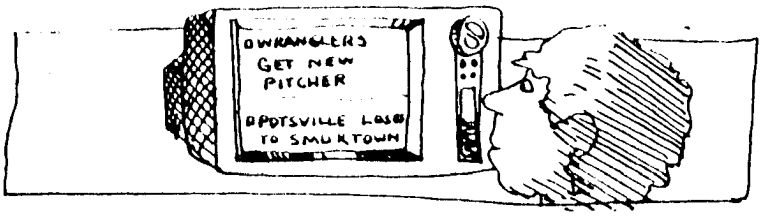
Finding Out About Computers

Data Bases

Data bases are computerized libraries called "networks." Large national networks can be tapped into by both business and personal computers.

To connect your home computer to one of these data bases, you must have a modem that receives and transmits information over telephone lines. You would have your own code number and password to insure personal security when using the data base.

Some of the most popular services available through data bases are stock market prices, news reports, airline flight schedules and reservations, hotel reservations, and employment opportunities. A network can even increase the storage capacity of your own microcomputer by storing your information in a private file.



On Your Own

1. Find out the names of three data base services and what information they provide.

2. Suppose you wanted to make airline reservations for your vacation. What information would you have to give the data base?

3. List five more services you would like to have available through a computer network.

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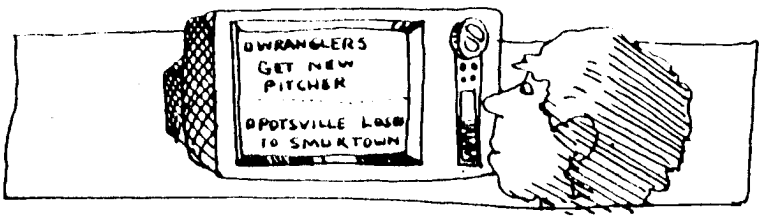

On Your Own

1. Find out the names of three data base services and what information they provide.
   Compuserve, Dow Jones, Comet (electronic mail system)
2. Suppose you wanted to make airline reservations for your vacation. What information would you have to give the data base?
   Destination point, date and time of travel, number of people in group, length of stay
3. List five more services you would like to have available through a computer network. Possible answers
   Weather reports, electronic games, biorhythms, horoscopes, movie reviews

Finding Out About Computers

Computer Careers

Suppose you decide that someday you would like to work with computers. What job in particular would you like to do? You could have the job of designing hardware or assembling computer parts. You may want to explore the field of computer programming. You could work at actually writing programs for a company or analyzing what programs should be written. Operating the computer once the programs have been written may be your special interest.

COMPUTER PROGRAMMING INSTRUCTOR
Full time instructor to teach computer programming and business applications.

There are many different jobs available in the field of computer applications. We looked at how computers help the handicapped, how computers can make music, and how computers can do word processing. Each application offers unique jobs related to that speical field.

EXPIRIENCED PROGRAMMER
Young growing computer company in southern N.H. offers challenging opportunity for professional growth.

Problems relating to computer security must be solved by people trained in computer law. Other career opportunities are computer sales, computer repair, and teaching about computers.

SOFTWARE ENGINEER
Telecommunications experience. An equal opportunity employer M/F.

APPLICATIONS PROGRAMMER
Full time, desired for fast paced organization. Knowledge of hotel and restaurant business would be a plus.

On Your Own

1. List five types of computer jobs and find a newspaper ad for each.
2. Interview a person who works with computers. Use the following questions as a guideline in your interview.
   - **a.** What is your job title?
   - **b.** What kind of work do you do?
   - **c.** Did you receive special training or education for the job?

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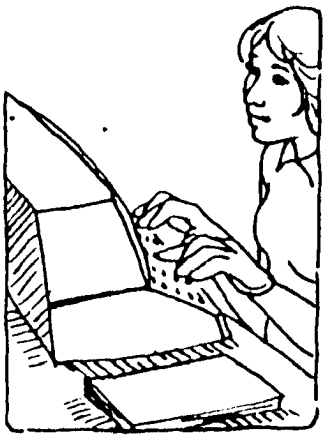
Finding Out About Computers

Word Processing

Word processing is a system for typing any kind of text material into a computer an then editing, changing or correcting the typed text easily and quickly. There are two types of equipment for this system. A word processor machine has as its only function the entering and editing of text. A word processing program allows a standard computer to function as a word processor. So, you can do word processing on most home computers.



If you are using a computer with a word processing program, you would not have to retype a report in order to make changes. You could quickly "erase" unwanted words by simply pressing a few keys on the computer's keyboard. Just as quickly, the remaining words in the paragraph would move backwards, closing in the gap left by the erased words. Then you press some other keys and sentences are moved to where you wnat them. Finally, you tell the computer to search through the report, finding and correcting misspelled words. Once you have your book report exactly as you want it, you could use a printer to get a "hard copy" paper version, printout.

On Your Own

1. How do you get the computer to make changes in text material?

2. Describe both the advantages and disadvantages of word processing.

3. Find out the names of word processing programs available for microcomputers.

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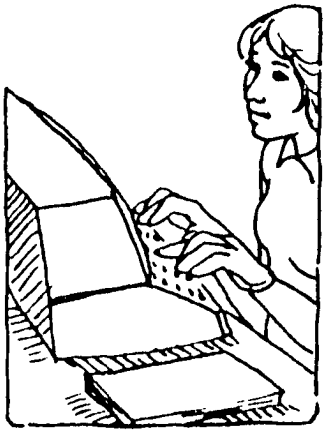


On Your Own

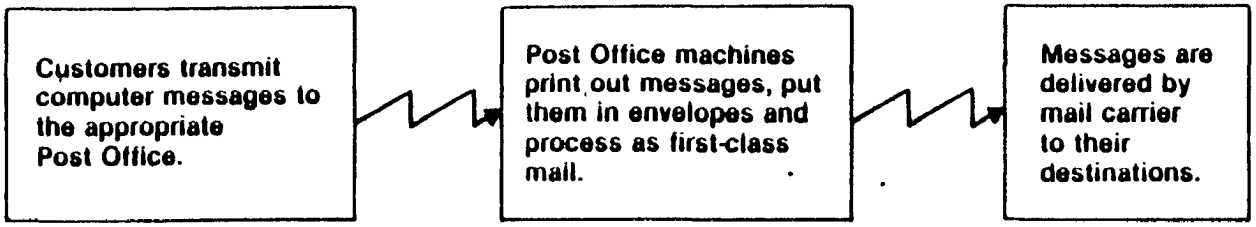
1. How do you get the computer to make changes in text material?
   Use computer-understood "commands" that are typed at the keyboard.
2. Describe both the advantages and disadvantages of word processing.
   Advantages: Easier to correct errors, quick method of proofreading
   Disadvantages: Expensive tool, difficult to take work home, complicated to use at first, good typing s
3. Find out the names of word processing programs available for microcomputers.
   Answers will vary

Finding Out About Computers

Electronic Mail Systems

Imagine that your mailbox is the computer terminal in your home! Press a key and messages will appear on your TV screen instantly. Electronic mail allows you to receive your mail over a computer network, read it on the TV screen and use a computer keyboard to reply. An electronic mail system can be used at home, at work, or while traveling – anywhere you can tie into the network with the proper terminal.

The United States Postal Service has introduced Electronic Computer-Originated Mail, or E-COM. The diagram shows how this particular system works.



This system is designed for use by businesses because many messages must be sent at the same time. The system is fast and efficient.

On Your Own

1. Describe how electronic systems will affect the paper industry.

2. List some advantages and disadvantages of E-COM.

3. Find out what companies offer an electronic mail system and send for information.

4. Find out what businesses in your area use electronic mail.

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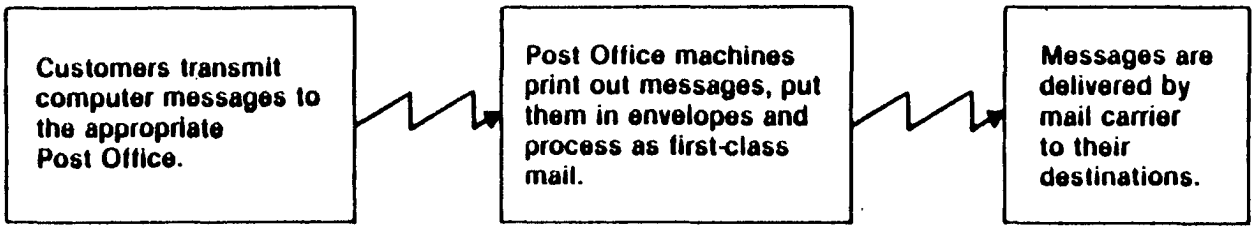


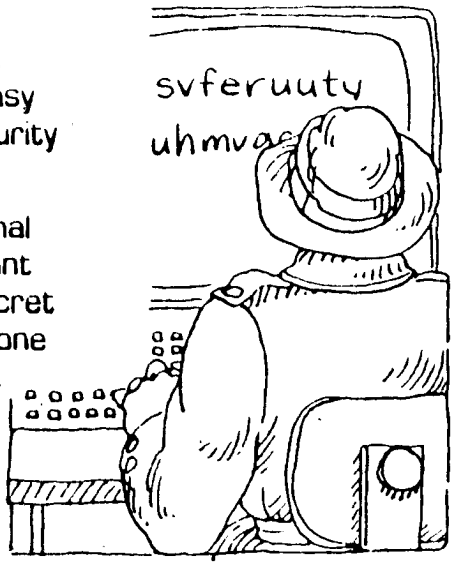
This system is designed for use by businesses because many messages must be sent at the same time. The system is fast and efficient.

On Your Own

1. Describe how electronic systems will affect the paper industry.
   Paper demand will decrease. Because information is displayed on screens
2. List some advantages and disadvantages of E-COM.
   Advantages: quick, reliable
   Disadvantages: designed for bulk mail, does not allow for advertising
3. Find out what companies offer an electronic mail system and send for information. Answers will vary.
4. Find out what businesses in your area use electronic mail.

Finding Out About Computers

Information Security



Data bases or networks, are computerized libraries that store vast amounts of information. Networks make it easy for people to get information. There must be built-in security to prevent unauthorized use of the information.

If you join a computer network, you will be given a personal account number and password to use every time you want to get information. Most security measures involve a secret code called a cryptogram. Usually, the code substitutes one letter for another or uses numbers to represent letters.

Using the key provided, decode the message below.

Key

a	b	c	d	e	f	g	h	i	j	k	l	m	n	o	p	q	r	s	t	u	v	w	x	y	z
j	l	h	t	u	w	y	x	a	d	f	p	o	r	s	b	c	v	e	g	m	q	n	k	i	z

Message

rugnsvferuutyssteuhmvagi

On Your Own

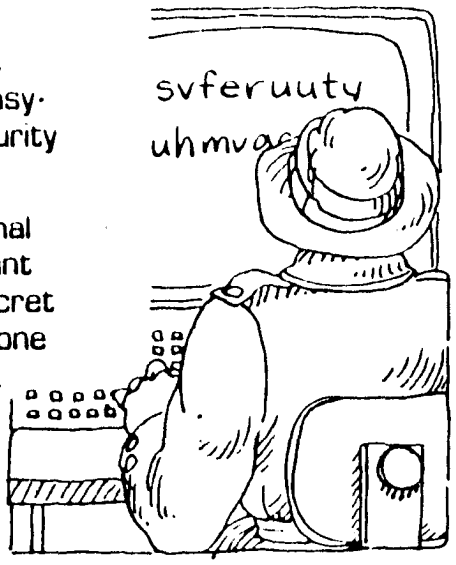
1. Make a list of the kinds of computerized files for which you think security is necessary.

2. Describe the security problems that could develop from using an electronic mail system that types letters at a computer terminal and distributes them electronically.

3. Use the key above to write a coded message. Give your message to a classmate to decode.

Finding Out About Computers

Information Security



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Using the key provided, decode the message below.

Key

a	b	c	d	e	f	g	h	i	j	k	l	m	n	o	p	q	r	s	t	u	v	w	x	y	z
j	l	h	t	u	w	y	x	a	d	f	p	o	r	s	b	c	v	e	g	m	q	n	k	i	z

Message

rugnsvferuutyssteuhmvagi

On Your Own Answers will vary.

1. Make a list of the kinds of computerized files for which you think security is necessary.

2. Describe the security problems that could develop from using an electronic mail system that types letters at a computer terminal and distributes them electronically.

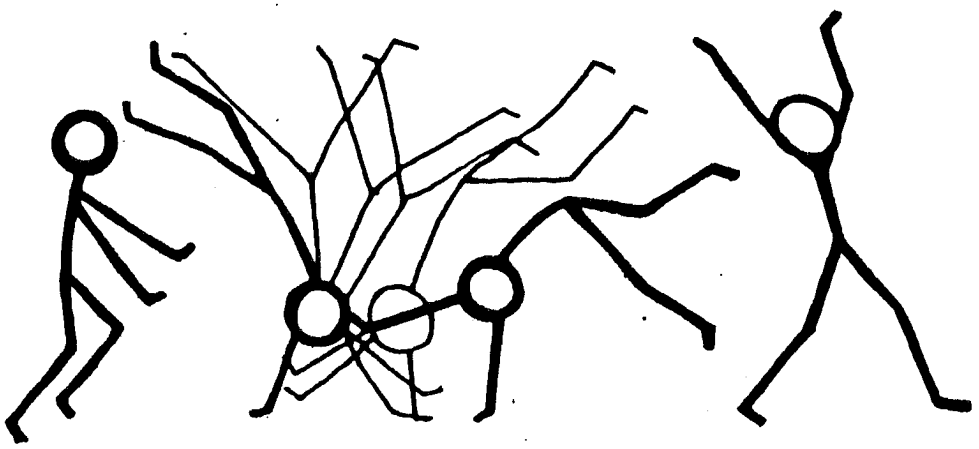
3. Use the key above to write a coded message. Give your message to a classmate to decode.

Finding Out About Computers

Computers and Sports

If tennis or racquetball is your favorite sport, you could make use of a computer to find a partner. You would provide your club with your skill level rating and your preference for time and type of play. The computer would then find your ideal practice partner!

Suppose you are a gymnast and want to perfect your cartwheel. You can make use of cameras and a computer to help analyze your motions. The cameras would film you from different angles. The computer would process the picture and show a diagram of your cartwheel on the screen. You could then study the results and analyze your performance.



On Your Own

1. Why are computers so important in road races and marathons?

   _____

   _____

2. What sport do you play? Describe how a computer could help you improve your performance.

   _____

   _____

3. Find out if any sports teams in your school or community use computers in their practice sessions.

Finding Out About Computers

Computers and Sports

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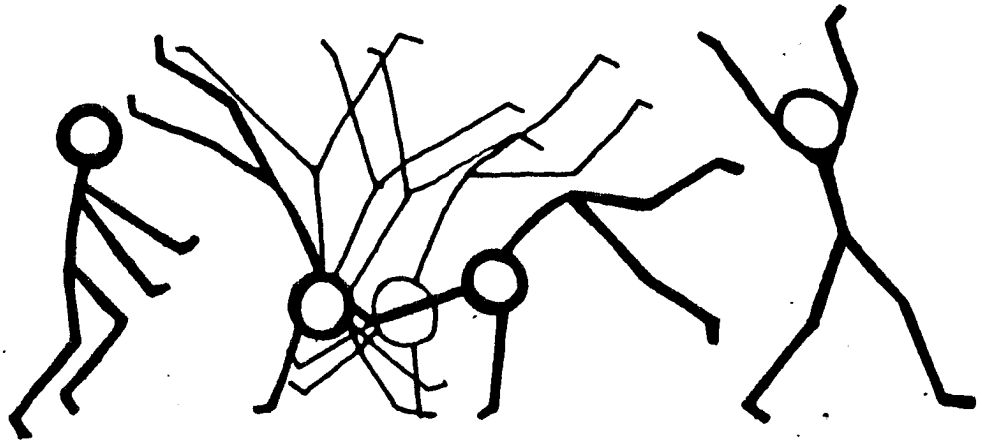

On Your Own

1. Why are computers so important in road races and marathons?

   Runner's times are reported accurately to the nearest fraction of a second

2. What sport do you play? Describe how a computer could help you improve your performance.

   Answers will vary

3. Find out if any sports teams in your school or community use computers in their practice sessions.

Finding Out About Computers

Computers and Music

Musicians are now using computers to create music. Programs are typed in at the keyboard and converted into sound by built-in sound synthesizers. The computer can be programmed to sound like any musical instrument or combination of instruments.

Research on computer music is being done to improve musical scores in movies. Software packages are available to train musicians in music theory and harmony. New computer technology allows composers to hear what they have composed almost immediately rather than waiting to hear their ideas played by a group of musicians.

A home computer music system would consist of a microcomputer, a piano-like keyboard, a voice synthesizer, and an output device such as a screen or printer to display your musical score. You would be able to compose, arrange and hear your own creations in one system!

On Your Own

1. Describe several uses of computers in music.

2. What hardware and software would be included in a home computer music system?

3. Find someone who plays an instrument or sings. Find out how a computer music system would be helpful to them.

Finding Out About Computers

Computers and Music

Musicians are now using computers to create music. Programs are typed in at the keyboard and converted into sound by built-in sound synthesizers. The computer can be programmed to sound like any musical instrument or combination of instruments.

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On Your Own

1. Describe several uses of computers in music.
   Creation of new musical scores
   Teaching aid for music theory
   Improvement of musical scores in movies
2. What hardware and software would be included in a home computer music system?
   Microcomputer, piano-like keyboard, voice synthesizer, output device, computer program
3. Find someone who plays an instrument or sings. Find out how a computer music system would be helpful to them.
   Answers will vary

Finding Out About Computers

Computer Checkout

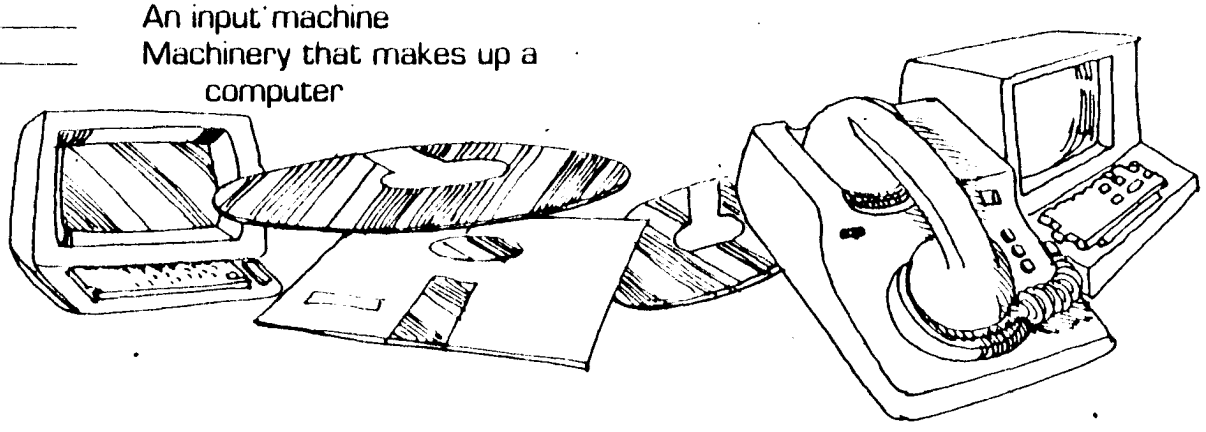
Now it is time to check your knowledge of computer terms and meanings. Match Column A with Column B.

Column A

_____ Temporary memory in computer
_____ Step-by-step instructions given to a computer
_____ A diagram that describes a procedure
_____ Central Processing Unit or heart of a computer
_____ A device for storing information
_____ The use of humanlike machines
_____ Permanent memory in a computer
_____ Program that never ends
_____ Space needed to store one character
_____ The programs for a computer
_____ A device that controls things on a computer screen
_____ A device that connects computers over telephone lines
_____ Receiving correspondence over a computer network
_____ Computer network
_____ Errors in a computer program
_____ A BASIC statement
_____ An electronic device that is the memory of the microcomputer
_____ An input machine
_____ Machinery that makes up a computer

Column B

1. microcomputer
2. hardware
3. CPU
4. software
5. floppy disk
6. LOGO
7. chip
8. ROM
9. RAM
10. byte
11. flowchart
12. program
13. bugs
14. infinite loop
15. FOR and NEXT
16. robotics
17. data base
18. modem
19. electronic mail
20. joystick



Finding Out About Computers

Computer Checkout

Now it is time to check your knowledge of computer terms and meanings. Match Column A with Column B.

Column A

9 Temporary memory in computer
12 Step-by-step instructions given to a computer
11 A diagram that describes a procedure
3 Central Processing Unit or heart of a computer
5 A device for storing information
16 The use of humanlike machines
8 Permanent memory in a computer
14 Program that never ends
10 Space needed to store one character
4 The programs for a computer
20 A device that controls things on a computer screen
18 A device that connects computers over telephone lines
19 Receiving correspondence over a computer network
17 Computer network
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15 A BASIC statement
7 An electronic device that is the memory of the microcomputer
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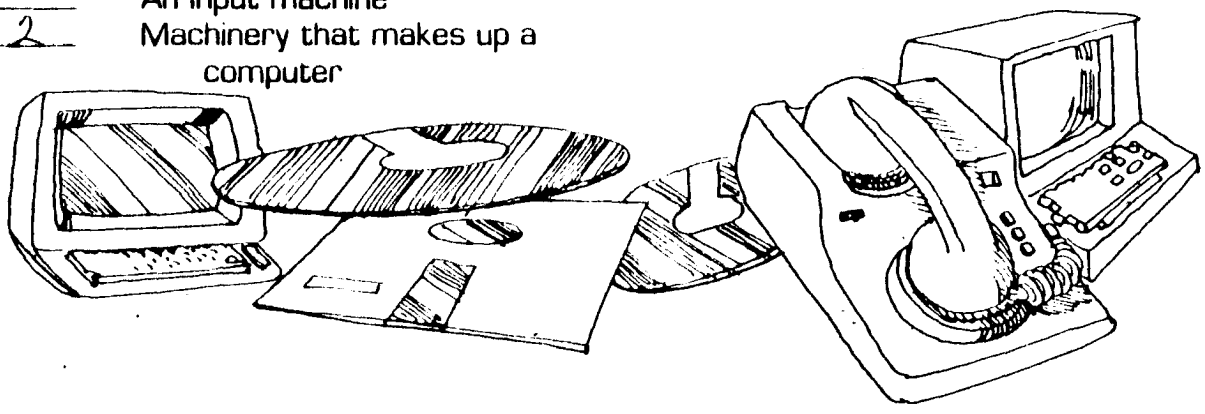

EVALUATING THE MATERIALS

Directions: Please check the appropriate response following each question. The best time to make an evaluation is immediately following the use of the materials. The numbers on the Scale of Effectiveness range from one (low) to six (high).

ACTIVITY #	USED	NOT USED	SCALE OF EFFECTIVENESS
1	____	_____	1 2 3 4 5 6
2	____	_____	1 2 3 4 5 6
3	____	_____	1 2 3 4 5 6
4	____	_____	1 2 3 4 5 6
5	____	_____	1 2 3 4 5 6
6	____	_____	1 2 3 4 5 6
7	____	_____	1 2 3 4 5 6
8	____	_____	1 2 3 4 5 6
9	____	_____	1 2 3 4 5 6
10	____	_____	1 2 3 4 5 6
11	____	_____	1 2 3 4 5 6
12	____	_____	1 2 3 4 5 6
13	____	_____	1 2 3 4 5 6
14	____	_____	1 2 3 4 5 6
15	____	_____	1 2 3 4 5 6
16	____	_____	1 2 3 4 5 6
17	____	_____	1 2 3 4 5 6
18	____	_____	1 2 3 4 5 6
19	____	_____	1 2 3 4 5 6
20	____	_____	1 2 3 4 5 6
21	____	_____	1 2 3 4 5 6

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ACTIVITY #	USED	NOT USED	SCALE OF EFFECTIVENESS
22	____	_____	1 2 3 4 5 6
23	____	_____	1 2 3 4 5 6
24	____	_____	1 2 3 4 5 6
25	____	_____	1 2 3 4 5 6
26	____	_____	1 2 3 4 5 6
27	____	_____	1 2 3 4 5 6
28	____	_____	1 2 3 4 5 6
29	____	_____	1 2 3 4 5 6
30	____	_____	1 2 3 4 5 6
31	____	_____	1 2 3 4 5 6
32	____	_____	1 2 3 4 5 6
33	____	_____	1 2 3 4 5 6
34	____	_____	1 2 3 4 5 6
35	____	_____	1 2 3 4 5 6
36	____	_____	1 2 3 4 5 6
37	____	_____	1 2 3 4 5 6
38	____	_____	1 2 3 4 5 6
39	____	_____	1 2 3 4 5 6
40	____	_____	1 2 3 4 5 6
41	____	_____	1 2 3 4 5 6
42	____	_____	1 2 3 4 5 6

EVALUATING THE MATERIALS

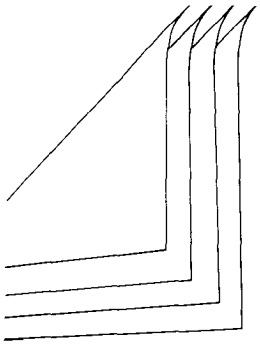
Directions: Please check the appropriate response following each question. The best time to make an evaluation is immediately following the use of the materials. The numbers on the Scale of Effectiveness range from one (low) to six (high).

ACTIVITY #	USED	NOT USED	SCALE OF EFFECTIVENESS
43	____	_____	1 2 3 4 5 6
44	____	_____	1 2 3 4 5 6
45	____	_____	1 2 3 4 5 6
46	____	_____	1 2 3 4 5 6
47	____	_____	1 2 3 4 5 6
48	____	_____	1 2 3 4 5 6
49	____	_____	1 2 3 4 5 6
50	____	_____	1 2 3 4 5 6
51	____	_____	1 2 3 4 5 6
52	____	_____	1 2 3 4 5 6
53	____	_____	1 2 3 4 5 6
54	____	_____	1 2 3 4 5 6
55	____	_____	1 2 3 4 5 6
56	____	_____	1 2 3 4 5 6
57	____	_____	1 2 3 4 5 6
58	____	_____	1 2 3 4 5 6
59	____	_____	1 2 3 4 5 6
60	____	_____	1 2 3 4 5 6
61	____	_____	1 2 3 4 5 6
62	____	_____	1 2 3 4 5 6
63	____	_____	1 2 3 4 5 6

EVALUATING THE MATERIALS

Directions: Please check the appropriate response following each question. The best time to make an evaluation is immediately following the use of the materials. The numbers on the Scale of Effectiveness range from one (low) to six (high).

ACTIVITY #	USED	NOT USED	SCALE OF EFFECTIVENESS
64	____	_____	1 2 3 4 5 6
65	____	_____	1 2 3 4 5 6
66	____	_____	1 2 3 4 5 6
67	____	_____	1 2 3 4 5 6
68	____	_____	1 2 3 4 5 6
69	____	_____	1 2 3 4 5 6
70	____	_____	1 2 3 4 5 6
71	____	_____	1 2 3 4 5 6
72	____	_____	1 2 3 4 5 6
73	____	_____	1 2 3 4 5 6
74	____	_____	1 2 3 4 5 6
75	____	_____	1 2 3 4 5 6
76	____	_____	1 2 3 4 5 6
77	____	_____	1 2 3 4 5 6
78	____	_____	1 2 3 4 5 6
79	____	_____	1 2 3 4 5 6
80	____	_____	1 2 3 4 5 6
81	____	_____	1 2 3 4 5 6
82	____	_____	1 2 3 4 5 6
83	____	_____	1 2 3 4 5 6
84	____	_____	1 2 3 4 5 6



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ACTIVITY REFERENCES

Aaron, I., Artley, A., Jenkins, W., Ramirez, A., Robinson, H., Schiller, A., Smith, M. Masters, Blasting Off. Glenview, Ill.: Scott, Foresman and Company, 1975.

Activity Number	Reference Page
5	80
7	79
16	81

Aaron, I., Artley, A., Jenkins, W., Ramirez, A., Robinson, H., Schiller, A., Smith, M. Skillbook, Blasting Off. Glenview, Ill.: Scott, Foresman and Company, 1975.

Activity Number	Reference Page
4	80
6	79
14	81

Aaron, I., Artley, A., Jenkins, W., Ramirez, A., Robinson, H., Schiller, A., Smith, M. Skillbook, Orbiting Earth. Glenview, Ill.: Scott, Foresman and Company, 1975.

Activity Number	Reference Page
33	103
34	106
35	105
41	99
42	102

Beckenbach, E., Chinn, W., Dolcaiani, M., Feldman, B., Markert, W., Wooton, W. Pre-Algebra. Boston: Houghton Mifflin Company, 1977.

Activity Number	Reference Page
48	125, 126, 127
52	129
53	130
54	172
55	59, 60
56	303
57	306
58	311
59	345
60	367
61	500-501

Cole, W., Duncan, E., Haubner, M., Quast, W., Sparks, T. Level 7 Teacher's Edition for Practice Activities Enrichment Activities Tests. Boston: Houghton Mifflin Company, 1983.

Activity Number	Reference Page
25	23

Cole, W., Duncan, E., Haubner, M., Quast, W., Sparks, T. Mathematics 7. Boston: Houghton Mifflin Company, 1983.

Activity Number	Reference Page
27	60
28	61

Cole, W., Duncan, E., Haubner, M., Quast, W., Sparks, T. Practice Activities 7. Boston: Houghton Mifflin Company, 1983.

Activity Number	Reference Page
26	23

Cole, W., Duncan, E., Haubner, M., Quast, W., Sparks, T. Practice Activities 8. Boston: Houghton Mifflin Company, 1983.

Activity Number	Reference Page
51	56

Cole, W., Duncan, E., Haubner, M., Quast, W., Sparks, T. Teacher's Resource Book Level 7. Boston: Houghton Mifflin Company, 1983.

Activity Number	Reference Page
1	110
2	129
45	54
46	75
50	20
62	68
63	69
66	74
69	70
72	72
74	73
77	75
80	76
82	77
84	78

Cole, W., Duncan, E., Haubner, M., Quast, W., Sparks, T. Teacher's Resource Book Level 8. Boston: Houghton Mifflin Company, 1983.

Activity Number	Reference Page
3	131
47	76
49	38
64	79
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68	82
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83	87

Durr, W., Hayward, C., Pescosolido, J. Practice Book for Accents. Boston: Houghton Mifflin Company, 1978.

Activity Number	Reference Page
10	43
11	46
18	53
19	54
20	61
32	74
36	75
43	76

Durr, W., Pescosolido, J., Poetter, W. Practice Book for Encore. Boston: Houghton Mifflin Company, 1978.

Activity Number	Reference Page
12	41
21	74
22	71
23	72
31	65
37	66
38	68
39	69
40	70

Easton, L. & Klein, M. Expressways Level 7. Oklahoma City: The Economy Company, 1981.

Activity Number	Reference Page
8	317
15	59

Easton, L. & Klein, M. Expressways Level 7 Activity Book. Oklahoma City: The Economy Company, 1981.

Activity Number	Reference Page
9	126
17	29
24	67
29	82
30	65

Easton, L. & Klein, M. Expressways Level 8 Activity Book. Oklahoma City: The Economy Company, 1981.

Activity Number	Reference Page
13	117
44	37

References

Bitter, G. "Games" aren't all bad. Educational Computer, 1983, 3, 20.

Blumas, A. Problem solving and decision making through flow charting. MATYC Journal, 1976, 10, 133-136.

Carlisle, K. The learning strategy technique of task analysis. NSPI Journal, 1982, 12, 9-11.

Green, J. B. F. Skinner's technology of teaching. Classroom Computer Learning, 1984, 2, 24-28.

Hallam, S. & Hallam, J. Flowcharting: a conceptual view. Business Education Forum, 1975, 12, 20-22.

Hines, S. Computer Programming abilities of five-year old children. Educational Computer, 1983, 3, 10-12.

Kallhaus, N. & Clark, J. Flowcharting: a graphic approach in the machines classroom. Business Education World, 1971, 5, 18-19.

Kratzer, M. Computer literacy - what is it? Microcomputer Newsletter, 1984, IIe, 8-9.

Merrill, P. Analysis of a procedural task. NSPI Journal, 1980, 2, 11-15.

Platt, A. & Byron, R. Designing the computer-literate school. Classroom Computer Learning, 1983, 4, 57-60.

Slesnick, T. Mandates aren't good enough here's an alternative. Classroom Computer Learning, 1984, 4, 26-27.

Watson, F. Flowcharts and algorithms. Mathematics In School, 1975, 4, 24-27.