

PROGRAMS, '63

**A Guide to Programed Instructional
Materials Available to
Educators by September 1963**

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Editor

LINCOLN F. HANSON

with the assistance of

CAROL CHRISTMAN AND GERTRUDE SEIDEL

Information Division

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Office of Education

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New York 24, New York**

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MATHEMATICS

H.S.

BASIC MATHEMATICS

DANIEL G. BOBROW, Dept. of Mathematics, Massachusetts
Institute of Technology

Published by **ENCYCLOPAEDIA BRITANNICA PRESS**,
425 N. Michigan Avenue, Chicago 11, Illinois

Programed text, 3,674 frames, paperback, 590 pp., 8-1/2"
x 11-1/2", \$10.75. Available in 4 separate units.

For use in **TEMAC BINDER**, \$1.25; program reusable,
\$9.50.

Teacher's Manual available, \$1.25.

Table of Contents.

Constructed Responses always used; no Multiple Choice;
no Branching.

DEVELOPMENTAL (FIELD TEST) POPULATION(S):

"Student groups at the Britannica Center for Studies
during developmental stage. Classroom tested at
Roanoke, Virginia—evaluative stage."

Other using population(s): "Remedial mathematics for
ninth grade or senior high school, retraining in adult
education."

No special prerequisites.

Average Time: "110 classroom hours for average
students." (est.).

No Revision.

(1 sample page)

MATHEMATICS

BASIC MATHEMATICS

Bobrow; ENCYCLOPAEDIA BRITANNICA PRESS
one sample page:

8. In elementary mathematics the individual symbols most often used are the ten *digits*:

0, 1, 2, 3, 4, 5, 6, 7, 8, and _____.

9

9. 9 is a digit; 5 is also an example of a _____.

digit

10. Symbols to represent almost any number can be written using just the ten _____, 0, 1, 2, 3, 4, 5, 6, 7, 8, 9.

digits

11. Although many people use the two words *number* and *number* without realizing that they are different, we must remember that they are related but not identical words.

_____ are ideas, whereas _____ are symbols used to stand for numbers.

Numbers; numerals

12. We write symbols, called _____, to represent numbers, which are _____. We must keep in mind that numbers and numerals are not the same thing. However, we will speak of the *number* 37. By this we mean the idea represented by the symbol "37," which is a _____.

numerals
ideas

13. When we say "13 is a two-digit number," we mean that the symbol or _____ for this number is made up of _____ digits.

numeral

numeral
two

14. Mathematicians have a special name for whole numbers. They call *whole numbers*, *integers*. Thus, 5, 236, and 34 are all _____, whereas $4\frac{1}{2}$ is not an integer.

integers

BASIC MATHEMATICS

MATHEMATICS

H.S.

BASIC MATHEMATICS

A Problem-Solving Approach

RICHARD H. O'MALLEY, Math. Dept., Capichino High School, San Bruno, California; in conjunction with Behavioral Research Laboratories, Palo Alto, Calif.
Published by **ADDISON-WESLEY PUBLISHING CO.**, Inc.
Reading, Mass.

Programed text, 5000 frames, paperback, 8-1/2" x 11",
\$10.90 (approx.)

Teacher's Manual available.

Table of Contents.

Diagnostic, Final, Unit Test(s) available. More than one equivalent form of unit test available.

Multiple Choice Constructed Responses usually used;
no Branching.

DEVELOPMENTAL (FIELD TEST) POPULATION:

"Student tested with both classroom groups and internal control groups."

Prerequisites: "Should know how to add, subtract, multiply and divide simple whole numbers."

Average Time: "Designed for full year General Mathematics course."

Next Revision:

(1 sample page)

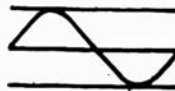
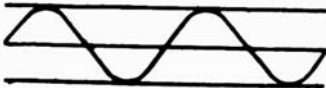
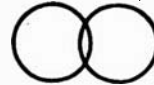
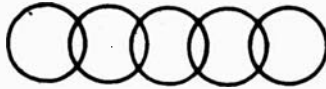
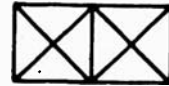
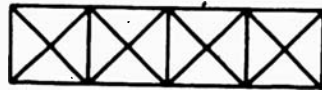
MATHEMATICS

BASIC MATHEMATICS

O'Malley; ADDISON-WESLEY PUBLISHING CO.
one sample page:

SECTION 1

1. Some people wonder what mathematics is all about. To a great extent, mathematics is a study of patterns. Sometimes these patterns take shapes, like designs on rugs or dishes. Continue the patterns below:



2. Numbers, also, often take the form of patterns. What is the next number in the pattern below?

1, 2, 3, 4, 5, _____

3. Scientists are interested in finding patterns. The scientist is interested in finding the pat _____ in nature.

6

patterns

MATHEMATICS

Jr.H.S.

FACTORS AND PRIMES

An Introduction to Number Theory

VERNON L. DAUSCH, Millburn Junior High School, New Jersey

MARTIN M. MOSKOWITZ, Vailsburgh High School, Newark, New Jersey

ERNEST R. RANUCCI, Newark State College, Union, New Jersey

MORTON SELTZER, Weequahic High School, Newark, New Jersey

EDWARD J. ZOLL, Newark State College, Union, New Jersey

**Published by THE MACMILLAN COMPANY,
60 Fifth Avenue, New York 11, N. Y.**

Programed text, 500 frames, paperback, 112 pp., 8-1/4" x 11", \$1.50.

Can be used with FLEXITAB BINDER, \$1.67 per copy, program can be reusable.

Table of Contents.

Unit and Final Test(s) available.

Constructed Responses usually used; some Multiple Choice; no Branching.

DEVELOPMENTAL (FIELD TEST) POPULATION(S):

"Average 7th and 8th grade students. Some testing of students in grades 5 and 6."

Prerequisites: "Program will fit in with both 'modern' and traditional backgrounds."

Average Time: 12-15 hours (est.).

Next Revision:

(1 sample page)

MATHEMATICS

FACTORS AND PRIMES

Dausch, Moskowitz, Ranucci, Seltzer, Zoll; THE MAC-MILLAN COMPANY

one sample page:

15. The question mark in $?|18$ could represent the number $—?$

- a. 3 b. 4 c. 5

a. 8

16. And the question mark in $11|?$ could stand for the number $—?$

- a. 45 b. 55 c. 65

b. 55

17. You know that 10 is a factor of 10. In symbols, you would write

this as _____

$10|10$

18. Is it correct to say that $25|25$?

- a. Yes b. No

a. Yes

19. And is it correct to say that $41|41$?

- a. Yes b. No

a. Yes

20. When we write $40|40$ we mean that _____

40 is a factor of 40.
(Or 40 divides 40 with
no remainder)

21. The question mark in $?|13$ can represent only two possible numbers. The numbers are _____ and _____

1, 13

22. Of course if $6|12$, it is not possible that $12|6$. When one number is the factor of another number, we can't interchange numbers when we use the "factor" symbol.

In each pair below, the "factor" symbol is used correctly once. Circle the three cases in which the symbol is used correctly.

1. $3|6$ $6|3$

1. $3|6$

2. $4|24$ $24|4$

2. $4|24$

3. $5|20$ $20|5$

3. $5|20$

MATHEMATICS

Jr. H.S.

INTERMEDIATE MATHEMATICS SERIES:

INTRODUCTION TO MODERN MATHEMATICS

CHARLOTTE YESSELMAN

PAUL THOMAS, both of Teaching Materials Corp.

**Published by TEACHING MATERIALS CORPORATION,
575 Lexington Avenue, New York 22, N.Y.**

**Program text, 1,042 frames, paperback, 255 pp.,
8 1/2" x 11", \$8.50.**

**For use in MIN/MAX II machine, \$25.00; program
reusable, \$7.50.**

**Teacher's Manual: General Manual for all TMI-Grolier
programs available.**

Table of Contents.

Unit Test(s) included.

**Constructed Responses always used; no Multiple Choice;
no Branching.**

DEVELOPMENTAL (FIELD TEST) POPULATION(S):

"Junior high school students - 12 year old 7th graders."

**Prerequisites: "Seventh grade reading level and ability
to perform the four fundamental arithmetical opera-
tions with whole numbers."**

**Average Time: 15-25 hours (based entirely on data);
standard deviation, 1.49 hours.**

Next Revision: February, 1963.

(1 sample page)

MATHEMATICS

**INTERMEDIATE MATHEMATICS SERIES:
INTRODUCTION TO MODERN MATHEMATICS
Yesselman, Thomas; TEACHING MATERIALS
CORPORATION**

one sample page:


41 The value of 6 in 661 is \dots times the value of 6 in 636.

10

42 The value of second position is 10. What is the value of third position?
(A) 0 (C) 10×10 or 100
(B) 1 (D) $10 \times 10 \times 10$ or 1000

(C) 10×10 or 100

43 The value of fourth position is $\dots \times \dots \times \dots \times \dots$.



$10 \times 10 \times 10 = 1000$

44 The value of (10th/first/sixth) position is $10 \times 10 \times 10 \times 10 \times 10$.

TEST

45 **PLACE VALUE TABLE** Complete the Table.

Number of place (or position)	5th	A \dots	3rd	B \dots	1st
Value of place (or position)	$10 \times 10 \times 10 \times 10$	$10 \times 10 \times 10$	C \dots	10	D \dots

A. 4th C. 10×10
B. 2nd D. 1

A. B. C. D.

2-0

MATHEMATICS

Jr. H. S.

**INTERMEDIATE MATHEMATICS SERIES--MODERN
MATHEMATICS: NUMBER SYSTEMS**

CHARLOTTE YESSELMAN

PAUL THOMAS, both of Teaching Materials Corporation
Published by **TEACHING MATERIALS CORPORATION**,
575 Lexington Avenue, New York 22, New York

Programed text, 1,480 frames, paperback, 346 pp.,
8-1/2" x 11", bound in 2 separate volumes, \$11.00.
For use in MIN/MAX II machine, \$25.00; program
reusable, \$10.00.

Teacher's Manual: General Manual for all TMI-Grolier
programs available.

Table of Contents.

Unit Test(s) included.

Constructed Responses always used; no Multiple Choice;
no Branching.

DEVELOPMENTAL (FIELD TEST) POPULATION(S):

"12 year old 7th graders."

Prerequisites: "Seventh grade reading ability and ability
to perform the four fundamental arithmetical opera-
tions with whole numbers. TMI-Grolier INTRODUC-
TION TO MODERN MATHEMATICS is a useful but
not absolute prerequisite for the successful completion
of this course."

Average Time: 25-35 hours (based entirely on data);
standard deviation, 2.04 hours.


Next Revision: November, 1963.

(1 sample page)

MATHEMATICS

INTERMEDIATE MATHEMATICS SERIES—MODERN MATHEMATICS: NUMBER SYSTEMS Yesselman, Thomas; TEACHING MATERIALS CORPORATION

one sample page:

51	<p>Help Sam get the answer right. Put in 4 as quotient and 6 as divisor. 24 ÷ ... = ...</p>	
$24 \div 6 = 4$		
52	<p>In $10 \div 2 = 5$, 2 is the _____ and 5 is the _____.</p>	
TEST		
53	<p> $23 \div 3 = 11 \div$ $23 \div 11 = 3 \div$ As the divisors get larger $23 \div 3 = 7 \div$ $23 \div 13 = 1 \div$ ($2 \rightarrow 3 \rightarrow 5 \rightarrow 7 \rightarrow 11 \rightarrow 13 \rightarrow 17 \rightarrow 19$) $23 \div 5 = 4 \div$ $23 \div 17 = 1 \div$ the quotients ($11 \div \rightarrow 7 \div \rightarrow 4 \div \rightarrow$ etc) get _____ $23 \div 7 = 3 \div$ $23 \div 19 = 1 \div$ </p>	
smaller		
54	<p> $23 \div 3 = 11 \div$ $23 \div 11 = 3 \div$ $23 \div 3 = 7 \div$ $23 \div 13 = 1 \div$ $23 \div 5 = 4 \div$ $23 \div 17 = 1 \div$ $23 \div 7 = 3 \div$ $23 \div 19 = 1 \div$ </p> <p>What is the smallest divisor of 23 which gives a quotient (answer) less than itself? ...</p>	
3 (the quotient is 4.)		
55	<p>If the same number is divided by many different numbers, then the larger the divisor, the _____ the quotient.</p>	
smaller		3-11

MATHEMATICS

Jr. H.S.

**INTRODUCTION TO BASIC PRINCIPLES OF MODERN
MATHEMATICS**

HAINES, Harper and Row

AMARYLLIS D. HUNT, Programmer, General Programmed
Teaching Corporation

JOHN MORRIS, Editor, General Programmed Teaching
Corporation

Published by HARPER AND ROW,
49 E. 33rd St., New York, N.Y.

Programed text, 1500 frames, paperback, 300 pp., \$2.00.
Teacher's Manual: "Instructions to teacher included in
preface."

Table of Contents.

Final test available.

Constructed Responses usually used; some Multiple
Choice Responses; no Branching.

DEVELOPMENTAL (FIELD TEST) POPULATION(S):

"Developmental testing: Junior high students. Field
testing: Junior high students."

Prerequisites: None

Average Time: 20 hours (est.).

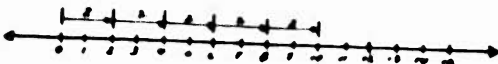
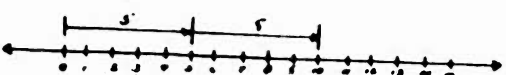
Next Revision: 1968.

(1 sample page)

MATHEMATICS

INTRODUCTION TO BASIC PRINCIPLES OF MODERN MATHEMATICS

Haines, Hunt, Morris; HARPER AND ROW
one sample page:

<p>C-1 The number line is used here to show the multiplication of 5×2. (Adding 2 five times.)</p>  <p>We arrive on the number line at the point whose coordinate is _____. Is it 5, 2, or 10?</p>	<p>10</p>
<p>C-2 Multiply 2×5. (Add 5 two times.)</p>  <p>Again we arrive on the number line at the point whose coordinate is _____.</p>	<p>10</p>
<p>C-3 It has been shown on the number line that</p> $5 \times 2 = 2 \times \underline{\quad}$ <p>Copy and complete.</p>	<p>$5 \times 2 = 2 \times 5$</p>
<p>C-4 Multiply</p> <p>(a) $3 \times 4 = \underline{\quad}$</p> <p>(b) $4 \times 3 = \underline{\quad}$</p> <p>Answer yes or no.</p> <p>(c) Does $3 \times 4 = 4 \times 3$?</p>	<p>(a) 12</p> <p>(b) 12</p> <p>(c) yes</p>
<p>C-5 Does $8 \times 10 = 10 \times 8$? (Yes or No.)</p>	<p>Yes</p>

MATHEMATICS

H.S.-Coll.

AN INTRODUCTION TO GROUPS AND FIELDS

A Programmed Unit in Modern Mathematics

BOYD EARL, Teacher of mathematics, high-school and
Bucknell University

WENDELL SMITH, Psychology Dept., Bucknell University

WILLIAM MOORE, Education Dept., Bucknell University.

Published by **McGRAW-HILL BOOK COMPANY, Inc.**,
330 West 42nd Street, New York City.

Programed text, 1500 frames, paperback and hardcover,
400 pp., 6" x 9", \$3.95 paper edition; \$5.95 cloth
edition.

Teacher's Manual available.

Unit and Final Tests "contained in Teacher's Manual"

Diagnostic tests "contained in program."

Constructed Responses usually used; some Multiple
Choice; no Branching.

DEVELOPMENTAL (FIELD TEST) POPULATION(S):

Prerequisites: "Working knowledge of set theory and set
notation."

Additional equipment required: "Ruler and graph paper."

Average Time: 25 hours.

Next Revision:

(1 sample page)

MATHEMATICS

AN INTRODUCTION TO GROUPS AND FIELDS Earl, Smith, Moore; McGRAW-HILL BOOK COMPANY one sample page:

GROUPS AND FIELDS - SAMPLE FRAMES (preliminary version)

Q2.492

Given a set S and a binary relation R in S , R is reflexive if and only if for all $x \in S$, _____

A2.492

$(x,x) \in R$ or $x R x$

Q2.493

Let $S = \{1,2,3,4\}$. If a binary relation R in S is to be reflexive, what elements must be in R ?

A2.493

$(1,1)$ $(2,2)$ $(3,3)$ $(4,4)$

Q2.494

Given a set S and a binary relation R in S , R is symmetric if and only if whenever $(x,y) \in R$, then _____

A2.494

$(y,x) \in R$

Q2.495

Let $S = \{1,2,3,4\}$ and $R = \{(1,1) (2,2)\}$ Is R symmetric? Why?

A2.495

Yes, whenever $(x,y) \in R$, then $(y,x) \in R$.

MATHEMATICS

H.S.-Coll.

INTRODUCTORY CALCULUS

Part I and Part II

DANIEL G. BABROW, Mathematics Dept.,
Massachusetts Institute of Technology

Published by ENCYCLOPAEDIA BRITANICA PRESS,
425 North Michigan Avenue, Chicago 11, Ill.

Programed texts, 2,194 frames (part I), 1,154 frames
(part II), paperback, 8 1/2" x 11 1/2", \$7.35 (part I),
\$7.50 (part II).

For use in TEMAC Binder, \$1.25; program reusable, \$6.10
each part.

Table of Contents.

Unit Test(s) available, \$1.60 (Part I).

Constructed Responses always used; no Multiple Choice;
no Branching.

DEVELOPMENTAL (FIELD TEST) POPULATION(S):

"High school and college students, Roanoke, Virginia,
Hollins College. Field test - Roanoke Public Schools.
(part I). College students at Hollins College, Roanoke,
Va., High school students in Roanoke Public Schools."
(part II).

Others using population(s): "Professional review; Adult
education."

Prerequisites: Completion of H.S. math sequence. (part I)
Completion of Introductory Calculus Part I. (part II)

Average Time: 40 classroom hours (part I) est.

25 classroom hours for average students (part II) est.

No Revision expected.

(2 sample pages)

MATHEMATICS

INTRODUCTORY CALCULUS

Babrow; ENCYCLOPAEDIA BRITANNICA PRESS

2 sample pages:

2187. Recall that more than one of these differentiation rules may be needed in any particular example. For example, if $y = \frac{(2x-5)(2x+4)}{(2x+3)^2}$, then we can write $y = \frac{u}{v}$ by letting $u =$ _____ and $v =$ _____.

$$\frac{(2x-5)(2x+4)}{(2x+3)^2}$$

2188. Having found $u = (2x-5)(2x+4)$, we must use the product rule on u ; let $u = uv_1$, so that $\frac{du}{dx} = v_1 \frac{du_1}{dx} + u_1 \frac{dv_1}{dx} =$ _____.

$$2(2x-5) + 2(2x+4) = 12x+3$$

2189. We also found $v = (2x+3)^2$. To find $\frac{dv}{dx}$, we must use the power rule for functions. Let $v = w^2$, so that $v = w^2$; then $\frac{dv}{dx} =$ _____.

$$2x+3, \\ 4(2x+3) = 8x+12$$

2190. Thus, for $y = \frac{(2x-5)(2x+4)}{(2x+3)^2}$, y may be written in the form $\frac{u}{v}$, where $u = (2x-5)(2x+4)$ and $v = (2x+3)^2$. Then $\frac{du}{dx} = 12x+3$ (by the product rule) and $\frac{dv}{dx} = 8x+12$ (by the power rule for functions); thus, $\frac{dy}{dx} = \frac{v \frac{du}{dx} - u \frac{dv}{dx}}{v^2} =$ _____
(Do not bother to simplify your answer.)

$$\frac{(2x+3)^2(12x+3) - (2x-5)(2x+4)(8x+12)}{(2x+3)^4}$$

1. In the course Introductory Calculus I, we defined the derivative f' of a function f and developed certain rules for differentiating various types of functions. Before taking up our first "new" topic (extreme values of functions), we will review some of these rules and, at the same time, introduce a few new terms and theorems.

2. The equation $y = \sqrt{1-x^2}$ defines y as an explicit function of x ; the equation $x^2 + y^2 = 1$ defines y as a(n) _____ function of x .

implicit

3. Given an equation which defines y as an implicit function of x , we can differentiate both sides of the equation (using the chain rule to differentiate expressions in y) and then solve for $\frac{dy}{dx}$. For example, given $2xy = 1$, we may write $\frac{d}{dx}(2xy) = \frac{d}{dx}(1)$; thus, _____ = 0.

$$2(y + x \frac{dy}{dx})$$

4. From $2xy = 1$ we get, by differentiating both sides of the equation, $2y + 2x \frac{dy}{dx} = 0$; solving, $\frac{dy}{dx} =$ _____.

$$-\frac{1}{x^2}$$

5. Given $x^2y^2 - 2xy = 10$, find $\frac{dy}{dx}$.

$$2xy^2 + 2x^2y \frac{dy}{dx} - 2y - 2x \frac{dy}{dx} = 0,$$

$$\text{so } \frac{dy}{dx} = \frac{y - xy^2}{xy - x}$$

6. Suppose $y = f(x)$; if we are given $y = g(t)$ and $x = f(t)$, these equations are called _____ equations for $y = f(x)$. Here, t is the parameter.

parametric

7. Given $y = g(t)$ and $x = f(t)$, we proved that $\frac{dy}{dx} =$ _____.

$$\frac{\frac{dy}{dt}}{\frac{dx}{dt}} \left(\text{or } \frac{g'(t)}{f'(t)} \right)$$

1 Introductory Calculus, Part II

MATHEMATICS

Jr. H.S.-H.S.

MATHEMATICS IN ACTION

Understanding Number Systems

PAUL H. BUCKLEY, Programmer

Published by HONOR PRODUCTS COMPANY,
20 Moulton Street, Cambridge, Mass.

For use in HONOR TEACHING MACHINE, \$20 (approx.);
program reusable, 200 frames, \$2.00-\$2.50. (Machine
may be marketed in retail channels at this \$20 combi-
nation price including 3 or 4 programs.)

Constructed Responses sometimes used; some Branching;
no Multiple Choice.

DEVELOPMENTAL (FIELD TEST) POPULATION(S):

"Private and public schools."

Prerequisites:

Average Time: 1 1/2-2 hours (est.).

Next Revision:

(1 sample page)

MATHEMATICS

MATHEMATICS IN ACTION Buckley; HONOR PRODUCTS COMPANY one sample page:

<p>The letter Q may be symbolized by either the number 17, or by the number 46. The number 17, therefore, is congruent to the number _____.</p>	46
<p>In the language of mathematicians, Independence Day is the same as, or is _____ to, the Fourth of July.</p>	congruent
<p>In geometry, if two figures are the same in shape and size, they are said to be _____ to each other.</p>	congruent
<p>If we agree on all these issues, your views and my views (are/are not) _____ congruent.</p>	are
<p>The mathematical shorthand for congruent is the symbol \cong. If 9 and 38 are congruent, you could express this as 9 _____ 38.</p>	\cong
<p>If the numbers 8 and 37 symbolize the same letter, which of the following is correct?</p> <ul style="list-style-type: none">a. $8 = 37$b. $8 \cong 37$ <p>Press and hold the button of your choice. The roll will move only when you choose the correct answer.</p>	b. $8 \cong 37$

MATHEMATICS

Elem.

MATHEMATICS ENRICHMENT

Programs A, B and C (3 volumes)

Sets, Numeration, Geometry

GEORGE SPOONER, Central Connecticut State College

Published by HARCOURT, BRACE & WORLD,

750 Third Avenue, New York 17, New York

Programed texts; Program A, 1107 frames;

Program B, 1228 frames; Program C, 1035 frames;

hardcover; Program A, 192 pp.; Program B, 224 pp.;

Program C, 208 pp.; 6 3/4" x 9 1/8"; Program A,

B and C, \$2.96 each.

Answer sheets available, \$.40.

Teacher's Manual available, free.

Table of Contents.

Unit Test(s) available, free.

Constructed Responses always used; no Multiple Choice
Responses; no Branching.

DEVELOPMENTAL (FIELD TEST) POPULATION(S):

"200 students (grades 4-5-6, students working at or
above grade placement)."

Prerequisites: Students should be in grades 4, 5 or 6;
working at or above grade placement.

Additional material required: "Skil-Slide," list price
\$.60, net to schools \$.40.

Average Time: 12-18 hours (est.).

Next Revision: "Not scheduled yet."

(2 sample pages)

MATHEMATICS

MATHEMATICS ENRICHMENT

Spomer; HARCOURT, BRACE & WORLD
2 sample pages:



Set D



Set E



Set F

Set E is the union of Set _____ and Set _____ 143

F, D or D, F

Set E is the union of Set D and Set F. Set E must have all the _____ of Set D and all the members of Set F. 144

members

The union of Set F and Set _____ is Set _____ 145

D, E
(in this order)

Here three sets are pictured.



Set M



Set W

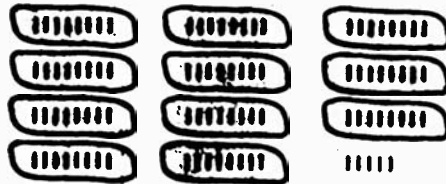


Set C

Set C is the u_____ of Set M and Set W. 146

union

THREE-PLACE NUMERALS IN THE BASE-EIGHT NUMERATION SYSTEM



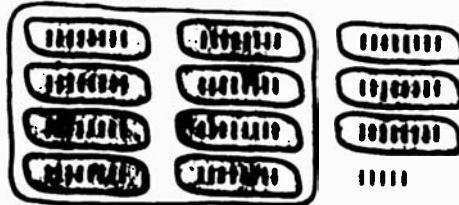
Here we see ones marks collected in sets of (how many?) _____ 872

eight

When we think of things collected in sets of eight, we are thinking
in the _____ numeration system.

873

base-eight



Here, one large curve has been drawn around eight of the
of eight ones. _____

874

sets

The set inside the large closed curve contains (how many?) _____
sets of eight ones.

875

eight

PAGE 176

MATHEMATICS

Jr. H.S.

**MODERN MATHEMATICS: A PROGRAMED TEXTBOOK,
COURSE I.**

LEWIS D. EIGEN, Vice President,
JEROME D. KAPLAN, Programmer
RUTH EMERSON, Programmer,
HAROLD M. KROUSE, Programmer, all of The Center For
Programed Instruction, Inc.

Published by **SCIENCE RESEARCH ASSOCIATES, Inc.**,
259 East Erie Street, Chicago 11, Illinois.

Programed text, 8419 frames, paperback, 838 pp.,
8 1/2" x 11", \$10.00. Bound in 10 separate units at
\$1.25 each.

Answer sheets available, \$1.00 (1 set free with each set
of texts).

Teacher's Manual available, \$1.25.

Table of Contents and Index.

Unit Tests available, \$2.50; Final Test available, \$.30.

Constructed Responses usually used; some Multiple Choice;
some Branching.

DEVELOPMENTAL (FIELD TEST) POPULATION(S):

"8th grade independent school classes; 8th grade
public school enrichment classes; 9th grade public
school academic classes."

Other using population(s): "6th grade enrichment classes,
10th-12th grade classes, college classes, 10th grade
remedial classes, in-service teachers acquiring
background in modern mathematics."

Prerequisites: "Competence in arithmetic; 7th grade
reading level."

Average Time: 80-100 hours (est.).

Next Revision: 1965.

(9 sample pages)

MATHEMATICS

MODERN MATHEMATICS: A PROGRAMED TEXTBOOK, COURSE I

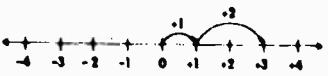
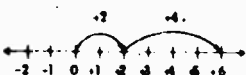

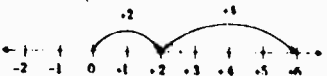
Eigen, Kaplan, Emerson, Krouse; SCIENCE RESEARCH
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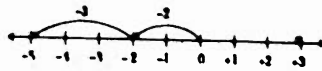
Selections from
MODERN MATHEMATICS: A PROGRAMED TEXTBOOK

Reprinted from MODERN MATHEMATICS by Lewis D. Eigen,
Jerome D. Kaplan, and Ruth Emerson. ©1961, Science
Research Associates, Inc.

Chapter 2. DIRECTED NUMBERS

<p>←4</p> <hr/> <p>0</p> <p>+7 or (-7) (-7 is better)</p> <hr/> <p>+9 +11 +12</p> <hr/> <p>If your answer was three, go directly to frame 176. If your answer was not three, go to the next frame.</p>	<p>165.</p>  <p>When we add trips (directed numbers), we always start at '0' $(+1) + (+2) = \square$</p> <hr/> <p>166. When we add trips (directed numbers), we always start at \square.</p> <p>167. $(+6) + (+1) = \square$ (Hint: From a scale and mark out the two trips if you have to.)</p> <hr/> <p>168.</p> <p>$(+6) + (+5) = \square$ $(-2) + (-9) = \square$ $(-8) + (-4) = \square$</p> <hr/> <p>169. The last frame had three problems on it. How many did you get right? \square</p>
<p>←4</p> <hr/> 	<p>170.</p>  <p>$(+2) + (+2) = \square$</p> <hr/> <p>171. To find out what $(-2) + (-4)$ is, first draw a number scale. Then, starting at '0', draw an arrow representing a trip of -2. Then from "-2" draw an arrow representing a trip of -4. Draw a number scale and indicate the addition \square.</p>
<p>←4</p> <hr/>	<p>172.</p>  <p>$(+2) + (+4) = ?$ The second arrow ends up at \square.</p>
<p>←4</p> <hr/>	<p>173. $(-2) + (-4) = \square$</p>

- 11 174. $(-8) + (+3) = \square$ (Hint: To get this answer you may have to draw a scale with more mileposts than previously.)
- 12 175. $(-4) + (-8) = \square$
- Yes 176. If we start at '0' and take two trips to the right, do we end up to the right of '0'? (Yes or no?)
- Yes. (The sum of two positive numbers is a positive number.) 177. If we add two positive numbers, is the sum a positive number? (Yes or no?)
- 5 178.



$(-2) + (-3) = \square$ (Hint: There do we end up after the two trips?)

Chapter 5. SETS AND SUBSETS

- 6 1. The numerals we use to denote numbers are: '0', '1', '2', '3', '4', '5', , '7', '8', '9'.
- 10 2. This set of symbols, '0', '1', '2', '3', '4', '5', '6', '7', '8', '9', is made up of (how many?) different symbols.
- 9 3. The set of whole numbers from 0 to 9 is made up of 10 numbers. They are 0, 1, 2, 3, 4, 5, 6, 7, 8, .
- 10 4. The numbers 0, 1, 2, 3, 4, 5, 6, 7, 8, 9 form a set of (how many?) numbers.
- set 5. The numbers 0, 1, 2, 3, 4, 5, 6, 7, 8, 9 form a of 10 numbers.
- r 6. The letters a, b, form a set of the first three letters of the alphabet.
- set 7. The letters a, b, r form a of the first three letters of the alphabet.
- r 8. The letters a, , z form a set of the last three letters of the alphabet.
- set 9. The letters a, v, r form a of the last three letters of the alphabet.
- three 10. The set formed by a, v, z is the set of the last letters of the alphabet.
- r 11. By using the symbols '1' to replace a, v, z we can represent the set of the last three letters of the alphabet by '1a, , z1'.
- last 12. By using the symbols '1' if we can represent the set of the three letters of the alphabet by '1a, y, z1'.
- set 13. We can represent the of the last three letters of the alphabet by '1a, v, z1'.

	14	We can represent the set of the first two letters of the alphabet by the $\{a, b\}$.
15	15	The way to represent a set is to use the symbols " $\{ \}$ ". We call these symbols "set braces". They are not parentheses. Write the symbols we call set braces in the answer space: $\{ \}$
16	16	When we represent the set of the first two letters of the alphabet we use the set braces " $\{ \}$ " and we use the comma " $,$ " to get " $\{a, b\}$ ". Write the symbols for this set in the answer space: $\{a, b\}$
17	17	By using the set braces " $\{ \}$ " and the comma, we can represent the set of the first two letters of the alphabet by writing $\{a, b\}$.
18	18	We can represent the set of the last two letters of the alphabet by $\{z, y\}$.
19	19	We can represent the set of the last two letters of the alphabet by $\{z, y\}$.
20	20	We can represent the set of the first three letters of the alphabet by $\{a, b, c\}$.
21	21	We can represent the set of the first four letters of the alphabet by $\{a, b, c, d\}$.
22	22	$\{a, b, c\}$ is the set of the first $\{ \}$ letters of the alphabet.
23	23	$\{a, b, c, d\}$ is the $\{ \}$ of the first four letters of the alphabet.

Chapter 2 ORDERED PAIRS AND RELATIONS

pairs	86	We call any set of ordered pairs a relation. $\{(0, 1), (2, 1), (3, 2)\}$ is a set of ordered $\{ \}$. Therefore, $\{(0, 1), (2, 1), (3, 2)\}$ is a relation.
relation	87	$\{(0, 2), (1, 2)\}$ is a set of ordered pairs. Therefore, $\{(0, 2), (1, 2)\}$ is a $\{ \}$.
relation or set of ordered pairs	88	$\{(1, 3), (3, 1), (2, 1)\}$ is a $\{ \}$.
pairs	89	$\{a, b, c, d\}$ is not a relation, since $\{a, b, c, d\}$ is not a set of ordered $\{ \}$.
Yes	90	Is $\{(2, 1)\}$ a relation? $\{ \}$ / Yes or no?
relation	91	Since $\{(2, 0)\}$ is a set of one ordered pair, $\{(2, 0)\}$ is a $\{ \}$.
$R = \{(1, 1), (2, 1)\}$ or $R = \{(1, 1), (2, 1)\}$	92	Let $P = \{(1, -2)\}$ and let $Q = \{(1, 2)\}$. $P \times Q = \{ \}$.
ordered pairs	93	For all sets L and R , $L \times R$ is a set of $\{ \}$.
relation	94	For all sets L and R , where L is a set of ordered pairs, $L \times R$ is a $\{ \}$.
pairs	95	A relation is a set of ordered $\{ \}$.
relation	96	A $\{ \}$ is a set of ordered pairs.
a set of ordered pairs	97	A relation is $\{ \}$.



Chapter 18. BINARY OPERATIONS

- ordered pairs
64. If the domain of an operation is a set of ordered pairs, the operation is called a **binary operation**. () ()
65. The word **binary** contains the Latin prefix **bi-** meaning **two**, which in English is used as a prefix meaning **two**. A bicycle has () (how many?) wheels?
66. Ordered pairs contain () (how many?) elements.
67. () is a binary operation because its domain is made up of () ()
68. Its domain is made up of ordered pairs. () is a () ()
69. The domain of a binary operation is a set of ordered pairs. Therefore, the domain of a binary operation is a () ()

90. Binary operations can be represented by tables. We can express a subset of the operation \cdot as follows:

$2 \cdot 2 = 4, 2 \cdot 3 = 6, 3 \cdot 2 = 6, 3 \cdot 3 = 9$ ()

We can then express it in this table, with the same information in different form:

	2	3	
2	()	6	<i>(Complete the table by filling in the boxes.)</i>
3	6	9	

6, 12, 18
6, 12, 18

91. $2 \cdot 3 = ()$, $3 \cdot 3 = ()$, $4 \cdot 3 = ()$
Complete this table for another subset of \cdot :

	2	3	4
2	4	()	8
3	6	9	()
4	8	12	()

25
20

95. Complete this table representing a subset of \cdot :

	4	5	6	7
4	16	20	24	28
5	20	()	30	35
6	24	30	36	42
7	28	35	42	()

Chapter 19. COMMUTATIVE OPERATIONS

- sleeves
1. The result of rolling up your sleeves, either right then left or left then right, is that both () are rolled up. Either order gives the same result.
- socks
2. Putting on socks before shoes ends with the shoes outside. Putting on shoes before socks ends with the () outside.



No.	5. We have two orders for putting on socks and shoes: first socks, then shoes, and first shoes, then socks. Do these two different orders produce the same result? [] (Yes or no?)
Yes.	6. Suppose that you have two mathematics textbooks to study: <i>Introductory Calculus</i> and <i>Advanced Calculus</i> . Does the order in which you study these books make any difference? [] (Yes or no?)
No.	7. Suppose that you have two fiction books to read: <i>Treasure Island</i> and <i>Rack Rodgers Explores the Canals of Mars</i> . Does the order in which you read these make any difference? [] (Yes or no?)
2	8. If we multiply 2 by 1, the product is equal to the product we get when we multiply 1 by [].
3	9. If we add 3 to 2, the sum is the same as when we add 2 to [].
commutative	10. Consider any operation \circ . If $\circ(a, b) = \circ(b, a)$ for any a, b in a set S , we say that the set S is commutative with respect to \circ . Let \mathbb{R} = the real numbers, $p \in \mathbb{R}$, and $q \in \mathbb{R}$. Since $\circ(p, q) = \circ(q, p)$, we say that \mathbb{R} is [] with respect to the operation [].
commutative	11. A set S is commutative with respect to an operation \circ if $\circ(a, b) = \circ(b, a)$ whenever $a \in S$ and $b \in S$. If we have specified the set S , we will use the abbreviation ' \circ is a commutative operation'. Let us specify that we are considering \mathbb{R} . If $p \in \mathbb{R}$ and $q \in \mathbb{R}$, $\circ(p, q) = \circ(q, [])$. Therefore, we say that \circ is a [] operation.
commutative operation	12. When we say that any operation \circ is a commutative operation, we mean that the order of two elements with respect to \circ can be reversed without altering the result of the operation. The expressions ' $3 \circ 1$ ' and ' $1 \circ []$ ' give the same result, 4, because \circ is a [] operation.
mutate	13. The word 'mutation' means a change: if a thing mutates, it changes; if you change something, you [] it.
commutative	14. The word 'commutative' is built on the word 'mutate'. When the order of two elements in an operation \circ can be changed without altering the result, we call \circ a [] operation.
image	15. $\circ(a, b) = c$; $\circ(b, a) = c$ \circ is a commutative operation, since both (a, b) and (b, a) have the same [] under \circ , where a and b are any real numbers.

Chapter 26. EQUATIONS, PRONUMERALS, AND SOLUTION SETS

True	16. Equations and inequations are symbols for statements. ' $5 = 3 + 2$ ' is a symbol for a statement. Is the statement true or false? []
false	17. Some statements are true and some statements are false. If an equation stands for a true statement, we will say that the equation is a true equation. If an equation stands for a false statement, we will say that the equation is a [] equation.
false	18. ' $5 = 3 + 1$ ' is an equation. ' $5 = 3 + 1$ ' is a [] (true or false?) equation.



Chapter 26. EQUATIONS, PRONUMERALS, AND SOLUTION SETS

2	55.	$5 \cdot \Delta = 7.$	Since only a numeral for 2 can replace ' Δ ' to make a true equation, the solution set of this equation is $\{ \square \}$.
1	56.	$3 \cdot \gamma = 4.$	Since only a numeral for 1 can replace ' γ ' to make a true equation, the solution set of this equation is $\{ \square \}$.
{1} (Don't forget the set braces)	57.	$1 \cdot \Delta = 7.$	Since only a numeral for 3 can replace ' Δ ' to make a true equation, the solution set of this equation is $\{ \square \}$.
2	58.	$\nabla \cdot \Delta = 7.$	To make a true equation, we must replace ' Δ ' with a numeral for \square .
set	59.	$5 \cdot x = 9.$	The solution $\{ \square \}$ of this equation is $\{1\}$.
{1}	60.	$\star \cdot 1 = 2.$	The solution set of this equation is \square .
solution set	61.	$9 \cdot a = 16.$	$\{7\}$ is the \square $\{ \square \}$ of this equation.
{2}	62.	$5 \cdot \gamma = 7.$	The solution set of this equation is \square .
solution set	63.	$x + 5 = 11.$	The \square of this equation is $\{6\}$.
{1,1}	64.	$5 \cdot 6 = \Delta.$	The solution set of this equation is \square .

Chapter 28. IDENTITIES, EXPRESSIONS, AND TERMS

Yes.	123.	If two equations have the same solution set, then we say that the two equations are equivalent equations. Are ' $x + 2 = 5$ ' and ' $x = 3$ ' equivalent equations? \square (Yes or no?)
equivalent solution set	124.	' $y - 3 = 5$ ' and ' $y - 2 = 6$ ' are \square equations because they have the same \square .
equivalent they have the same solution set	125.	' $\beta = -6$ ' and ' $\beta - 2 = -8$ ' are \square equations because \square .
No (The solution sets are $\{1\}$ and $\{8\}$)	126.	Are ' $y + 2 = 6$ ' and ' $y - 3 = 5$ ' equivalent equations? \square (Yes or no?)
$x = 3$	127.	Since ' $y = 3$ ' and ' $y + 2 = 5$ ' are equivalent equations, we can say that ' $y = 3$ ' is equivalent to ' $y + 2 = 5$ ' and that ' $x + 2 = 5$ ' is equivalent to ' \square '.
basic	128.	If one expression of an equation has only one term, a pronumeral completely alone, and the other expression contains no pronumeral at all, then we say that the equation is a basic equation. ' $x = 3$ ' is a \square equation.

basic equation	129	'x = y' is not a <input type="checkbox"/> <input type="checkbox"/>
Yes	130	Is '2 = y' a basic equation? <input type="checkbox"/> (Yes or no?)
pronumeral	131	'x = 2x - 3' is not a basic equation. There is a <input type="checkbox"/> in both expressions.
No	132	Is 'x = 2x - 6' a basic equation? <input type="checkbox"/> (Yes or no?)
No	133	'x + 1 = 2' is not a basic equation, since the left expression contains two terms, not just the pronumeral. Is 'm - 3 = 17' a basic equation? <input type="checkbox"/> (Yes or no?)
a, c, and d	134	Which of the following are basic equations? <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <ul style="list-style-type: none"> a) $x = 4$ b) $x - 2 = 6$ c) $y = 2$ d) $2 = y$ e) $x = 2x - 4$
Yes	135	'b = 2 + 1' and '3(2) + 4 = 6' are both basic equations. Is 'x = 4(-3) + 1' a basic equation? <input type="checkbox"/> (Yes or no?)
No	136	'2q = 6' is not a basic equation, since the left expression does not contain 'q' alone. Is '5t = 25' a basic equation? <input type="checkbox"/> (Yes or no?)
alone	137	'x = 6' is not a basic equation either, since the pronumeral 'x' is not completely <input type="checkbox"/> in the left expression.
a, b, and f	138	Which of the following are basic equations? <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <ul style="list-style-type: none"> a) $a = -6$ b) $2 + 1 = q$ c) $-12 = -4$ d) $6N + 1 = 7$ e) $5b = 17$ f) $k = 4(6) + 17$
	139	The solution sets of basic equations are very easy to find. What is the solution set of 'x = 2(3) + 1'? <input type="checkbox"/>

Chapter 30. ONE-STEP EQUATIONS

	23	$3 + 1 = 4 - 1 - 1$ The expression '3 + 1' can be simplified to only one term. '3 + 1' is equivalent to ' <input type="checkbox"/> '.
4	24	$3 + 1 = 4 - 1 + 1$ The expression '4 - 1 + 1' can also be simplified to only one term. '4 - 1 + 1' is equivalent to ' <input type="checkbox"/> '.
4	25	If '3 + 1' is equivalent to '4' and '4 - 1 + 1' is equivalent to '4', then '3 + 1 = 4 - 1 + 1' must be equivalent to '4'. <input type="checkbox"/>
equivalent	26	'3 + 4 = 8' is equivalent to '3 + 1 = 4 - 1 + 1'. '7 = 4' is also equivalent to '3 + 1 = 4 - 1 + 1'. Therefore, '3 + 1 = 1' and ' <input type="checkbox"/> = 4' must be <input type="checkbox"/> to each other.

171	27. The solution set of ' $7 = k$ ' is <input type="text"/> .
solution sets 171	28. Since ' $7 = k$ ' and ' $3 = k - 4$ ' are equivalent, their <input type="text"/> must be equal. Therefore, the solution set of ' $3 = k - 4$ ' is <input type="text"/> .
adding expressions	29. $3 = k - 4$ $7 = k$ We have taken a non-basic equation and transformed it into an equivalent basic equation whose solution set was easy to find. We transformed the equation by <input type="text"/> the same number to the values of both of its <input type="text"/> .
7	30. Solve ' $b - 7 = 3$ '. Adding 7 to the values of both expressions given us ' $b - 7 + 7 = 3 + 7$ '. <input type="text"/> = <input type="text"/> .
equivalent b	31. ' $b - 7 + 7 = 3 + 7$ ' can be simplified to the <input type="text"/> equation <input type="text"/> = 10'.
1101	32. The solution set of ' $b = 10$ ' is <input type="text"/> .
1101	33. We start with ' $b - 7 = 3$ '. By adding 7 to the value of both expressions we transform ' $b - 7 = 3$ ' into ' $b = 10$ ', which is a basic equation equivalent to ' $b - 7 = 3$ '. The solution set of ' $b = 10$ ' is 1101. Therefore, the solution set of ' $b - 7 = 3$ ' is <input type="text"/> .
basic equation	34. We can easily solve a non-basic equation if we can transform it into an equivalent basic equation. The solution set of the non-basic equation will be the same as the solution set of the <input type="text"/> <input type="text"/> .
equivalent	35. The first step in solving a non-basic equation is to transform it into a basic equation that is <input type="text"/> to the non-basic equation.
basic	36. If we add the same number to the values of both expressions of an equation, we transform the equation into an equivalent equation. However, to solve our equation we want to transform it into an equivalent <input type="text"/> equation.
expressions pronumerals	37. To obtain a basic equation, we must isolate the pronumeral in one expression. In other words, we must know which number to add to the values of both <input type="text"/> . The addition of this number must isolate the <input type="text"/> in one expression.

Chapter 25. WORD PROBLEMS

$\frac{1}{3}$ 200 3 *	79. One-third of a forest was destroyed in a fire, and then 200 more trees were cut down, leaving 1200 trees. How many trees were there before the fire? Let f be the original number of trees. Then $1200 = \frac{f}{3} - 200$ This equation is equivalent to $f = \text{ } 1200 \text{ } 200.$
original posts $\frac{1}{2}$ 24	80. A dance floor was held up by supporting posts. When people started doing rock and roll, half as many more posts were needed as there were originally. When the new posts were added, there were 24 all together. How many posts were there originally? If p is the <input type="text"/> number of <input type="text"/> , then $p + \text{ } p = \text{ }.$

windows closed

No. (The solution set of $32 + 88 + s = 130$ is $\{10\}$. This means there will still be 22 seconds of green light in which to cross the street, since $32 + 10 = 22$.)

81. A house has 30 windows. Half of them face south, and a third of the remaining ones face west. If it rained in from the west, how many windows should be closed? If w is the number of to be , then $w = \frac{30}{1}$.

82. Suppose it takes you 130 seconds to walk a block. The green light lasts 32 seconds, and the red light lasts 88 seconds. If the green light at the next corner is just starting as you begin the block, will you have to wait for the light when you reach the corner? The equation for this problem is $32 + 88 + s = 130$, where s is the difference between the number of seconds it takes to walk the block and the number of seconds for one green and (how many?) red light(s). Will you have to wait for the light? (yes or no?)

Chapter 37. SOLVING INEQUALITIES

-3

62. To find a basic inequality that is equivalent to $x + 3 < 7$, we must add (what number?) to the value of each expression.

$x < 4$
or
 $x < 7 - 3$

63. If we add -3 to the value of each expression of $x + 3 < 7$, we get the equivalent basic inequality .

solution set \forall

64. $x < 4$ is equivalent to $x + 3 < 7$. Both of these inequalities have the same .

$\{x : x < 4\}$

65. What is the solution set of $x < 4$?

$\{x : x < 4\}$

66. What is the solution set of $x + 3 < 7$?

$x > 7\frac{1}{2}$
(Add 7 to the value of each expression.)

67. Write a basic inequality that is equivalent to $x - 7 > \frac{1}{2}$.

$\{x : x > 7\frac{1}{2}\}$

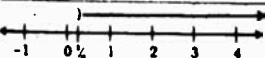
68. $x > 7\frac{1}{2}$ is equivalent to $x - 7 > \frac{1}{2}$. What is the solution set of $x - 7 > \frac{1}{2}$?

$\{x : x > 11\}$

69. What is the solution set of $A + 10 > 11$?

$\{x : x > 2\frac{1}{2}\}$

70. What is the solution set of $r + 6\frac{1}{2} > 9$?



(The solution set is $\{p : p > \frac{1}{4}\}$.)

71. Graph the solution set of $p + \frac{1}{4} > 1$.

MATHEMATICS

High School

NUMBER BASES AND BINARY ARITHMETIC

MADELEINE L. MICHAEL, Programmer, Learning Inc.

SHEILA LEVINSKY, Programmer, Learning Inc.

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Published by **CORONET INSTRUCTIONAL FILMS**,
65 E. So. Water Street, Chicago 1, Illinois

Programed text, 331 frames, paper back, 68 pp., 7" x 10",
\$1.20.

Teacher's Manual included.

Test Set included.

Constructed Responses usually used; some Multiple Choice; no Branching.

DEVELOPMENTAL (FIELD TEST) POPULATION(S):

"...Small representative samplings at appropriate grade levels tested informally on one-to-one basis with programmer. Small representative samplings under controlled conditions (Dukane Redi-tutor using 35 mm. film) for each revision of program. Program has been through 4 complete revisions, each revision based on data obtained from formal machine testing. Field testing in progress: Classroom testing from 9th through 10th grades, administered by classroom teachers. Test areas distributed geographically from Florida to California. All testing conducted by Learning Incorporated."

Prerequisites: "Grade 9 reading level. Ability to perform the four arithmetic operations."

Average Time: 4 hours, 25 minutes (based entirely on data); standard deviation, 59.3 minutes.

Next Revision: "The published program is the final revision."

(1 sample page)

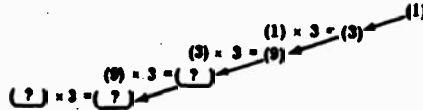
MATHEMATICS

NUMBER BASES AND BINARY ARITHMETIC

Michael, Levinsky, Neilsen; CORONET INSTRUCTIONAL FILMS

one sample page:

2-24 When you multiply each place value by 3 you get the next higher place value of the base-3 system. The first five place values of base-3 are:



(27);
(27); (81)

2-25

31022 in base-3 = 3(81) + 1(27) + 0(9) + 2(3) + 2(1)
Remember that, just as in decimal numerals, the ones place is always at the (?) (right/left).

right

2-26 Fill in the missing place values:

Base-3 (81)	(?)	(9)	(3)	(1)
Base-5 (625)	(125)	(?)	(5)	(1)
Base-2 (16)	(8)	(4)	(2)	(?)
Base-6 (1,296)	(216)	(36)	(?)	(1)

(27);
(25);
(1);
(6)

2-27 (32), (16), (8), (4), (2), (1)

These place values are in a base-(?) system. Since the base is the number of digits used, this system uses only (?) digits.

2;

two

2-28 (27), (9), (3), (1)

These place values are in a system which uses (?) digits.

three

2-29

Place value	(512)	(64)	(8)	(1)
Method	64 x 8	8 x 8	1 x 8	

This chart shows how the four lowest place values in some system are obtained. The base of the system which uses these place values is (?).

MATHEMATICS

Jr. H.S.

SEVENTH GRADE MATHEMATICS

DANIEL P. MURPHY, Britannica Center for Studies in Learning

Published by **ENCYCLOPAEDIA BRITANNICA PRESS**,
425 N. Michigan Avenue, Chicago 11, Illinois

Programed text, 4,777 frames, paperback, 70 pp., 8-1/2" x 11-1/2", \$13.25. Available in 4 separate units.

For use in **TEMAC BINDER**, \$1.25; program reusable, \$12.00.

Teacher's Manual available, \$1.00.

Table of Contents.

Constructed Responses always used; no Multiple Choice; no Branching.

DEVELOPMENTAL (FIELD TEST) POPULATION(S):

Other using population(s): "Advanced sixth grade students; eighth and ninth grade students with deficiencies."

Prerequisites: "Sixth grade understanding of basic operations."

Average Time: 120 classroom hours (est.).

No Revision.

(1 sample page)

MATHEMATICS

SEVENTH GRADE MATHEMATICS Murphy; ENCYCLOPAEDIA BRITANNICA PRESS one sample page:

3469. Look at the perimeter of the rectangle in the preceding frame.

According to the Commutative Principle of Addition, we know that the order of the addends may be changed without affecting the sum.

Therefore, we could have written the sum as follows:

$$\text{Perimeter} = 10 + 5 + 10 + 5 \text{ or}$$

$$\text{Perimeter} = 10 + 10 + 5 + 5.$$

Since we may group the addends without affecting the sum, according to the Associative Principle of Addition, we may group these as follows:

$$\text{Perimeter} = (10 + 10) + (5 + 5).$$

Finally, by our definition of multiplication, we may write:

$$\text{Perimeter} = 2 \cdot 10 + 2 \cdot 5.$$

Is the sum of $2 \cdot 10$ and $2 \cdot 5$ equal to 30?

Yes

$$2 \cdot 10 + 2 \cdot 5$$

$$= 20 + 10 = 30$$

3470. What is the perimeter of this rectangle?



$$\text{Perimeter} = 4 + 2 + 4 + 2 \text{ or}$$

$$\text{Perimeter} = 4 + 4 + 2 + 2 \text{ or}$$

$$\text{Perimeter} = (4 + 4) + (2 + 2) \text{ or}$$

$$\text{Perimeter} = 2 \cdot 4 + 2 \cdot 2 \text{ or}$$

$$\text{Perimeter} = 8 + 4$$

$$\text{Perimeter} = 12 \text{ ft.}$$

SEVENTH GRADE MATHEMATICS

MATHEMATICS - SETS

Elem.

ARITHMETIC WITH SETS

Book 4, Progressive Elementary Mathematics Series

ARITHMETIC IN USE

Book 5, Progressive Elementary Mathematics Series

FRANK W. BANGHART, Director and Staff, Mathematical Research Laboratories.

Published by NOBLE AND NOBLE, PUBLISHERS, Inc.,
67 Irving Place, New York 3, New York.

Programed texts, Book 4: 4200 frames & 460 test items in frame format, Book 5: 4100 frames & 410 test items in frame format, clothbound and paperback, 512 pp. each book, 8" x 10", Book 4 & 5: clothbound at \$5.88 each, 2 paperbacks at \$2.24 each.

Teacher's Manual available, free to using teachers.

Table of Contents, Index.

Unit test(s) included.

Constructed Responses usually used; some Multiple Choice Responses; some Branching.

DEVELOPMENTAL AND (FIELD TEST) POPULATION(S):

"Developmental populations included approximately one thousand fourth [and one thousand fifth] grade students in the Baltimore County (Md.), Norfolk, Va., and Norfolk County (Va.) schools."

Prerequisites: None.

Average Time: 120 hours, if properly integrated with classroom activities.

Next Revision: 1968.

Literature: See February, 1963 issue of Arithmetic Teacher.

(8 sample pages)

MATHEMATICS - SETS

ARITHMETIC WITH SETS

ARITHMETIC IN USE

Banghart; NOBLE AND NOBLE, PUBLISHERS

8 sample pages:

24. Fred, Dave, and Ken have on blue shirts. If we name the set of boys wearing blue shirts Set B, we can now show that Fred belongs to this set by writing: Fred \in B. We can show that Ken belongs to this set, too, by writing: Ken \in B.

25. Jack wants to write in set language that a guppy is a member of the set of fish F. Jack should write, Guppy \in F.

26. Alice wants to write that the potato is a member of the set of vegetables V. She can write it in set language like this _____.

27. Apple \in R. This set sentence tells us that the apple is a member of Set R. If R is the set of all red things, Apple \in R tells us that the apple is _____.



28. We know that Set G is the set of girls who are wearing blue skirts. If we write Polly \in G, we know that Polly is wearing a _____.

29. We can talk about a collection of things as a _____ of things. Then we can name the set. If we call the set of flowers F, the _____ of the set is F.



30. We can list the members of a set. To show that April, May, June, July, and August are all members of a group of months M, we can write

M = { _____, _____, _____, _____, _____ }.

31. We can show that something is a member of a set. To show that Fred belongs to the Scout Troop T, we can write _____.



32. This is the set of the Wise children. Ruth, Ellen, and Bobby are all _____ of the set of Wise children.

33. Ruth and Ellen are also members of another set. This is the set of Wise girls. Ruth and Ellen are members of _____ sets.

34. Mrs. White had a garden in which she raised roses, daisies, carrots, and peas. This we could call Set P. Roses, daisies, carrots, and peas are members of Set _____.



35. Roses and daisies are a _____ of flowers which Mrs. White raised. Carrots and peas are a _____ of vegetables which Mrs. White raised.



36. The whole set of plants P which Mrs. White raised has two smaller sets in it. Set P has a set of flowers and a _____ of vegetables in it.



BIG SETS AND LITTLE SETS

11

37. Many sets have smaller sets in them. *Subset* is a word we use to talk about a set which is part of, or inside, a larger set.

Jane saw this set of animals one day:



The set of white animals is a subset of the set of all the animals she saw. The set of spotted animals is a _____ of all the animals she saw.

38. The set of Wise children, $W = \{Ruth, Ellen, Bobby\}$, has 2 subsets inside it. They are Subset F (girls) and Subset J (boy).

$\{Ruth, Ellen\} = F$ $\{Bobby\} = J$

Sets F and J are _____ of Set W.

39. This is a set of numbers: $\{2, 3, 4, 5, 6\} = \text{Set } N$. In Set N there is a set of even numbers A and a set of odd numbers B.

$\{2, 4, 6\} = A$, the set of even numbers in Set N.
 $\{3, 5\} = B$, the set of odd numbers in Set N. Sets A and B are _____ of Set N.

40. Ted, Bill, Jack, Jane, and Sue form one spelling team, which we will call Set R. Jane is a member of Set R. We write this in set language as $Jane \in R$. To show that Sue is a member of Set R, we could write _____.

41. Ted, Bill, and Jack are each members of Set R. They are also members of a subset of R, which we can call Subset B.

To show that Subset B is a subset of Set R, we can write $B \subseteq R$.



42. Jane and Sue, the girls, are also a subset of Set R. We can call them Subset G. To show that Subset G is a subset of R, we can write $G \subseteq R$, because both members of Subset G are members of Set _ .

43. Betay has a blue sweater, a green sweater, and a white sweater. We can call this the ____ of Betay's sweaters.

44. We can make subsets from the set of Betay's sweaters. We can put each of the 3 sweaters into a set by itself. We will then have _____ B, _____ G, and _____ W.

45. We can make other subsets from Betay's set of 3 sweaters. We can make a subset with B and G in it. We can make a _____ with B and W in it. We can make a _____ with G and W in it.

46. To show that Set B is a subset of Set S (the set of all Betay's sweaters), we can write $B \subseteq S$.

47. Joan wants to write that F is a subset of Set K. Joan should write $F \subseteq$ _ .

48. Bill has 3 fish, and Fred has 3 fish bowls. If they put 1 fish in each bowl, they will see that they have the same number of fish and bowls. There will be ____ fish or bowls left over.



THE SYMBOL \subseteq

1. We have already learned to multiply any number by 10. To multiply 10×23 , we write:

$$\begin{array}{r} 23 \\ \times 10 \\ \hline 230 \end{array}$$

We think 23×1 ten = 23 tens = 230. Now look at these problems:

$$\begin{array}{r} 14 \\ \times 10 \\ \hline 140 \end{array}$$

$$\begin{array}{r} 27 \\ \times 10 \\ \hline \end{array}$$

2. $\begin{array}{r} 35 \\ \times 10 \\ \hline \end{array}$

3. $\begin{array}{r} 43 \\ \times 10 \\ \hline \end{array}$

4. $64 \times 10 = \underline{\quad}$

5. $78 \times 10 = \underline{\quad}$

6. We also know how to multiply numbers like 20×24 . We write:

$$\begin{array}{r} 24 \\ \times 20 \\ \hline \end{array}$$

and think 24×2 tens = 48 tens = 480. Now look at these:

$$\begin{array}{r} 16 \\ \times 40 \\ \hline 640 \end{array}$$

$$\begin{array}{r} 34 \\ \times 20 \\ \hline \end{array}$$

7. $\begin{array}{r} 16 \\ \times 20 \\ \hline \end{array}$

8. $\begin{array}{r} 43 \\ \times 70 \\ \hline \end{array}$

9. $\begin{array}{r} 24 \\ \times 30 \\ \hline \end{array}$

10. $\begin{array}{r} 48 \\ \times 50 \\ \hline \end{array}$

11. When we learned to multiply two-digit numbers, we first looked at numbers written in *expanded form*. In expanded form, to multiply 2×23 we can write:

$$2 \times (1 \text{ ten} + 2 \text{ ones}) = 2 \text{ tens} + 4 \text{ ones} = 26$$

So, to multiply 2×23 we can write:

$$2 \times (2 \text{ tens} + 3 \text{ ones}) = 4 \text{ tens} + 6 \text{ ones} = \underline{\quad}$$

12. $3 \times 23 = 3 \times (2 \text{ tens} + 3 \text{ ones}) = \underline{\quad} \text{ tens} + \underline{\quad} \text{ ones} = \underline{\quad}$

13. $5 \times 11 = 5 \times (1 \text{ ten} + 1 \text{ one}) = \underline{\quad} \text{ tens} + \underline{\quad} \text{ ones} = \underline{\quad}$

14. Then we learned to carry, using numbers written in expanded form.

$4 \times 34 = 4 \times (3 \text{ tens} + 4 \text{ ones}) = 12 \text{ tens} + 16 \text{ ones} =$
 $13 \text{ tens} + 6 \text{ ones} = \underline{\quad}$

15. $6 \times 18 = 6 \times (1 \text{ ten} + 8 \text{ ones}) = 6 \text{ tens} + 48 \text{ ones} =$
 $\underline{\quad} \text{ tens} + \underline{\quad} \text{ ones} = \underline{\quad}$

16. Now we can use numbers written in expanded form. Let us use them with a two-digit multiplier.

Suppose we want to multiply 11×23 . The 11 is the same as $(1 \text{ ten} + 1 \text{ one}) = 10 + 1$. So, we know 11×23 is the same as $(10 + 1) \times 23$.

When we multiply 11×23 , we multiply 1×23 and 10×23 , then add the two products. Our problem should now look like this:

$$\begin{array}{r} 23 \\ \times 11 \\ \hline 23 \leftarrow \text{This number is } 1 \times 23 \\ 230 \leftarrow \text{This number is } 10 \times 23 \\ \hline 253 \leftarrow \text{This number is } 23 + 230 \end{array}$$

17. To multiply 32×14 , we say 2×14 and 30×14 . Then we add the two products. What is the answer? $\underline{\quad}$

$$\begin{array}{r} 14 \\ \times 32 \\ \hline 28 \leftarrow 28 \text{ is } 2 \times 14 \\ 420 \leftarrow 420 \text{ is } 30 \times 14 \\ \hline \leftarrow \text{This number is } 28 + 420 \end{array}$$

18.
$$\begin{array}{r} 18 \\ \times 42 \\ \hline 36 \leftarrow 2 \times 18 \\ 720 \leftarrow \quad \times \quad \\ \hline \end{array}$$

19.
$$\begin{array}{r} 32 \\ \times 25 \\ \hline 160 \\ 640 \\ \hline \end{array}$$

USING EXPANDED FORM IN MULTIPLICATION

20.

$$\begin{array}{r}
 47 \\
 \times 37 \\
 \hline
 329 \\
 141 \\
 \hline
 1759
 \end{array}$$

21.

$$\begin{array}{r}
 53 \\
 \times 46 \\
 \hline
 318 \\
 2438 \\
 \hline
 2438
 \end{array}$$

$$\begin{array}{r}
 22. \quad 63 \\
 \times 24 \\
 \hline

 \end{array}$$

This number is 4×63 .
 This number is 30×63 .
 This number is the sum of 4×63 and 30×63 .

$$\begin{array}{r}
 23. \quad 75 \\
 \times 62 \\
 \hline

 \end{array}$$

$$\begin{array}{r}
 24. \quad 83 \\
 \times 24 \\
 \hline

 \end{array}$$

25. We can use a "short cut" when we multiply.

$$\begin{array}{r}
 83 \\
 \times 24 \\
 \hline
 332 \\
 1660 \\
 \hline
 1992
 \end{array}$$

You have seen that we always have a zero in this place. Why? Because we are always multiplying by a number that ends in a zero:
 $20 \times 83 = 1660$.

We need not write down that zero. But we must remember to put all the other numbers in their right places.

$$\begin{array}{r}
 83 \\
 \times 24 \\
 \hline
 332 \\
 166
 \end{array}$$

This is where the zero would go, if we wrote it.

26.

$$\begin{array}{r} 47 \\ \times 31 \\ \hline 47 \end{array}$$

This number is $47 \times 30 \rightarrow$ _____ \leftarrow Don't write the zero!

27. When we use this shorter way of multiplying, we multiply the multiplicand by each digit in the multiplier. Remember to move the second row over one place to the left (to the tens place).

$$\begin{array}{r} 47 \\ \times 31 \\ \hline 47 \\ 141 \end{array}$$

This is 1×47 .

This is 3×47 . We moved 141 _____ place to the left.

28.

$$\begin{array}{r} 97 \\ \times 48 \\ \hline 291 \\ 388 \end{array}$$

This is _____ \times _____.

This is _____ . We remembered to move 388 one place to the left.

29.

$$\begin{array}{r} 66 \\ \times 57 \\ \hline 462 \\ 330 \end{array}$$

This is _____ \times _____

This is _____ \times _____

We moved 330 one place to the left.

30.

$$\begin{array}{r} 51 \\ \times 36 \\ \hline \end{array}$$

31.

$$\begin{array}{r} 28 \\ \times 94 \\ \hline \end{array}$$

PRACTICE WITH THE "SHORT CUT"

19.

MATHEMATICS-SETS

Elem.-Jr.H.S.

INTRODUCTION TO SETS

EUGENE D. NICHOLS

ROBERT KALIN

HENRY GARLAND, all of Florida State Univ.

Published by: HOLT, RINEHART & WINSTON,

383 Madison Ave., N. Y. 17, N.Y.

**Programed text, 255 frames, paperback, 72 pp., 7" x 10",
\$.96.**

Teacher's Manual available, \$.16.

Table of Contents.

Final Test included.

**Constructed Responses usually used, some Multiple Choice,
no Branching.**

DEVELOPMENTAL (FIELD TEST) POPULATION(S):

"Grades 7 thru 12."

**Prerequisites: "Familiarity and skill in computing with
counting numbers."**

Average Time: 2-4-1/2 hours (est.).

Next Revision: Unknown.

(1 sample page)

MATHEMATICS-SETS

INTRODUCTION TO SETS

Nichols, Kalin, Garland; HOLT, RINEHART & WINSTON
one sample page:

- 80 Tell how many members there are in each set.
(a) The set of counting numbers between 5 and 8. _____
(b) The set of counting numbers between 5 and 7. _____
(c) The set of counting numbers between 5 and 6. _____

STOP

- 80 (a) Two (b) One (c) None or Zero

- 81 You saw that the set of counting numbers between 5 and 6 has no members.
The set of counting numbers between 5 and 6 is a word-description of the empty set.
The empty set is the set that has no members.
The set of counting numbers between 8 and 9 is the _____ set.

STOP

- 81 empty

- 82 A symbol for the empty set is \emptyset .
(Draw a circle with a slash through it.)
The empty set, \emptyset , is the set that has no members.
A word-description of the empty set, \emptyset , is the set of all three-legged birds.
Which descriptions describe \emptyset ?
(a) The set of counting numbers between 106 and 107.
(b) The set of green stripes in the U.S. flag.
(c) {6}.
(d) The set of women presidents of the U.S.

STOP

- 82 (a), (b), (d)

- 83 The set of five-sided triangles is the _____ set. The (word) symbol used to represent this set is _____.

STOP

- 83 empty, \emptyset

- 84 Which description describes \emptyset ?
(a) The set of even numbers between 3 and 17.
(b) The set of even numbers between 3 and 5.
(c) The set of even numbers between 4 and 6.

STOP

MATHEMATICS - SETS

H.S. - Coll.

**AN INTRODUCTION TO SETS, INEQUALITIES, AND
FUNCTIONS**

Introduction to Analytic Geometry

CLAUDE THOMPSON, Associate Professor of Mathematics,
Hollins College

Published by **ENCYCLOPAEDIA BRITANNICA PRESS**,
425 N. Michigan Avenue, Chicago 11, Illinois

Programed text, 1,605 frames, paperback, 8-1/2" x 11-1/2",
\$11.50, available in 3 separate units.

For use in TEMAC BINDER, \$1.25; program reusable,
\$10.25.

Teacher's Manual available, \$1.00.

Table of Contents.

Constructed Responses always used; no Multiple Choice;
no Branching.

DEVELOPMENTAL (FIELD TEST) POPULATION(S):

"Selected students developmentally, Roanoke City
Public Schools for field test evaluation."

Other using population(s): "Professional review in modern
mathematics."

Prerequisites: "Highschool algebra and trigonometry."

Average Time: 25 classroom hours for average
students (est.).

No Revision.

(1 sample page)

MATHEMATICS - SETS

AN INTRODUCTION TO SETS, INEQUALITIES, AND FUNCTIONS

Thompson; ENCYCLOPAEDIA BRITANNICA PRESS
one sample page:

12. In mathematics it is not considered proper to define a concept in terms of that concept. Since the words "set" and "collection" have the same meaning, we cannot *define* the concept of "set" using the word "_____."

collection

13. We can, however, *describe* a _____ using the word "collection."

set

14. For our purposes, the concept of "set" is an undefined concept, just as the concepts of "point" and "line" are undefined concepts in _____.

geometry

15. We have taken the concept of "_____" as undefined.

set

16. A set may be described as _____.

any collection of distinct objects

17. The distinct objects which make up a set are called the *elements* of that set. For example, the _____ of the set consisting of the negative integers $-1, -5, -507$ are the negative integers $-1, -5, -507$.

elements

18. Those distinct objects which make up a set are called the _____ of the set.

elements

19. Consider as a set the fifty states of the United States; each state is an _____ of this set.

element

20. A _____ is any collection of distinct objects, called _____.

set

elements

21. The collection of books in a library is a set; the elements of this set are _____.

books

SETS, INEQUALITIES, AND FUNCTIONS

MATHEMATICS - SETS

Elem.-Jr.H.S.

LANGUAGE OF SETS

DONALD COOK, Basic Systems, Inc.

Published by: APPLETON-CENTURY-CROFTS, LYONS &
CARNAHAN,

34 West 33rd Street, New York 1, N.Y.

Programed text, 797 frames, hard bound, 264 pp., 7 1/2" x
10", \$2.60

Teacher's Manual available, free upon adoption of 10
programs.

Table of Contents.

Unit and Final Test and Diagnostic Test(s) available free
with Teacher's Manual.

Constructed Responses usually used; some Multiple Choice;
no Branching.

DEVELOPMENTAL (FIELD TEST) POPULATION(S):

"Developmental validation test: Total of 26 students
were sampled. The validation group consisted of 12
students ranging in school grade from 6-9th grade."

Prerequisites:

Additional material required: Response Book, \$.64.

Average Time: 14 hours (based entirely on data). Range:
7 1/2-20 1/2 hours.

No Revision

(1 sample page)

MATHEMATICS-SETS


LANGUAGE OF SETS

Cook; APPLETON-CENTURY-CROFTS, LYONS & CARNAHAN

one sample page:

$A \subset B$
 $A \supset B$
 $A \cap B \neq \emptyset$
 Draw a Venn diagram of sets A and B .

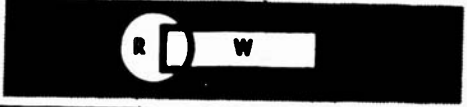
Sample answer:



777

Fill in the blanks

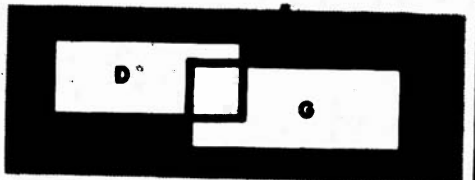
_____ \subset _____
 _____ \supset _____
 _____ \cap _____ $\neq \emptyset$



$R \subset W$
 $R \supset W$
 $R \cap W \neq \emptyset$

778


Describe this Venn diagram symbolically.



$D \subset G$
 $D \supset G$
 $D \cap G \neq \emptyset$

779

Is $A \cap B = \emptyset$? In any of the other three types of Venn diagrams, can $A \cap B = \emptyset$? Therefore, $A \cap B = \emptyset$ describes the relationship between two _____ sets.



yes
 no
 disjoint

780

MATHEMATICS-SETS

8th Grade

SETS, EQUATIONS, AND INEQUALITIES

MILDRED REIGH, Mathematics Dept.

J. WILLIAM MOORE, Education Dept.

WENDELL SMITH, Psychology Dept., all of Bucknell University.

Published by McGRAW-HILL BOOK COMPANY, Inc.,
330 West 42nd Street, New York City.

Programed Text, 2000 frames, \$ ____.

Teacher's Manual available.

Table of Contents.

Unit and Final Test(s) available.

Constructed Responses always used; some Branching,
no Multiple Choice.

DEVELOPMENTAL (FIELD TEST) POPULATION(S):

"Developmental: 12 eighth grade students drawn from upper half of class. Test: 90 eighth grade students, one-half average and one-half above average in mathematics ability."

Prerequisites: "Knowledge of arithmetic."

Average Time: 52 hours (est.).

Next Revision: June, 1963.

(1 sample page)

MATHEMATICS-SETS

SETS, EQUATIONS, AND INEQUALITIES

Reigh, Moore, Smith; MCGRAW-HILL BOOK COMPANY
one sample page:

(Preliminary Version)

Q1-24 ϵ the band, can be read in any of three ways:

• Jane is a member of the band.

Jane belongs to the band.

Jane is an element of the band.

Since these three sentences mean the same thing, we choose the phrase which sounds the best in that particular sentence. However, we shall use, most often, the phrase, "is a member of."

The symbol ϵ can be written in words in three different ways. Write the three ways.

A1--24 is a member of; belongs to;
 is an element of
 (Any order is correct.)

Q1--25 If ϵ could be written three ways: is a member of; is an element of; belongs to; what symbol would you use for each of these three expressions: is not a member of; is not an element of; does not belong to?

A1-25

MATHEMATICS-SETS

Jr. H.S.

SETS, OPERATIONS, AND CIRCUITS

An Introduction to Set Theory

VERNON L. DAUSCH, Milburn Junior High School, New Jersey

MARTIN M. MOSKOWITZ, Vailsburg High School, Newark, New Jersey

ERNEST R. RANUCCI, Newark State College, Union, New Jersey

MORTON SELTZER, Weequahic High School, Newark, New Jersey

EDWARD J. ZOLL, Newark State College, Union, New Jersey

Published by **THE MACMILLAN COMPANY**,
60 Fifth Avenue, New York 11, N. Y.

Programed text, 500 frames, paperback, 112 pp., 8-1/4" x 11", \$1.50.

Can be used with **FLEXITAB BINDER**, \$1.67 per copy, program can be reusable.

Table of Contents.

Unit and Final Test(s) available.

Constructed Responses usually used; some Multiple Choice; no Branching.

DEVELOPMENTAL (FIELD TEST) POPULATION(S):

"Average 7th and 8th grade students. Some testing of students in grades 5 and 6."

Prerequisites: "Programs will fit in with both 'modern' and traditional backgrounds."

Average Time: 12-15 hours (est.).

Next Revision:

(1 sample page)

MATHEMATICS-SETS

SETS, OPERATIONS, AND CIRCUITS

Dausch, Moskowitz, Ranucci, Seltzer, Zoll; THE MAC-MILLAN COMPANY

one sample page:

17. The set, *Even numbers between 11 and 15*, contains —?— elements.
a. two b. three c. five a. two
18. 8 —?— a member of the set, *Even numbers between 11 and 15*.
a. is b. is not b. is not
19. 14 —?— a member of the set, *Even numbers between 11 and 15*.
a. is b. is not a. is
20. Mickey Mouse —?— a member of the set, *Even numbers between 11 and 15*.
a. is b. is not b. is not
21. The name of a set tells us what is included in the _____
set
22. When we deal with a set, we often need to know what the set contains. Often the _____ of the set tells us what is included in the set.
name
23. Two members of the set, *Cities in California*, are —?— and —?—.
a. San Francisco b. Chicago c. Los Angeles d. Paris
a. San Francisco
c. Los Angeles
24. You can tell which of the cities above belong to the set because you know the —?— of the set.
a. size b. name c. direction b. name

MATHEMATICS-SETS

H.S.-Coll.

SETS, RELATIONS, AND FUNCTIONS

A Programmed Introduction to Modern Mathematics

MYRA McFADDEN, mathematics teacher and programmer

WENDELL SMITH, Psychology Dept., Bucknell University

WILLIAM MOORE, Education Dept., Bucknell University.

Published by McGRAW-HILL BOOK COMPANY, Inc.,

330 West 42nd Street, New York City.

Programed text, 1150 frames, paperback and hardcover,
300 pp., 6" x 9", \$3.95 paper edition; \$5.95 cloth
edition.

Teacher's Manual available.

Unit and Final tests "contained in Teacher's Manual, no
extra charge." Diagnostic tests "contained in program."

Constructed Responses usually used; some Multiple Choice;
no Branching.

DEVELOPMENTAL (FIELD TEST) POPULATION(S):

Prerequisites: "Knowledge of high school algebra and
geometry is recommended."

Additional equipment required: "Ruler and graph paper."

Average Time: 28 hours (est.). "Recommend 4 weeks use
within semester's work."

Next Revision:

(1 sample page)

MATHEMATICS-SETS

SETS, RELATIONS, AND FUNCTIONS

McFadden, Smith, Moore; McGRAW-HILL BOOK COMPANY
one sample page:

Difference of Two Sets

303 Let $(U - S)$ be the set of all elements of U which are not elements of S .

Given $U = \{1, 2, 3, 4, 5, 6, 7, 8, 9, 10\}$, $S = \{2, 3, 4\}$:

- (1) $U - S = \{ \quad \quad \quad \}$ (list the elements).
 (2) $S' = \{ \quad \quad \quad \}$ (list the elements).

(1) $U - S = \{1, 5, 6, 7, 8, 9, 10\}$ (2) $S' = \{1, 5, 6, 7, 8, 9, 10\}$

304 Given $U = \{1, 2, 3, 4, 5, 6, 7, 8, 9, 10\}$, $S = \{2, 3, 4\}$:

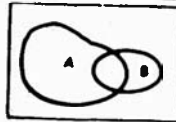
Make a Venn diagram showing S , S' , and U . Shade the diagram to show that the elements of S' are the same as the elements of the set $U - S$, namely, $\{1, 5, 6, 7, 8, 9, 10\}$. Place the names of the elements of U and S in the proper location in your Venn diagram.



305 If $A = \{1, 2, 3, 4, 5\}$ and $B = \{4, 5, 6, 7\}$, the idea of set difference, namely, $A - B$, is the set of all elements of A which are not elements of B . List the elements of $A - B$.

306 Using a Venn diagram, show what is meant by $A - B$, given $A = \{1, 2, 3, 4, 5\}$
 $B = \{4, 5, 6, 7\}$

Make a drawing, and shade the part showing elements of A which are not elements of B .



MATHEMATICS - SETS

H.S.

THEORY OF SETS

JOAQUIN BUSTOZ, Programmer, Learning Incorporated
SHIRLEY FRYE, Mathematics Instructor, Arcadia High
School, Scottsdale, Arizona.

Published by **LEARNING INCORPORATED**,
1317 West Eighth Street, Tempe, Arizona.

Programed text, 415 frames, \$3.50.

Constructed Responses usually used; some Multiple
Choice; no Branching.

DEVELOPMENTAL POPULATION(S): Grades 9-11.

Other Using Population(s): "Subjects as low as grade 5."

Prerequisites: Grade 9 reading level.

Average Time: 3 hours, 46 minutes (based entirely on
data); standard deviation, 37.6 minutes..

Next Revision:

(1 sample page)

MATHEMATICS - SETS

THEORY OF SETS

Bustoz, Frye; LEARNING INCORPORATED
one sample page:

1-15 In mathematics, symbols are used to replace words, phrases or clauses. The Greek letter, \in (epsilon), is the symbol that will be used for the words "belongs to" or "is an element of." Copy the symbol that stands for "is an element of."

\in

1-16 Using the letter T to represent the set of all green vegetables, we write "asparagus \in T" and read this "asparagus belongs to T." This simply means that asparagus is an _____ of the set of green vegetables.

element

1-17 If the letter P represents the set of cities in the United States, then Pittsburgh belongs to P, or in symbols, Pittsburgh \in P.

\in

1-18 In the statement "Felix \in X", X is the name of the _____ and Felix must be an _____ of the set.

set; element

1-19 Write the phrase "5 is an element of set M" in symbols: _____

$5 \in M$

1-20 The symbol \in means "belongs to." The symbol \notin means "~~does~~ not belong to." To write in symbols "Mary does not belong to Boy Scout Troop #12," we would have _____ Boy Scout Troop #12.

Mary \notin Boy Scout Troop #12

1-21 The symbol for "belongs to" is _____. The symbol for "does not belong to" is _____.

\in ; \notin

1-22 If we wrote "the triangle \notin B" we would mean that the triangle is _____ an _____ of Set B.

not; element

MATHEMATICS-STATISTICS

H.S. -Coll.

ADVANCED MATHEMATICS SERIES: INTRODUCTORY
STATISTICS

Part I: Descriptive Statistics; Part II: Statistical
Inference

JAMES L. EVANS

LLOYD E. HOMME, both of Teaching Materials Corporation
Published by TEACHING MATERIALS CORPORATION
575 Lexington Avenue, New York 22, New York

Programed text, Part I: 836 frames; Part II: 830 frames,
paperback, Part I: 143 pp.; Part II: 141 pp., 8-1/2"
x 11", \$6.00 for each part; both parts combined \$11.00.

Part I and Part II combined for use in MIN/MAX II teach-
ing machine, \$25.00; program reusable, \$10.00.

Teacher's Manual: General Manual for all TMI-Grolier
programs available.

Table of Contents.

Final Test included.

Constructed Responses always used; no Multiple Choice;
no Branching.

DEVELOPMENTAL (FIELD TEST) POPULATION(S):
"Eleventh-grade students."

Prerequisites:

Average Time: Part I & II: 10-15 hours each (based en-
tirely on data); standard deviation, 12 hours. Part I
& II combined: 20-35 hours (based entirely on data);
standard deviation, 12 hours.

Next Revision: December, 1963.

(2 sample pages)

MATHEMATICS-STATISTICS

ADVANCED MATHEMATICS SERIES: INTRODUCTORY STATISTICS

Evans, Homme; TEACHING MATERIALS CORPORATION
2 sample pages

13	<p>A more formal way of finding a number which is halfway between two others is to add them and divide by 2. For example, in the distribution 4, 8, 22, 68, the median = $\frac{8 + 22}{2} = \frac{30}{2} = 15$. In the distribution, 1, 4, 68, 100, the median = 67.</p>	13
	<p>$\frac{4 + 68}{2} = \frac{72}{2} = 36$</p>	
14	<p>Whether the number of scores to add or even, they must still be ranked, if they are not in order. For example 8, 18, 11, 17, would be ranked 8, 11, 18, 17, and the median would be $\frac{11 + 18}{2} = \frac{29}{2} = 14.5$. Rank the following scores: 1, 20, 8, 17, and find the median.</p>	14
	<p>1, 8, 17, 20 median = $\frac{8 + 17}{2} = \frac{25}{2} = 12.5$</p>	
15	<p>In distribution A, the median is 67. In distribution B, the median is 67. A 1, 17, 13, 8, 6, 10, 10 B 1, 100, 99, 14, 16, 98</p>	15
	<p>10 98</p>	
16	<p>Find the medians: 2, 4, 14, 28. Median = 67 2, 7, 8, 10, 11. Median = 67</p>	16
	<p>8 8</p>	
17	<p>In this distribution the mode is 67, the median is 67. 2, 2, 7, 7, 7, 8, 9</p>	17
	<p>7 7</p>	
18	<p>It is (possible not possible) that both the median and the mode may be the same number for certain distributions.</p>	18
	<p>possible</p>	

63	<p>Suppose you take 9 samples of 1,000,000 scores each. You then compute the means of the samples and get 2.2, 2.6, 2.7, 2.4, and 2.0. What is the median of this sampling distribution of means? (2) _____</p>	63															
2.7																	
64	<p>Suppose you have a sampling distribution of some statistic, such as the variance or mode. You can calculate the variance of this distribution, just as if it were an ordinary frequency distribution. Example: If you get the variances of several samples, and then compute the mean of these variances, you would have the mean of the sampling distribution of variances. If you get the standard deviations of several samples, and then get the mode of these standard deviations, you would have (VSD) _____</p>	64															
the mode of a sampling distribution of standard deviations																	
65	<p>Given three samples:</p> <table style="margin-left: auto; margin-right: auto;"> <tr> <td style="text-align: center;">11</td> <td style="text-align: center;">12</td> <td style="text-align: center;">13</td> </tr> <tr> <td style="text-align: center;">1</td> <td style="text-align: center;">1</td> <td style="text-align: center;">1</td> </tr> <tr> <td style="text-align: center;">1</td> <td style="text-align: center;">1</td> <td style="text-align: center;">1</td> </tr> </table> <p>The sampling distribution of means has the scores 1, _____ The mode of the sampling distribution of means is (2) _____</p>	11	12	13	1	1	1	1	1	1	65						
11	12	13															
1	1	1															
1	1	1															
1, 1 1																	
66	<p>Given three samples:</p> <table style="margin-left: auto; margin-right: auto;"> <tr> <td style="text-align: center;">1</td> <td style="text-align: center;">2</td> <td style="text-align: center;">3</td> <td style="text-align: center;">4</td> </tr> <tr> <td style="text-align: center;">1</td> <td style="text-align: center;">1</td> <td style="text-align: center;">1</td> <td style="text-align: center;">1</td> </tr> <tr> <td style="text-align: center;">1</td> <td style="text-align: center;">1</td> <td style="text-align: center;">1</td> <td style="text-align: center;">1</td> </tr> </table> <p>The range of the sampling distribution of medians is (2) _____</p>	1	2	3	4	1	1	1	1	1	1	1	1	66			
1	2	3	4														
1	1	1	1														
1	1	1	1														
0 - 0 = 0																	
67	<p>The standard deviation of the sampling distribution of means is important enough to have a special name. It is called the STANDARD ERROR OF THE MEAN. So if you get the means of a group of samples, and then figure the (VSD) _____ of these means, you have the (VSD) _____</p>	67															
standard deviation standard error of the mean.																	
68	<p>Figure the standard deviation of the means in the samples below:</p> <table style="margin-left: auto; margin-right: auto;"> <tr> <td style="text-align: center;">A</td> <td style="text-align: center;">B</td> <td style="text-align: center;">C</td> <td style="text-align: center;">D</td> <td style="text-align: center;">E</td> </tr> <tr> <td style="text-align: center;">1</td> <td style="text-align: center;">1</td> <td style="text-align: center;">1</td> <td style="text-align: center;">1</td> <td style="text-align: center;">1</td> </tr> <tr> <td style="text-align: center;">1</td> <td style="text-align: center;">1</td> <td style="text-align: center;">1</td> <td style="text-align: center;">1</td> <td style="text-align: center;">1</td> </tr> </table> <p>The special name for this standard deviation is (VSD) _____</p>	A	B	C	D	E	1	1	1	1	1	1	1	1	1	1	68
A	B	C	D	E													
1	1	1	1	1													
1	1	1	1	1													
0 - 1 standard error of the mean.																	

MATHEMATICS-STATISTICS

Coll.

DESCRIPTIVE STATISTICS

. A Behavioral Approach

LASSAR G. GOTKIN

LEO S. GOLDSTEIN, both of The Center for Programed Instruction, Inc.

Experimental Edition published by THE CENTER FOR PROGRAMED INSTRUCTION, Inc.

365 West End Avenue, New York 24, New York.

Published Edition to be available from JOHN WILEY & SONS,

440 Park Avenue South, New York, New York.

**Programed text, 2000 frames, paperback, 250 pp.,
8 1/2" x 11", to be available in 3 separate volumes at
\$2.50 each.**

Table of Contents, Index.

Unit, Final, Diagnostic Test(s) available.

**Constructed Responses usually used; some Multiple
Choice Responses; some Branching.**

DEVELOPMENTAL (FIELD TEST) POPULATION(S):

"Individuals from Fashion Institute of Technology."

Prerequisites: High School algebra.

Average Time: 25-30 hours (est.).

Next Revision: February, 1964.

(2 sample pages)

MATHEMATICS-STATISTICS

DESCRIPTIVE STATISTICS

Gotkin, Goldstein; THE CENTER FOR PROGRAMED INSTRUCTION

2 sample pages:

UNIT V

Part B

The Median, Percentiles, and Percentile Rank

1. The Latin expression in media res means "in the middle of things".
A mediator is a person in the _____ of a dispute.
- A1. middle
2. The Mediterranean Sea was once considered to be in the middle of the world; medieval refers to the middle ages. These words contain the four-letter prefix _____. meaning "middle".
- A2. medi
3. $N = 5$
In this distribution of 5 scores, the middle score is 11.
It is the (mean/median/mode).
47
17
11
8
2
- A3. median
4. $N = 7$
99, 101, 101, 104, 105, 111, 118
These 7 scores are in numerical _____.
The middle score is _____. It is the (mean/mode/median).
- AA. order or sequence
104
median
5. $N = 7$
27, 14, 63, 1, 8, 92, 31
Which of these 7 scores is the median?

From Unit 1, Part A -
Population & Sample

(Panel II has not been
included.)

15. Each election year public opinion
pollsters like George Gallup, Elmo Roper
and Louis Harris predict the outcome of the
voting. These men poll (the entire voting
population/a sample of the voting
population). Why?

13. A sample of the voting
population.
It is too costly and
time consuming to poll the
entire voting population.

14. Time and cost are not the only reasons
why you might use a sample. If you wanted
to know how many miles wear you could
expect from a manufacturer's automobile
tires, would you use (a sample of the
tires/all the tires). Why?

14. A sample. If you
tested all of the tires
you would have none left
to sell.

15. Refer to Panel II
Who won the election for Governor in New
York State in 1958?
What percentage of the total vote did he
receive?

15. Rockefeller
55%

16. Did Rockefeller receive a majority of
the votes in New York City. (yes/no)

16. No. He received
only 45% of the New York
City votes.

17. If a large sample of New York City
voters were polled before the election, the
results would probably suggest that
(Harrison/Rockefeller) would win.

17. Harrison

18. A pollster wishing to predict the
winner of an election for the state
governor takes a large sample of voters
living in the state's largest city.

Is it likely that his sample will provide
a satisfactory approximation of state-wide
results.

18. No. He will probably
obtain a biased sample. The
pollster has "tested only the
pie crust." It is likely
that he will have introduced
a systematic bias since the
voting patterns of residents of
large cities usually differ from
those of rural and suburban areas.

MATHEMATICS-STATISTICS

H.S.-C011.

ELEMENTARY STATISTICS,

Part I: Descriptive Statistics

HOWARD W. ALEXANDER, Prof. of Math., Earlham
College

ROLAND F. SMITH, Prof. of Math., Earlham College

Published by: EARLHAM COLLEGE,
Richmond, Indiana

Programed text, 350 frames, Paperback, 78 pp., 8 1/2" x
11", \$2.50.

Available in French (partly.)

Table of Contents.

Unit Test(s) available.

Constructed Responses always used; no Multiple Choice;
no Branching.

DEVELOPMENTAL (FIELD TEST) POPULATION(S):

"A series of classes in Elementary Statistics at
Earlham College."

Prerequisites: Ninth-grade algebra.

Average Time: 8 hours (based entirely on data).

Next Revision: 1963 or 1964.

(1 sample page)

MATHEMATICS-STATISTICS

ELEMENTARY STATISTICS

Alexander, Smith; EARLHAM COLLEGE

one sample page:

1.1 Statistics is concerned with observations. These may be either numerical observations or non-numerical observations. For example, measuring the height of each student in a group would give rise to a set of _____ observations. Classifying the workers in a factory according to sex, on the other hand, would give rise to a set of _____ observations.

Answer: Numerical. Non-numerical.

Copyright 1960
Earlham College

1.2 When observations are classified, the classes into which they fall are called categories. Thus a classification of the workers in a factory according to sex would use the categories _____ and _____.

Answer: Male, female.

15.20 Suppose that for a certain distribution a code u is set up such that the mean and standard deviation of u are $\bar{u} = -.59$ and $s_u = 1.51$. If X and u are related by the equation $X = 5u + X_0 = 5u + 275$, then the mean of X is $\bar{X} = \underline{\hspace{2cm}}$, and the standard deviation of X is $s_x = \underline{\hspace{2cm}}$.

Answer: $\bar{X} = 5(-.59) + 275 = -2.95 + 275 = 272.05$.
 $s_x = 5(1.51) = 7.55$.

15.21 The advantage of using a code, u , is that the resulting computations usually involve much _____ numbers than if the original X -values were used.

Answer: Smaller.

MATHEMATICS-STATISTICS

H.S.-Coll.

AN INTRODUCTION TO PROBABILITY

BOYD EARL, Mathematics Dept., Wilkes College

J. WILLIAM MOORE, Education Dept., Bucknell University

WENDELL SMITH, Psychology Dept., Bucknell University

Published by **McGRAW-HILL BOOK COMPANY, Inc.**,
330 West 42nd Street, New York City.

Programed text, 1050 frames, hard and papercover,
250 pp., 6" x 9", \$3.95.

Teacher's Manual available.

Table of Contents, Index.

Unit and Final Test(s) available.

Constructed Responses always used; no Multiple Choice;
no Branching.

DEVELOPMENTAL (FIELD TEST) POPULATION(S):

"Developmental: (1) 10 high school students enrolled
in college preparatory program. (2) 15 high school
students enrolled in program in modern algebra.

Field test: (1) 50 high school students enrolled in
college preparatory program. (2) 20 high school
teachers. (3) 60 college freshmen in general mathe-
matics."

Prerequisites: "Two years of high school algebra."

Average Time: 23 hours (based entirely on data).

Standard Deviation: 7 hours.

Next Revision: June, 1963.

(1 sample page)

MATHEMATICS-STATISTICS

AN INTRODUCTION TO PROBABILITY

Earl, Moore, Smith; McGRAW-HILL BOOK COMPANY.

one sample page:

26. If the relative frequency of event A is one, we know that event A occurred every time the experiment was performed. Thus, if a coin was tossed seven times and the relative frequency of event H was one, (1) H appeared _____ times, that is, (2) $n(H) =$ _____.

Ans. (1) 7 (2) 7

- *27. The largest possible value for the relative frequency of event A is _____. In this case, we know that the event A occurred every time that the experiment was performed.

Ans. 1

28. If a coin is tossed 10 times, and A is the occurrence of a head, the smallest possible value of $n(A)$ is _____.

Ans. 0

- *29. If an experiment is performed N times, the smallest possible value of $n(A)$ for any event A is _____.

Ans. 0

MATHEMATICS – STATISTICS

H.S. - Coll.

INTRODUCTORY DESCRIPTIVE STATISTICS

With applications to Psychology

JOHN E. MILHOLLAND, Dept. of Psychology, University
of Michigan

Published by ENCYCLOPAEDIA BRITANNICA PRESS,
425 North Michigan Avenue, Chicago 11, Illinois

Programed text, 2,229 frames, paperback, 450 pp.,
8 1/2" x 11"; \$10.25. Bound in 2 separate volumes.
For use in TEMAC BINDER, \$1.25; program reusable,
\$9.00.

Table of Contents.

Constructed Responses always used; no Multiple Choice;
no Branching.

DEVELOPMENTAL (FIELD TEST) POPULATION(S):

"Student population in psychology classes at University
of Michigan."

Other using population(s): "Professional review; adult
education."

Prerequisites: None.

Average Time: "50 Classroom hours for average
students." (est.).

No Revision.

(1 sample page)

MATHEMATICS-STATISTICS

INTRODUCTORY DESCRIPTIVE STATISTICS Milholland; ENCYCLOPAEDIA BRITANNICA PRESS one sample page:

1621. Multiplying the scores by a _____
however, _____ the standard deviation by that
same _____

constant
multiplied
constant

1622. The standard deviation of $A + BX$, the transformed X
variable, would then be _____

$B\sigma_x$

1623. What would be the standard deviation of $C + DY$, the
transformed Y variable? _____

$D\sigma_y$

1624. Up to this point we have shown that performing a
_____ on two variables X and Y, so that they
become $A + BX$ and _____ makes the numerator
of the _____ form of the formula for the correlation
between the transformed variables equal to _____
and makes the standard deviations in the denominator equal to
_____ and _____

linear transformation
 $C + DY$
deviation
 BX and DY

1625. Write the deviation formula for r with these entries made
(Refer to Supplement No. 15 or 17 if you wish.)

$$\frac{(A + BX)(C + DY)}{\sqrt{(A + BX)^2 + (C + DY)^2}}$$

$$\frac{BCDy}{\sqrt{B^2\sigma_x^2 + D^2\sigma_y^2}}$$

1626. If we divide both numerator and denominator of the right
side by B and by D, what will the result be?

$$\frac{(A + BX)(C + DY)}{\sqrt{(A + BX)^2 + (C + DY)^2}}$$

$$\frac{C\sigma_y}{\sqrt{\sigma_x^2 + \sigma_y^2}}$$

1627. The right side of this equation, however, is the regular
_____ formula for the correlation between
_____ and _____

deviation
X, Y

STATISTICS

- 244 -

MATHEMATICS-STATISTICS

H.S., Coll. &
Grad. School

PROBABILITY AND STATISTICS - A PROGRAMMED
COURSE OF INSTRUCTION

ALBERT E. HICKEY, President

SANFORD M. AUTOR, Director of Programming, Entelek,
Inc.

Published by ADDISON-WESLEY Publishing Co., Inc.
Reading, Mass.

Programed text, 3,000 frames, paperback, 500 pp., 8-1/2"
x 11", \$3.00.

Table of Contents.

Constructed Responses usually used; some Multiple
Choice; no Branching.

DEVELOPMENTAL (FIELD TEST) POPULATION(S):

"Senior high school and college students."

Prerequisites: High school mathematics.

Average Time: 40 hours (est.).

Next Revision: 1965.

(2 sample pages)

MATHEMATICS-STATISTICS

PROBABILITY AND STATISTICS - A PROGRAMMED
COURSE OF INSTRUCTION

Hickey, Autor; ADDISON-WESLEY

2 sample pages:

PROBABILITY AND STATISTICS:
A Programmed Course of Instruction
Albert E. Hickey and Sanford M. Autor

The letters A and B can be ordered
or arranged in a row as AB or _____. BA

A and B can be ordered or arranged
in a row in _____ (how many?) different
ways. 2

Each different arrangement of A and
B in order (AB or BA) is called a permu-
tation. A permutation of a number of
objects is any arrangement of these ob-
jects in a definite order. The _____ of
A and B are AB and BA. permutations

To "permute" objects is to arrange
them in a row in a definite _____. order

To _____ objects is to arrange them
in a row in a definite order. permute

AB and BA are permutations of the
letters A and B. ABC and ACB are per-
mutations of the three letters _____,
taken all together. A, B, and C

ABC and ACB are two possible _____
of A, B, and C, taken all together. permutations

ABC and ACB are two permutations of BAC
A, B, and C. Other permutations of A, BCA
B, and C, taken all together, are _____, CBA
_____, _____, and _____. CAB

The permutations of A, B, and C,
taken all together, are _____, _____, _____, ABC ACB
_____, _____, and _____. There are _____ BAC BCA
(how many?) permutations of A, B, and C, CBA CAB
when taken all together. 6

One random variable, X, in tossing a coin 3 times is the number of heads obtained. The first column of Panel VI-1 shows a _____ space for this experiment.

sample

A second variable, Y, in tossing a coin 3 times is the number of runs obtained.

The sample point HHH represents one run of 3 heads. The same point TTT represents one _____ of 3 tails.

run

The sample point HHH has one run. The sample point TTT also has _____ run. The sample point HHT has two

one
runs

HHT has two runs. The first run has exactly two H's. The second run has exactly one _____.

T

HHH has one run.
HHT has two runs.
HTT has _____ runs.
HTH has _____ runs.

two
three

HHH has exactly 3 H's and 1 run.
HHT has exactly _____ H's and _____ runs.
HTT has exactly _____ H and _____ runs.
HTH has exactly _____ H's and _____ runs.

2 2
1 2
2 3

Refer to Panel VI-1. The 2 random variables for the experiment are the _____ and the _____ when a coin is tossed 3 times in succession.

number of
heads
number of
runs

Look at Panel VI-1. The random variable number of heads is denoted by _____. The random variable number of runs is denoted by _____.

X
Y

**A PROGRAMMED INTRODUCTION TO STATISTICAL
CONCEPTS**

CELESTE McCOLLOUGH

**LOCHE VAN ATTA, both of Psychology Dept.,
Oberlin College.**

**Published by McGRAW-HILL BOOK COMPANY, Inc.
330 West 42nd Street, New York City.**

**Programed text, 1200 frames, paperback and hardcover,
295 pp., 6" x 9", \$3.95 paper edition; \$5.95 cloth
edition. Will also be available for use with KONCEPT-
O-GRAPH machine.**

**Diagnostic tests "contained in program"; pre and post
Constructed Responses always used; no Multiple Choice;
no Branching.**

DEVELOPMENTAL (FIELD TEST) POPULATION(S):

Prerequisites:

Average Time: 20 hours (based entirely on data).

Next Revision:

(1 sample page)

MATHEMATICS-STATISTICS

A PROGRAMMED INTRODUCTION TO STATISTICAL CONCEPTS

McCullough, Van Atta; McGRAW-HILL BOOK COMPANY
one sample page:

33. This outcome would occur one time in 256 experiments, if the assumption is correct that the drug really makes no difference. One can conclude either that a relatively rare event has in fact occurred, or one can _____ the null hypothesis. reject
34. Notice that nothing has been said about "proving" or "disproving" the assumption. When you reject a null hypothesis, you conclude merely that the observed results would be extremely _____ if the hypothesis were maintained, and that you would therefore prefer to maintain some other hypothesis which could make the observed results more _____. rare, unusual
probable
35. When the difference between the observed outcome and the outcome expected on the null hypothesis is large, the difference is considered to be _____, and the null hypothesis is _____. ?
significant
rejected
36. Coin behavior does not have to be compared to the behavior of unbiased coins. One might hypothesize that the coin's behavior is not different from that of a hypothetical biased coin with $P_H = 1/6$, and this would still be a _____ hypothesis because it is a hypothesis of _____ difference. null
no, zero

Section 4. Testing the Null Hypothesis

37. Testing the null hypothesis in coin-tossing experiments requires deciding whether the behavior of the observed coin is really _____ from the behavior expected of an unbiased coin. The procedure in making this decision is the same, whether the experiment concerns coins or psychological processes. different
38. To answer the question, "is the coin biased?" one must ask, "What is the probability of getting a result as extreme as this from an unbiased coin?" If the coin has given 10 heads in 10 tosses, the probability of this outcome is 1 to 1024. The probability of getting this result or something equally extreme is $\frac{1}{2}$ in 1024, for there is one other equally extreme result—namely, _____. 10 tails
39. In other words, the probability of a perfectly unbiased coin behaving as badly as this, purely by chance, is _____ in 1024. This probability itself is low enough to warrant rejection of the null hypothesis; one would conclude that the coin is _____. 2
biased
40. If the observed result were 9 heads and 1 tail, this event would have a probability of _____, according to the Special Answer Sheet. This particular event would occur by chance about _____ time(s) in 100 such experiments, when the coin is unbiased. 10/1024
1

STATISTICS: PROBABILITY MODELS OF RANDOM PROCESSES

TECHNICAL STAFF, General Education, Inc.

Published by GENERAL EDUCATION, Inc.

96 Mt. Auburn St., Cambridge 38, Mass.

Programed text, 800 frames, loose leaf sheets for inclusion in three ringed notebook, 100 pp., 8 1/2" x 11", \$5.00.

Constructed Responses usually used; some Multiple Choice; no Branching.

DEVELOPMENTAL (FIELD TEST) POPULATION(S):

"Program was developmentally tested on one student at a time under closely supervised conditions and then revised. Five revisions were made. Programmer interviewed developmental test subjects at length."

Prerequisites: None.

Average Time: 8 hours (est.).

Next Revision: "None planned as yet."


(1 sample page)

MATHEMATICS-STATISTICS

STATISTICS: PROBABILITY MODELS OF RANDOM PROCESSES

Technical Staff; GENERAL EDUCATION
one sample page:

SHAPE AND PARAMETERS OF NORMAL CURVE

<p>602. The list to the right is called a binomial _____ of \bar{r}, where \bar{r} = number of heads, $n = 4$ tosses of a coin.</p>	<table border="1"> <thead> <tr> <th>\bar{r}</th> <th>P</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>1/16</td> </tr> <tr> <td>1</td> <td>4/16</td> </tr> <tr> <td>2</td> <td>6/16</td> </tr> <tr> <td>3</td> <td>4/16</td> </tr> <tr> <td>4</td> <td>1/16</td> </tr> </tbody> </table>	\bar{r}	P	0	1/16	1	4/16	2	6/16	3	4/16	4	1/16	<p>602. probability distribution</p>
\bar{r}	P													
0	1/16													
1	4/16													
2	6/16													
3	4/16													
4	1/16													
<p>603. Now display this probability distribution graphically by completing the bar graph at the right.</p>		<p>603</p>												
<p>604. The graph you just drew is reproduced as the graph on the left side of Exhibit 12. It shows how a total probability of _____ is distributed among the different possible values of _____. The graph (as well as the table from which it was drawn) is called the _____ probability distribution for $p = 1/2, n = 4$.</p>	<p>604. $1/2$ binomial</p>													
<p>605. Exhibit 12 reprints the binomial probability distribution for $n = 4$ trials, $p = 1/2$. Exhibit 12 also shows another type of probability distribution we shall discuss. As Exhibit 12 indicates, this second type of probability distribution is called the _____.</p>	<p>605. normal probability distribution</p>													
<p>606. Exhibit 12 shows that the _____ probability distribution is smooth, symmetrical, and bell-like in shape; the _____ probability distribution is step-like in shape.</p> 	<p>606. normal binomial</p>													

MATHEMATICS-STATISTICS

Jr. H.S. -H.S.

WHAT ARE THE CHANCES?

An Introduction to Probability

MARTIN M. MOSKOWITZ, Vailsburg H. S.

Published by THE MACMILLAN COMPANY,
60 Fifth Avenue, New York 11, New York

Programed text, 385 frames, 105 pp., paperback,
8-1/4" x 11", \$1.48.

Teacher's Manual will be available.

Table of Contents.

Unit and Final Test(s) included.

Constructed Responses usually used; some Multiple Choice
Responses; and no Branching.

DEVELOPMENTAL (FIELD TEST) POPULATION(S):

"New Jersey high school students at the seventh,
eighth and ninth grade levels."

Prerequisites: None.

Average Time: 10 hours (est.).

Next Revision: 1965.

(1 sample page)

MATHEMATICS-STATISTICS

WHAT ARE THE CHANCES? Moskowitz; THE MACMILLAN COMPANY one sample page:

STOP HERE

■ Suppose you are included among 30 students in a class. The teacher is going to choose 1 student at random to stay two hours after classes are dismissed to help her arrange the class library. Just before she makes her decision, however, a message comes from the principal's office that the 5 glee club members in the class must not be kept in after school.

a. If you are not a member of the glee club, what is the prob-

ability that you will be asked to stay after school? _____

b. If you are in the glee club, what is the probability that you

will be chosen to stay in after school? _____

c. If you are a member of the glee club and your friend is not, what is the probability that you or your friend will be asked to stay after school? (Assume, of course, that your friend is a

member of the class.) _____

a. $\frac{1}{25}$

b. 0

c. $\frac{1}{25}$



Independent Events

32. In the last section you saw cases in which the outcome of an event (such as choosing a red ticket on the first draw, and not replacing it before the second draw took place) changed the sample space for some other event.

When the outcome of one event does not in any way affect the outcome of some other event, we say that the two events are independent.

In the picture above, you can see that the result obtained on the first dial does not affect the result obtained on the second dial. Assuming that each spinner chooses a number at random, we can say that the two choices are independent.

MATHEMATICS-TRIGONOMETRY

H.S.-Coll.

ANALYTIC TRIGONOMETRY

DAVID C. LUCKHAM, Mathematics Dept., Massachusetts
Institute of Technology.

Published by ENCYCLOPAEDIA BRITANNICA PRESS,
425 N. Michigan Avenue, Chicago 11, Illinois

Programed text, 3,063 frames, paperback, 674 pp.,
8-1/2" x 11-1/2", \$18.50.

For use in TEMAC BINDER, \$1.25; program reusable,
\$17.25.

Teacher's Manual available, \$1.50.

Table of Contents.

Constructed Responses always used; no Multiple Choice;
no Branching.

DEVELOPMENTAL (FIELD TEST) POPULATION(S):

"Selected students at Britannica Center for Studies in
Learning; Roanoke City Public Schools."

Other using population(s): "Engineers professional review."

Prerequisites: "High School algebra."

Average Time: 60 classroom hours for average
students (est.).

No Revision.

(1 sample page)

MATHEMATICS-TRIGONOMETRY

ANALYTIC TRIGONOMETRY

Luckham; ENCYCLOPAEDIA BRITANNICA PRESS

one sample page:

902. The cosine function is an even function. The same is also true of the secant function as is shown by:

$$\begin{aligned} \sec(-a) &= \frac{1}{\cos(-a)} \\ &= \frac{1}{\cos a} \quad (\text{since } \cos(-a) = \cos a) \end{aligned}$$

$$\sec(-a)$$

$$\cos a$$

$$\sec a$$

$$\cot a = \frac{1}{\tan a}$$

903. Similarly, by using the elementary identity _____ it is possible to determine which of the properties of $\tan a$ are also possessed by $\cot a$.

904. Since $\tan a$ is a periodic function with period π , it will follow by an argument like those above that $\cot a$ is also a _____ function with period _____.

periodic; π

905. $\tan a$ is an odd function. An argument like those above will show that $\cot a$ is an _____ function.

odd

906. It is not hard to show that $\cot a$, like $\tan a$ is an unbounded function. Like $\tan a$, its range is the set of all _____ in Figure 53 in the supplementary book the properties of the six trigonometric functions are summarized for reference.

real numbers

907. The three reciprocal trigonometric functions are the cotangent, secant, and cosecant functions. The elementary identities relating the trigonometric functions are:

$$\cot a = \frac{1}{\tan a};$$

$$\sec a = \frac{1}{\cos a};$$

$$\csc a = \frac{1}{\sin a}.$$

$$\frac{1}{\cos a}$$

$$\frac{1}{\sin a}$$

Each of these is true for all values of a for which both sides of the equation are defined.

ANALYTIC TRIGONOMETRY

MATHEMATICS-TRIGONOMETRY

H.S.

TRIGONOMETRY

A Practical Course

**NORMAN A. CROWDER, Vice President and Technical
Director, Educational Science Div., U.S. Industries.**

**GRACE C. MARTIN, Assistant to the President, Educ.
Science Div., U.S. Industries.**

**Published by: DOUBLEDAY & COMPANY, Inc.,
575 Madison Avenue, N.Y.C.**

**Programed text, 247 frames, hard cover, 248 pp.,
8 1/4" x 5 3/8", \$4.95.**

Table of Contents, Index.

Unit Test(s) included.

**Multiple Choice Responses and Branching always used;
no Constructed Responses.**

DEVELOPMENTAL (FIELD TEST) POPULATION(S):

Prerequisites:

Average Time: 5-7 hours (est.).

Next Revision: "Not scheduled".

(1 sample page)

MATHEMATICS-TRIGONOMETRY

TRIGONOMETRY

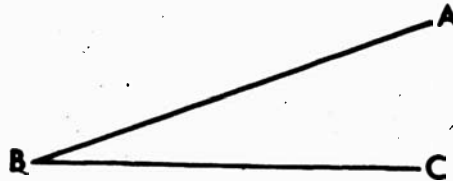
Crowder, Martin; DOUBLEDAY & COMPANY
one sample page:

Sample from Trigonometry: A Practical Course

35

We are about to see how the ideas of ratio and proportion apply to the triangle.

You should know that an angle is a geometric figure formed by two line segments drawn from the same point, or vertex. Thus



An angle usually is designated by capital letters placed at the vertex and the sides of the angle, as shown above. In this case, we might speak of the diagram as showing angle ABC (with the vertex letter in the middle), or as $\angle ABC$, or just as $\angle B$.

Angles, as you know, are measured in degrees. A circle contains 360 degrees (360°).

You should remember the answer to this question:

How many degrees are there in a right angle?

45° page 29

90° page 38

100° page 42

MATHEMATICS-TRIGONOMETRY

H.S.

TRIGONOMETRY I and II

LAURENCE WHISLER, Consultant in Programed Education, Central Scientific Co.

**Published by CENTRAL SCIENTIFIC Company,
1700 Irving Park Road, Chicago 13, Ill.**

**Planned for use in CENCO PROGRAMED LEARNER,
\$2.95; 100 problem items in I, 200 in II, 30 to 40 pp.
Multiple Choice Responses always used; no Constructed
Responses; no Branching.**

DEVELOPMENTAL (FIELD TEST) POPULATION(S):

"Planned sample of 100."

Prerequisites: None

Average Time: 3 hours (est.).

Next Revision: September, 1963.

(1 sample page)

MATHEMATICS-TRIGONOMETRY

TRIGONOMETRY I and II
Whisler; CENTRAL SCIENTIFIC COMPANY
one sample page:

TRIGONOMETRY I

32-1/2. Study relationships in triangle FGH

$$\text{Sin angle HFG} \quad \frac{\text{GH}}{\text{HF}}$$

$$\text{Cosin angle HFG} \quad \frac{\text{FG}}{\text{HF}}$$

$$\text{Sin HFG} \quad \frac{\text{FG}}{\text{HF}}$$

$$\text{Cos HFG} \quad \frac{\text{GH}}{\text{HF}}$$

.....

33. Given:

Point F is 44 meters east of point H.
Point F is 90 meters north of point H.
Line FH is 123 meters.

What is the cosine of angle GHF?

- a) .36 b) .43 c) .29

.....

 a

MATHEMATICS-TRIGONOMETRY

H.S.

TRIGONOMETRY (PLANE)

**DAVID L. LUCKHAM, Research Assistant, Massachusetts
Institute of Technology**

**Published by ENCYCLOPAEDIA BRITANNICA PRESS,
425 N. Michigan Avenue, Chicago 11, Illinois**

**Programed text, 4,900 frames, paperback, 835 pp.,
8-1/2" x 11-1/2", \$13.00. Available in 3 separate
units @ \$5.25 each.**

**For use in TEMAC BINDER, \$1.25; program reusable,
\$11.75.**

Teacher's Manual available, \$2.50.

Table of Contents.

**Unit Test(s) available, \$1.60. More than one equivalent
form of test available.**

**Constructed Responses always used; no Multiple Choice;
no Branching.**

**DEVELOPMENTAL (FIELD TEST) POPULATION(S):
"Roanoke City Public Schools."**

**Other using population(s): "Professional review; adult
education."**

Prerequisites: "Ninth grade algebra."

**Average Time: 80 classroom hours for average students
(est.).**

No Revision.

(1 sample page)

MATHEMATICS-TRIGONOMETRY

TRIGONOMETRY (PLANE)

Luckham; ENCYCLOPAEDIA BRITANNICA PRESS

one sample page:

3180. Thus, as x approaches $\frac{\pi}{2}$, the graph of $y = \tan x$ approaches the vertical line of points whose x -coordinates are $\frac{\pi}{2}$. However, the graph does not cross or touch this line. It approaches indefinitely close to it.

If the graph of $y = \tan x$ touched or crossed the vertical line through $x = \frac{\pi}{2}$, then there would be a point lying on the graph whose x -coordinate was _____.

$\frac{\pi}{2}$

3181. However, we know that there is no point on the graph of the function $y = \tan x$ whose x -coordinate is $\frac{\pi}{2}$, since $\tan \frac{\pi}{2}$ does not have a definite (finite) _____.

value

3182. We call the vertical line through the point $x = \frac{\pi}{2}$ an asymptote of the graph of the function $y = \tan x$.

asymptote

An asymptote of a graph is a line which the graph approaches indefinitely close to without ever touching.

The line perpendicular to the x -axis through the point $x = \frac{\pi}{2}$ is called an _____ of the graph of $y = \tan x$.

3183. An asymptote of a graph is a _____ which the graph approaches indefinitely _____ to without ever touching.

line,
close (or near)

3184. We have seen that the line consisting of all points whose x -coordinates are equal to _____, that is, the line $x = \frac{\pi}{2}$, is an _____ of the graph of the function $y = \tan x$.

$\frac{\pi}{2}$,
asymptote

3185. As x approaches $\frac{\pi}{2}$ from values less than $\frac{\pi}{2}$, the values of $\tan x$ are _____ and become indefinitely large. We denote this fact by writing

positive,
+ =

$$\tan \frac{\pi}{2} = \infty$$

379 Trigonometry

MEDICINE

Adult

DIABETES CONTROL (FOR DOCTORS)

**MIRIAM SIERRA-FRANCO, U.S.I. Educational Science
Division**

**DR. ARTHUR KROSNICK, Coordinator, Diabetes Control
Program, N. J. Dept. of Health**

**Published by EDUCATIONAL SCIENCE DIVISION.,
U.S. INDUSTRIES, Inc.**

250 Park Avenue, New York, New York

For use in AUTOTUTOR MARK II, \$1,250; program re-
usable, 330 frames, \$ _____

Table of Contents.

Unit Test(s) available.

Multiple Choice Responses and Branching always used;
no Constructed Responses.

DEVELOPMENTAL (FIELD TEST) POPULATION(S):

Prerequisites: MD degree.

Average Time: 3-6 hours (est.).

Next Revision: Not scheduled.

(1 sample page)

MEDICINE

DIABETES CONTROL (FOR DOCTORS) Sierra-Franco, Krosnick; EDUCATIONAL SCIENCE DIVISION, U.S. INDUSTRIES

one sample page: 5

Sample from Diabetes Control

11

In the last half of the nineteenth century, Claude Bernard defined the renal threshold for glucose. This threshold is the blood level above which glucose is excreted in the urine. (Urine normally contains a small quantity of glucose and other sugars.)

Bernard showed that glucose is excreted in the urine either when the renal threshold is too low (renal glycosuria) or when the concentration of glucose in the blood is too high. This research led to Bernard Naunyn's recognition that the glycosuria which is a sign of diabetes mellitus results from hyperglycemia.

The glycosuria which occurs as the result of a lowered renal threshold is found in a rare abnormality involving renal tubules. In this defect, patients have normal or low blood glucose concentrations, but the tubules fail to reabsorb glucose normally.

In this first part of our discussion, we are skimming through basic knowledge of the nature of diabetes mellitus and of relevant normal processes. So, now let us try to define the condition.

Of the alternatives shown below, which best completes the following definition of diabetes mellitus? Select the alternative you think is correct, and then push the button beside the answer you have chosen.

Diabetes mellitus is a disturbance of carbohydrate metabolism characterized by glycosuria due to:

Excretion of too much glucose in the urine.

C

Excessive glucose in the blood.

B

A low renal threshold for glucose.

A

MEDICINE

Adults

MEDICAL PHYSIOLOGY FOR THE HOME

TOM TRUJILLO, Programmer, General Programmed
Teaching Corporation

SHIRLEY B. BITTERLICH, Editor, General Programmed
Teaching Corporation

Published by **ENCYCLOPAEDIA BRITANNICA PRESS**,
425 N. Michigan Avenue, Chicago 11, Illinois

Programed text, 1800 frames, paperback, 385 pp.,
8-1/2" x 11", \$ _____.

Teacher's Manual: "Instructions to teacher included in the
preface."

Table of Contents.

Final test available.

Constructed Responses usually used; some Multiple Choice
Responses; no Branching.

DEVELOPMENTAL (FIELD TEST) POPULATION(S):

"Developmental testing: College students and adults.

Field testing: Adults."

Prerequisites: None.

Average Time: 18 hours (est.).

Next Revision: Undetermined.

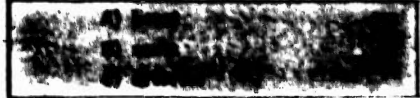
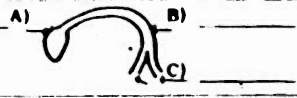





(1 sample page)

MEDICINE

MEDICAL PHYSIOLOGY FOR THE HOME

Trujillo, Bitterlich; **ENCYCLOPAEDIA BRITANNICA PRESS**

one sample page:

61	The aorta further divides into smaller passageways called <u>arteries</u> .
	Label the drawing. 
62	The arteries carry blood away from the heart and towards the body tissues.
	true false
63	The aorta divides into smaller passageways called _____
	
64	Complete the following: heart → aorta → _____
	_____
65	Label the diagram.
	

MEDICINE

Tech. Ed.

MEDICAL TERMINOLOGY

A Programmed Textbook

GENEVIEVE LOVE SMITH

PHYLLIS E. DAVIS, both of Point Park Jr. College.

**Published by: JOHN WILEY & SONS, Inc.,
605 Third Avenue, New York 6, N.Y.**

**Programed text, 1483 frames, Paper Spiral Bound, 300 pp.,
8 1/2" x 11", \$4.95.**

Teacher's Manual available, free.

Index.

Unit and Final Test(s) available.

**Constructed Responses always used; no Multiple Choice;
no Branching.**

DEVELOPMENTAL (FIELD TEST) POPULATION(S):

**"Jr. College Medical Secretarial Students; Jr. College
Liberal Arts Students."**

Prerequisites: None.

Average Time: 30 hours (est.).

Next Revision:

(1 sample page)

MEDICINE

MEDICAL TERMINOLOGY

Smith, Davis; JOHN WILEY & SONS
one sample page:

- 194 cephalalgia
The word root - combining form for head is cephal/o. The word for pain in the head is _____
- 195 cephal/o/dyn/ia
cephalodynia
sef al o din' i a
cephalgia
Another word for head pain is cephal/o/dyn/ia. This shows the combining form before the word root + a suffix. If this seems a headache, relax. Either word, _____ or _____ will do for headache.
- 196 dyn/ia
algia
Algia and dyn/ia are usually interchangeable. The combining form requires _____, while a word root takes the suffix _____.
- 197 cephal/o/dyn/ic
cephalodynic
sef al o din' ic
Dyn/ia can take the adjectival form, dyn/ic. An adjective that means pertaining to head pain is _____.
- 198 cephal/o/dyn/ic
To say medically that headache discomfort is exaggerated, use the adjective _____.

TAKING CARE OF DIABETES

**MIRIAM SIERRA-FRANCO, U.S.I. Educational Science
Division**

**DR. ARTHUR KROSNICK, Coordinator, Diabetes Control
Program, N. J. Dept. of Health**

**Published by EDUCATIONAL SCIENCE DIVISION,
U.S. INDUSTRIES, Inc.
250 Park Avenue, New York, New York**

**For use in AUTOTUTOR MARK II, \$1,250; program
reusable, 205 frames, \$70.00.**

Table of Contents.

Unit Test(s) available.

**Multiple Choice Responses and Branching always used;
no Constructed Responses.**

DEVELOPMENTAL (FIELD TEST) POPULATION(S):

106 diabetics at Boston (Mass.) treatment centers.

Prerequisites: Diabetes

Average Time: 2-5 hours (est.).

Next Revision: Late 1963.

(1 sample page)

MEDICINE

TAKING CARE OF DIABETES
Sierra-Franco, Krosnick; EDUCATIONAL SCIENCE
DIVISION, U.S. INDUSTRIES
one sample page:

Sample from Taking Care of Diabetes

18

YOUR ANSWER: Carbohydrate is a source of body fuel.

You are correct.

The foods we eat also contain protein, fat, minerals, vitamins, and water. Carbohydrate is a part of the food the body uses for fuel.

Cars use fuel just as it comes from the pump. But the body can't do this. The body has to change carbohydrate into a different form before it can use it.

The body changes carbohydrate into a form called glucose. Then it can use this glucose right away for energy and warmth.

If the body wants to store fuel for future use, it then changes the glucose into a form called glycogen. It stores the glycogen in the liver and other body tissues.



Remember the words "glucose" and "glycogen" and what they mean.
Now choose the right answer.

The body uses glucose:

To make carbohydrate.

B

For fuel.

A

MISCELLANEOUS

Open

BASIC MEMORY TRAINING

STANLEY L. LEVINE, Vice President, Training Systems, Inc.

Published by **TRAINING SYSTEMS, Inc.**,
12248 Santa Monica Blvd., Los Angeles 25, California.

Programed text, 216 frames, hard plastic cover, 150 pp.,
6" x 9", \$4.95

Table of Contents.

Constructed Responses usually used; some Multiple Choice;
no Branching.

DEVELOPMENTAL (FIELD TEST) POPULATION(S):

"This program has been checked with high school students, housewives, dental technicians, lawyers and two company presidents."

Prerequisites: 8th grade reading level.

Average Time: 2 hours (based entirely on data).

Next Revision:

(1 sample page)

MISCELLANEOUS

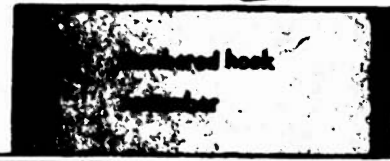
BASIC MEMORY TRAINING
Levine; TRAINING SYSTEMS
one sample page:

15

7

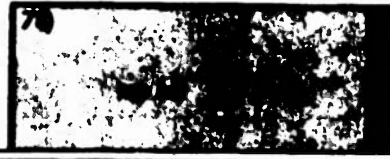
Let's see how this works. The mental hooks are made up of numbers, words, and pictures. The FIRST MENTAL HOOK is a _____.

TAG



79

Your fourth mental hook is a _____.



151

TECHNIQUES FOR REMEMBERING MENTAL PICTURES



THE THIRD TECHNIQUE IS:
(write the correct answer)

- a. EXAGGERATION
- b. MOTION
- c. UNUSUAL COMBINATIONS



BLACK AND WHITE INSPECTION

ART CUNNINGHAM, Hamilton Research Associates.

**Published by HAMILTON RESEARCH ASSOCIATES, Inc.,
Seneca Turnpike, New Hartford, N. Y.**

For use in PHOTOTUTOR machine, \$75.00; program re-usable, 64 frames (program also includes 36 actual photo negatives and 122 photo prints, graded and keyed to the item text), \$110.00.

Teacher's Manual included.

Constructed Responses always used; no Multiple Choice Responses; no Branching.

DEVELOPMENTAL (FIELD TEST) POPULATION(S):

"Inspector-trainees, automated cell printer photo-finishing houses."

Prerequisites: "Black and White Printer Training" program (or equivalent)."

Average Time: 2 hours (est.).

Next Revision:

(1 sample page)

MISCELLANEOUS

BLACK AND WHITE INSPECTION Cunningham; HAMILTON RESEARCH ASSOCIATES one sample page:

Black and White Inspection

<p style="text-align: center;">17</p> <p>See Figure 1.</p> <p>A is a good print, from a good negative, of a GOOD PICTURE. B is a good print, from a good negative, of a POOR PICTURE.</p> <p>Inspection is conducted to determine whether or not the PRINTS are good, not whether the PICTURES are good.</p> <p>Both of these prints should pass inspection.</p> <p>Q. Should a print be sent back for makeover because the picture is not a good shot?</p> <p style="text-align: center;">no</p>	<p style="text-align: center;">18</p> <p>See Figure 2.</p> <p>You must consider prints as GOOD when they are made from poor negatives (if they are good considering the negatives). Making good negatives is the job of the customer. Your job is to send him the best results from his efforts.</p> <p>Print A is a good print from a GOOD negative. Print B is a GOOD print from a POOR negative. Neither of these prints should be sent back to be made over.</p> <p>Q. A good print from a poor negative is one that gets the _____ from the negative.</p> <p style="text-align: center;">best</p>
<p style="text-align: center;">19</p> <p>A good print from a good negative will have a pleasant range of tones, from blacks to whites, without joining any of them.</p> <p>Q. Good prints from good negatives have pleasant _____ of _____.</p> <p style="text-align: center;">range, tones</p>	<p style="text-align: center;">20</p> <p>See Figure 3.</p> <p>All of these prints are good prints from good negatives. Note that all of them have a nice range of tones from black to white.</p> <p>Q. A good print _____ (has, does not have) a nice range of tones.</p> <p style="text-align: center;">has</p>

BLACK AND WHITE PRINTER TRAINING PROGRAM
ART CUNNINGHAM, Hamilton Research Associates.
Published by HAMILTON RESEARCH ASSOCIATES, Inc.,
Seneca Turnpike, New Hartford, N. Y.

For use in PHOTOTUTOR machine, \$75.00; program
reusable, 104 frames (program also includes more
than 50 actual photo negatives and more than 100
graded, keyed photo prints), \$175.00.

Teacher's Manual included.

Constructed Responses always used; no Multiple Choice;
no Branching.

DEVELOPMENTAL (FIELD TEST) POPULATION(S):

"Photo-finishing trainees (25)."

Prerequisites: None

Average Time: 4 hours (est.).

Next Revision:

(1 sample page)

MISCELLANEOUS

BLACK AND WHITE PRINTER TRAINING PROGRAM Cunningham; HAMILTON RESEARCH ASSOCIATES one sample page:

Black and White Printer Training

<p style="text-align: center;">64</p> <p>Look at Figure 15. This negative is thin and flat. It lacks sufficient contrast and will not make a good print on any button.</p> <p>To match, in tone depth, good prints, it should be printed on the N button.</p> <p>Note that this negative is entirely thin and flat. If there were some areas of normal or greater contrast, it would be exposed differently.</p> <p>Q. A _____ negative should never be printed on the plus side.</p> <p style="text-align: center;">flat</p>	<p style="text-align: center;">65</p> <p>Look at Figure 16. This is a dense, flat negative. Though it is dense, it lacks sufficient contrast for a good print. This negative will not make a good print on any button. Note the prints made from it.</p> <p>However, because this negative is dense as well as flat, the photo cell will tend to over-expose on the N button.</p> <p>A dense, flat negative should be printed on the N button.</p> <p>Q. Dense, flat negatives should never be printed on the _____ side.</p> <p style="text-align: center;">+or plus</p>
<p style="text-align: center;">67</p> <p>The second blind spot of the photo cell is called DISTRIBUTION.</p> <p>Distribution relates to the balance between the size of the thin and the dense areas of a negative.</p> <p>If more than half of a negative is composed of dense, highlight areas, the negative is overbalanced on the highlight side.</p> <p>If more than half of a negative is composed of thin, shadow areas, the negative is overbalanced on the shadow side.</p> <p>Q. The second blind spot of the photo cell is _____.</p> <p style="text-align: center;">distribution</p>	<p style="text-align: center;">68</p> <p>When the N button is used, the photo cell is set to measure the correct exposure for a negative with a normal distribution of dense and thin areas. When the distribution is not normal and either the highlight or shadow areas are overbalanced, the cell must be adjusted away from normal to compensate for the unbalance.</p> <p>If there is an excess of highlight or dense area, the photo cell, when set on N, will make the print too dark. Such negatives must be printed on the minus side.</p> <p>Q. Negatives having an excess of highlight area should be printed on a button on the _____ side.</p> <p style="text-align: center;">minus</p>

MISCELLANEOUS

Tech. Ed.

BUILDING MATERIALS & METHODS OF CONSTRUCTION
WILLIAM J. HORNUNG, Teacher, Construction Technology
Published by **HORNUNG-SON PUBLICATIONS COMPANY,**
82 Wenwood Drive, Massapequa Park, L. I., N.Y.

Programed text, 511 frames, hard container, 160 pp.,
8 1/2" x 11", available in 2 separate volumes at
\$5.00 each.

Answer sheets available, \$.50 for each student.

Teacher's Manual available, \$3.50.

Table of Contents.

Unit Test(s) available; Final Test available, \$.50.

Constructed Responses usually used; some Multiple
Choice; no Branching.

DEVELOPMENTAL (FIELD TEST) POPULATION(S):

"Classes of 25 students consisting of (1) future
architects (2) builders & contractors (3) real estate
personnel (4) students of construction drafting."

Prerequisites: None

Average Time: 30 hours (based entirely on data);
standard deviation, 15%.

Next Revision: August, 1963.

(1 sample page)

MISCELLANEOUS

BUILDING MATERIALS & METHODS OF CONSTRUCTION Hornung; HORNING-SON PUBLICATIONS COMPANY one sample page:

11-3

9	<p>(c) <u>Classification for Use of Lumber</u> Lumber is classified according to its principal use: (1) <u>yard lumber</u>, (2) <u>structural lumber</u>, and (3) <u>factory or shop lumber</u>. Light frame construction concerns itself primarily with yard lumber.</p> <p>• Yard lumber is that which primarily concerns itself with construction.</p>	Light Frame	
10	<p>(d) <u>Lumber for General Building Purposes</u> Yard lumber is less than 6 inches in thickness and is used for general building purposes. It is classified by dimensions as follows: <u>strips</u> - <u>boards</u> - <u>dimension lumber</u>. <u>Strips</u> are less than 2 inches thick and not over 8 inches wide.</p> <p>• A piece of yard lumber that measures $\frac{3}{8}$" x 4" is called a _____.</p>	Strip	
11	<p><u>Boards</u> are yard lumber and are less than 2 inches thick and 6 inches or more in width.</p> <p>• Yard lumber that measures $\frac{3}{8}$" x 10" is called a _____.</p>	Board	
12	<p><u>Dimension lumber</u> consists of all yard lumber except boards, strips, and timbers. Yard lumber which is between 2 and 6 inches thick and of any width is <u>dimension lumber</u>.</p> <p>• Yard lumber that measures 2" x 8" is called _____.</p>	Dimension Lumber	

MISCELLANEOUS

Tech.Ed.

COLOR INSPECTION

ART CUNNINGHAM, Hamilton Research Associates.

**Published by HAMILTON RESEARCH ASSOCIATES, Inc.,
Seneca Turnpike, New Hartford, N. Y.**

For use in PHOTOTUTOR machine, \$75.00; program re-usable, 124 frames (program also includes color charts and diagrams, color negatives and 82 graded and keyed color prints), \$350.00.

Teacher's Manual included.

Constructed Responses always used; no Multiple Choice Responses; no Branching.

DEVELOPMENTAL (FIELD TEST) POPULATION(S):

"Inspector-trainees, photo-finishing houses using automated equipment."

Prerequisites: "Black and White Printing and/or inspection of equivalent."

Average time: 5 hours (est.).

Next Revision:

(1 sample page)

MISCELLANEOUS

COLOR INSPECTION

Cunningham; HAMILTON RESEARCH ASSOCIATES

one sample page:

Color Inspection

<p style="text-align: center;">66</p> <p>See Figure 7</p> <p>We will now relate the excess of colors to prints.</p> <p>The center print is a normal print. The four prints surrounding it show excesses of colors, two primaries, red and green at the left, and two secondaries, cyan and magenta to the right.</p> <p>Q. Where is the excess green print located?</p> <p style="text-align: center;">lower left</p>	<p style="text-align: center;">67</p> <p>Keep your magic triangle before you.</p> <p>These prints, except the normal print in the center, have a pronounced excess, each of a different color. They should be readily recognized.</p> <p>Q. Where is the magenta print located.</p> <p style="text-align: center;">lower right</p>
<p style="text-align: center;">68</p> <p>Note that the excess color is most apparent in the simple masses of the skingles, the cement paving and the ground. Close inspection will also disclose it in the flesh tones.</p> <p>Q. Where is the red print located?</p> <p style="text-align: center;">upper left</p>	<p style="text-align: center;">69</p> <p>If we wish to correct the red print we can mime red. This will increase cyan, the secondary color opposite it.</p> <p>The cyan will be increased in proportion as the red is reduced. In the cyan print in Figure 7, practically all of the red has been removed.</p> <p>Q. We will increase cyan in a print when we mime _____</p> <p style="text-align: center;">red</p>

MISCELLANEOUS

Coll. - Adult

FIRE INSURANCE POLICY

**JOHN R. FONSECA, Director of Educational Programs,
Hamilton Research Associates.**

**Published by HAMILTON RESEARCH ASSOCIATES, Inc.,
Seneca Turnpike, New Hartford, New York**

**Programed text, 650 frames, Vinyl, 100 pp., 8-1/2" x 11",
\$_____:**

Table of Contents, Index.

Unit and Final test(s) available.

**Constructed Responses always used; no Multiple Choice
Responses; no Branching.**

DEVELOPMENTAL (FIELD TEST) POPULATION(S):

"College students and insurance company personnel."

Prerequisites: None.

Average time: 7-10 hours (est.).

Next Revision:

(1 sample page)

MISCELLANEOUS

FIRE INSURANCE POLICY
Fonesca; HAMILTON RESEARCH ASSOCIATES
one sample page:

Fire Insurance Policy

61. immediate cause	62. When the hostile fire causes damage which is not the result of the actual flames, the fire is said to be the proximate cause of the damage, and not the immediate cause. When the smoke from a hostile fire causes damage to the property insured, the fire is the cause of the smoke damage, not the immediate cause.
62. proximate	63. If, when the insured's chair was destroyed the smoke from the fire damaged the walls of the room, the fire, as we have noted, would be the immediate cause of the loss of the chair. However, the fire was not the immediate cause of the damage to the walls. It was the _____ of this damage.
63. proximate cause	64. If damage is caused by the smoke of a hostile fire, the fire is said to be the proximate cause of this smoke damage. Fire is the _____ cause of damage resulting from the smoke of the fire.
64. proximate	65. When damage to the property occurs as a direct result of the fire but is not caused by actual flames of the fire, the fire is said to be the _____ of the loss.
65. proximate cause	66. Fire is the _____ cause of loss resulting from the flames of the fire. Fire is the _____ cause of loss when other damage also occurs as a direct result of the fire, but is not the result of the actual flames of the fire.

MISCELLANEOUS

Tech.Ed.

THE 24-HOUR CLOCK

and Time Computations

JEANNE VANG. LUCY., Programmer, Hamilton Research Associates.

Published by HAMILTON RESEARCH ASSOCIATES, Inc., Seneca Turnpike, New Hartford, N. Y.

**Programed text, 78 frames, paperback, 80 pp., 3" x 5" cards;
\$1.50.**

Final test available.

**Constructed Responses always used; no Multiple Choice;
no Branching.**

DEVELOPMENTAL (FIELD TEST) POPULATION(S):

"High School students (25)."

Prerequisites: None

Average time: 1 hour (est.).

Next Revision:

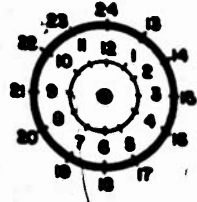
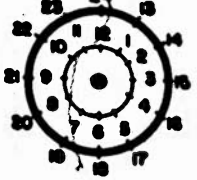
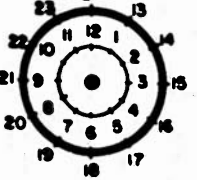
(1 sample page)

MISCELLANEOUS

THE 24-HOUR CLOCK

Lucy; HAMILTON RESEARCH ASSOCIATES
 one sample frame:

24-Hour Clock and Time Computations

 <p style="text-align: right;">26</p> <p>The numbers in the inner circle tell the time from midnight until noon and the outer circle tells the time from _____ to _____.</p>	<p>noon midnight</p>
 <p style="text-align: right;">27</p> <p>You can see that 4 p. m. is the same as 1600 and 10 p. m. is the same as _____.</p>	<p>2200</p>
 <p style="text-align: right;">28</p> <p>The minute hand works the same for both clocks. 9:24 a. m. is the same as 0924, and 2:19 p. m. is the same as _____ 3:15 p. m. is written _____ in 24-hour time.</p>	<p>1419 1515</p>
<p style="text-align: right;">29</p> <p>An easy way to change p. m. time to 24-hour time is to add 1200 to the p. m. time. 1:10 p. m. in the 24-hour time becomes 110 + 1200 or _____.</p>	<p>1310</p>
<p style="text-align: right;">30</p> <p>4:40 p. m. is written _____ in 24-hour time, and is spoken _____.</p>	<p>1640 sixteen-forty-hours</p>

MISCELLANEOUS

Adults

HOW TO FOLLOW THE STOCK MARKET
JANE BOYD LARIMORE, Programmer, Learning, Inc.
W. G. BECKER, Prof. of Finance, Arizona State
University.

Published by **LEARNING INCORPORATED,**
1317 West Eighth Street, Tempe, Arizona

Programed text, 167 frames, paperback, 53 pp. 8-1/2" x
11", \$2.20.

Table of Contents .

Constructed Responses usually used; some Multiple
Choice; no Branching

DEVELOPMENTAL (FIELD TEST) POPULATION(S):
Adults.

Other Using Population(s): High school students.

Prerequisites:

Average Time: 2 hours (est.).

Next Revision: "The program is the final revision."

(1 sample page)

MISCELLANEOUS

HOW TO FOLLOW THE STOCK MARKET
Larimore, Becker; LEARNING INCORPORATED
one sample page:

1-7



But before you contact a stock broker, you should decide what type of stock buyer you are going to be and what kind of _____ you want to buy.

stock

1-8 You could be one of two types of stock buyers: a speculator or an investor. Speculators speculate and investors _____.

invest

1-16



A speculator is not particularly interested in holding a stock long enough to receive dividend. He hopes to make a quick profit by selling stock at a _____ price than he paid.

higher (greater)

1-17 A man who buys 50 shares of stock at $38\frac{1}{2}$ points (\$38.50) per share and sells them the following week when they have gone up to 42 points (\$42) would be called a(n) _____.

speculator

1-18 A person who buys stock for the purpose of having a dividend income is called a(n) _____. A person who is interested in rapid capital gain is called a(n) _____.

investor;
speculator

MISCELLANEOUS

H.S.

HOW TO MEASURE BOARD FEET

PAK DONALD PUBLISHING CO. STAFF

Published by **PAK DONALD PUBLISHING Company, Inc.**,
Stayton, Oregon.

Programed text, 100 frames, loose leaf, 60 pp., 4 1/4" x
9 1/2", \$1.50, individual edition; \$3.50, classroom
edition.

Answer Sheets included.

Teacher's Manual included.

Final and Diagnostic Test(s) included.

Constructed Responses usually used; some Multiple Choice;
some Branching.

DEVELOPMENTAL (FIELD TEST) POPULATION(S):

Prerequisites:

Additional material required: 3 ring binder to hold program.

Average Time: 1/2-1 hour (est.).

Next Revision: Whenever necessary.

(1 sample page)

MISCELLANEOUS

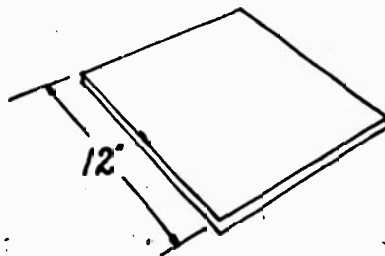
HOW TO MEASURE BOARD FEET

PakDonald Publishing Co. Staff; PAK DONALD PUBLISHING

one sample page:

Here's the same board.

3q



How wide is it — in inches?

2

32a

37q

And at this point you may have some objections.

“Suppose,” we can hear you say, “the thickness and width of the board is not given in inches? Suppose it's given in feet?”

Well, it isn't. Thickness is **always** given in inches. So is width. But length is nearly always given in feet.

But it was a good question. So good, as a matter of fact, we can't think of one to ask you. Just turn the page.

HOW TO READ THE OFFICIAL AIRLINE GUIDE

Quick Reference Edition

ROBERT R. PRENTIS

JEANNE VANG. LUCY

NANCY SIMMONS, all of Hamilton Research Associates.

**Published by: HAMILTON RESEARCH ASSOCIATES, Inc.,
Seneca Turnpike, New Hartford, N. Y.**

**Programed Text, 450 frames, loose leaf, 500 pp., 3" x 5"
cards, \$_____.**

Unit and Final Test(s) available.

**Constructed Responses always used; no Multiple Choice;
no Branching.**

DEVELOPMENTAL (FIELD TEST) POPULATION(S):

"Developmental tests—high school students (15),

Field tests—new-hire airline personnel (60)."

Prerequisites: None

**Average time: 5 hours (based entirely on data); standard
deviation, 1 hour.**

Next Revision:


(1 sample page)

MISCELLANEOUS

HOW TO READ THE OFFICIAL AIRLINE GUIDE
Prentis, Lucy, Simmons; HAMILTON RESEARCH ASSO-
CIATES

one sample page:

How to Read the Official Airlines Guide

Front side of card.	Back side of card.
<p style="text-align: right;">B10</p> <p>Before we can safely link flights through the connecting city, however, we must know how long it will take a passenger to change flights at the _____.</p>	<p>connecting city</p>
<p style="text-align: right;">B11</p> <p>A passenger lands at an airport at 12:30 p. m. He _____ (can, cannot) catch another plane leaving the same airport at 12:30 p. m.</p>	<p>cannot</p>
<p style="text-align: right;">B12</p> <p>He cannot catch an aircraft that is departing at the same time he is on an aircraft that is arriving. He _____ (would, would not, might) be able to catch an aircraft that departs Buffalo for Detroit five minutes after he arrives on a flight from Binghamton.</p>	<p>might</p>
<p style="text-align: right;">B13</p> <p>You _____ (know, do not know) whether or not he can make a connecting flight in Buffalo in five minutes.</p> 	<p>do not know</p>
<p style="text-align: right;">B14</p> <p>You do not know how long a passenger needs to make a connection in Buffalo. In order to construct a connecting trip for a passenger you must know what minimum connecting _____ is necessary for the passenger to make a connection.</p>	<p>time</p>

MISCELLANEOUS

Adults

HOW TO GET ALONG WITH YOUR BANK STATEMENT

JANE BOYD LARIMORE, Programmer, Learning, Inc.

**Published by LEARNING INCORPORATED,
1317 West Eighth Street, Tempe, Arizona.**

**Programed text, 50 frames, paperback, 13 pp., 8-1/2" x
11", \$.60**

**Constructed Responses usually used; some Multiple
Choice; no Branching**

DEVELOPMENTAL (FIELD TEST) POPULATION(S):

Adults.

Prerequisites:

Average Time: 1 hour (est.).

Next Revision: "The program is the final revision."

(1 sample page)

MISCELLANEOUS

HOW TO GET ALONG WITH YOUR BANK STATEMENT Larimore; LEARNING INCORPORATED one sample page:

32. Your Balance	Bank's Balance
\$500	\$500
	- 200 (outstanding checks)
	\$400
	+ 97 (unrecorded deposit)
	\$497

At this point most people would cheer -- There is only a \$3 difference between agreement and dis _____.

disagreement

33. But being a conscientious person you insist on unconditional surrender in the battle of the two _____.

balances

34. Your Balance	Bank's Balance
\$500	\$500
	- 200
	\$400
	+ 97
	\$497

To get to this point you added and subtracted the two things which you knew that the bank did not know. They were the _____ and the _____.

unrecorded deposit;
outstanding check
(other order)

35. Now to get to complete reconciliation you must subtract from your balance the bank's service _____.

charge(s)

36. The service charge is \$3. The difference between \$500 and \$3 is \$ _____.

\$497

37. Your Balance	Bank's Balance
\$500	\$500
- 3 (service charge)	- 200 (outstanding check)
\$497	\$400
	+ 97 (unrecorded deposit)
	\$497

The battle of the two _____ is over.

balances

MISCELLANEOUS

H.S. +

HOW TO BE MORE CREATIVE

LAURENCE WHISLER, Consultant in Programed Education, Central Scientific Co.

**Published by CENTRAL SCIENTIFIC Company,
1700 Irving Park Road, Chicago 13, Ill.**

Programed text, over 200 problem frames, 34 pp., 8-1/2" x 11", \$

Planned for use in CENCO PROGRAMED LEARNER, \$2.95; program included in price of machine.

Multiple Choice Responses always used; no Constructed Responses; no Branching.

DEVELOPMENTAL (FIELD TEST) POPULATION(S):

"Planned population of 100."

Prerequisites:

Average Time: 3 hours (est.).

**Next Revision: "Estimated date of availability: September."
(1 sample page)**

MISCELLANEOUS

HOW TO BE MORE CREATIVE
Whisler; CENTRAL SCIENTIFIC
one sample page:

HOW TO BE MORE CREATIVE
RULES FOR CREATIVE THINKING

IN BRIEF: The three rules for creative thinking are: Get and keep the initiative (in thought and action); alternate factual and imaginative thinking; practice, to define rules and to correct weaknesses.
.....

169 1/2 Creation results from personal speculative venture. Creation is a personal enterprise made where there is no possible guarantee of success. With or without reason, the creative individual believes that he controls his own fate.
.....

170. The detective with a continuing record of solving crimes is certain to be an individual who is creative, and individual who takes the initiative. The detective hears many reports about the crime. He does not accept as final the reports that he hears. The good detective expects to hear a good deal of "nonsense" about the crime. From the very first he has his own hypotheses or _____ about the cause of the crime.

- a) conclusions b) facts c) hunches
.....

MISCELLANEOUS

H.S.

HOW TO REMEMBER FACES AND NAMES

A Practical Application of Psychology

B. JAMES SPEROFF, Applied Psychology, Roosevelt University

**Published by LEARNING FOUNDATIONS INSTITUTE, Inc.,
271 North Avenue, New Rochelle, N.Y.**

**For use in the MINIK machine, \$14.95; program reusable;
210 frames, \$1.00.**

**Constructed Responses usually used; some Multiple Choice
Responses and Branching.**

DEVELOPMENTAL (FIELD TEST) POPULATION(S):

Prerequisites:

Average Time: 2 hours (est.).

**Next Revision
(1 sample page)**

MISCELLANEOUS

HOW TO REMEMBER FACES AND NAMES Speroff; LEARNING FOUNDATIONS INSTITUTE one sample page:



HOW TO REMEMBER
FACES AND NAMES

LEARNING FOUNDATIONS THROUGH SOLID FOUNDATIONS
© 1988

S 2-1. Far more people feel they need help in remembering names than in remembering faces. "How I remember your face, but..."

S 2-2. I hope we've made it clear already that this is partly feeling yourself. Just a hunch that you've seen a face is not remembering it.

Q 2-A. Remembering a name is (a) harder, (b) easier, (c) about the same as remembering a face.

STOP HERE, ANSWER, THEN MOVE TO
NEXT SECTION

A 2-A. (a) Harder. If your answer was correct, read S 2-1. If your answer was incorrect, read the following and reconsider answer to Q 2-A.

All too often we believe we remember seeing a person before, but we can't remember what his name was. But this is not remembering the person. Most people are better in remembering faces than in remembering names.

S 2-3. But it is perfectly true that names are harder to remember than faces. There are several good reasons for this.

S 2-4. First most people are "eye" minded than "ear" minded. This means that we see better than we notice and remember things we hear.

Q 2-B. People are (a) neither more or less, (b) more, (c) less "ear" minded than "eye" minded.

STOP, ANSWER, MOVE

A 2-B. (c) Less. If your answer was correct, read S 2-3. If your answer was incorrect, read the following and reconsider answer to Q 2-B.

Most people are better at remembering things they "see" than things they "hear".

S 2-5. Second, when you meet a person you see his face for at least several moments. In effect, you are seeing his face many times. Often you hear his name only once.

S 2-6. Sometimes you don't even hear his name once. The person introducing you may say it or mumble it. Even if he pronounces it clearly, often you are thinking about shaking hands and noticing how he looks and you don't hear it clearly, if at all.

Q 2-C. We "see" a face for (a) a shorter, (b) an equally long, (c) a longer period of time than "hear" the name that goes with it.

STOP, ANSWER, MOVE

A 2-C. (c) Longer. If your answer was correct, read S 2-7. If your answer was incorrect, read the following and reconsider answer to Q 2-C.

It is easier for people to remember faces than names because we get a chance to look at the person for a longer time than it takes to "hear" his name spoken. We might hear the name given only one time, and then it might be mumbled, mumbled or even mispronounced. Or we could be thinking about the person's manners, clothes rather than about his name.

S 2-7. This lesson exists -- **The First Rule for Remembering Names**. The first rule for remembering names is so simple and obvious that it seems absurd to mention it. Yet it is repeated so often that it has to be made a rule:

GET THE NAME.

S 2-8. This one rule, all by itself, will increase your memory for names by 50 per cent. How often have you been introduced to several people at once and realized when the introductions were over, that you didn't really get one single name? So make it a habit and first rule to get the name right at the start.

Q 2-D. The first rule of remembering names is (a) Fix the name, (b) Get the name, (c) Set the name.

STOP, ANSWER, MOVE

A 2-D. (b) Get the name. If your answer was correct, read S 2-8. If your answer was incorrect, read the following and reconsider answer to Q 2-D:

As simple as it may seem, one big reason why people do not remember names is because they did not get the name when they were being introduced. Get the person's name right off the bat!

S 2-9. STOP, LOOK and LISTEN. In fact, this and the first rule for remembering faces should all be rolled into one big rule labeled with the old railroad crossing sign:

Stop! LOOK! Listen!

S 2-10. Stop thinking about anything else for a moment. Think only of the person you are meeting.

S 2-11. Look at his face.

S 2-12. Listen to his name.

Q 2-E. In order to remember a name a person should (a) Stop, Think and Look, (b) Think, Listen and Look, (c) Stop, Listen and Look.

STOP, ANSWER, MOVE

A 2-E. (c) Stop, Listen and Look. If your answer was correct, read S 2-11. If your answer was incorrect, read the following and reconsider answer to Q 2-E.

In being introduced to a person, THINK only of the person, STOP everything else. Next, LOOK at or study his face and LISTEN for his name.

MISCELLANEOUS

H.S. & Adult Ed.

INTERIOR DECORATION

MARCIA B. PAZEL, Programmer, GPTC

JAMES F. RUDDLE, Editor, GPTC

EDNA M. MORGAN, Editor, General Programmed Teaching Corporation

Published by **ENCYCLOPAEDIA BRITANNICA PRESS,**
425 N. Michigan Avenue, Chicago 11, Illinois.

Programed text, 1800 frames, paperback, 360 pp.,
8-1/2" x 11", \$ _____.

Teacher's Manual: "Instructions to teacher included in preface."

Table of Contents.

Final test available.

Constructed Responses and Multiple Choice Responses usually used; no Branching.

DEVELOPMENTAL (FIELD TEST) POPULATION(S):

"Developmental testing: High school and college students. Field testing: High school students."

Prerequisites: None.

Average Time: 19 hours (est.).

Next Revision: Undetermined.





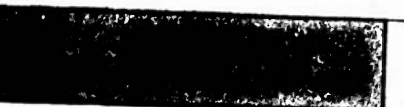
(1 sample page)

MISCELLANEOUS

INTERIOR DECORATION

Pazel, Ruddle, Morgan; ENCYCLOPAEDIA BRITANNICA
PRESS

one sample page:

220	The value of a color is described as light or dark compared to its basic hue, which is a <u>medium</u> , or middle value.
Circle the medium value.	
	yellow pink navy
221	What is the value of navy blue?
Check one.	
	medium dark light
222	The 12 basic color wheel hues are _____ values.
Check one.	
	medium light dark
223	The value of mint green is _____.
	
224	The lightness or darkness of a color is called its _____.
	

MISCELLANEOUS

Elem.-Adult

**LEARNING THE DIALOGUE MASS, FOR CHILDREN,
ADULTS AND MASS SERVERS
Latin (No. 14-19-02)**

**MEL THERRIEN, Teacher, St. Paul Public Schools
Published by ELECTRONIC TEACHING LABORATORIES,
5034 Wisconsin Avenue, N.W., Washington 16, D.C.**

**For use in TAPE RECORDER, program reusable,
260 frames, \$23.95.**

Unit test(s), "integral part of program."

**Repetition usually used; some Constructed Responses;
no Multiple Choice; no Branching.**

DEVELOPMENTAL (FIELD TEST) POPULATION(S):

Prerequisites: "Most useful to Roman Catholics."

**Additional material required: Minimum requirement:
tape recorder, missal; tape recorder, \$160.00.**

Average Time: 20 hours (est.).

**Next Revision: "Awaiting results of Vatican Conferences
(Ecumenical Council)."**

(1 sample page)

8
MISCELLANEOUS

LEARNING THE DIALOGUE MASS, FOR CHILDREN,
ADULTS AND MASS SERVERS
Therrien; ELECTRONIC TEACHING LABORATORIES
one sample page:

SAMPLE FRAMES Learning the Dialogue Mass

- | | |
|-----------------|------------------------------------|
| 1. CUE (Priest) | Domine, exaudi orationem meum. |
| RESPONSE | (timed pause for student response) |
| MASTER | Et clamor meus ad te veniat. |
| ↑ | |
| REINFORCEMENT | (timed pause for repetition) |
| 2. CUE (Priest) | Dominus vobiscum. |
| RESPONSE | (timed pause for student response) |
| MASTER | Et cum spiritu tuo. |
| ↑ | |
| REINFORCEMENT | (Timed pause for repetition) |
| PRIEST | Oremus. |

MISCELLANEOUS

Adult

OFFICIAL GIRLWATCHER'S MANUAL

JAC D. MEACHAM, Graficroll Systems, Inc.

**JOE BEAGIN, Founder, International Society of
Girlwatcher's.**

**Published by GRAFICROLL SYSTEMS, Inc.,
4215 Calavo Drive, La Mesa, California**

**Programed text, 200 frames, paperback, 110 pp.,
5-1/2" x 8", \$4.95.**

Table of Contents.

**Constructed Responses usually used; some Branching;
no Multiple Choice.**

DEVELOPMENTAL (FIELD TEST) POPULATION(S):

**"Any member of International Society of Girlwatcher's
and other interested males."**

Prerequisites: "20/20 vision or corrected as required."

**Additional material required: glasses, binoculars,
notebook**

Average Time: 2 1/2 hours (est.).

Next Revision: February, 1963.

(1 sample page)

MISCELLANEOUS

OFFICIAL GIRLWATCHER'S MANUAL
Meacham, Beagin; GRAFICROLL SYSTEMS
one sample page:

Official Girlwatcher's MANUAL

Directory of Girls

17 the untouchables	18-The girls that have a tendency to cry easily, or have chronic complaints, or appear to be nervous most of the time are the EMOTIONALS. The _____ are usually good for watching when stopped by the law for speeding.
18 emotionals	19- The UNMENTIONABLES are not in the <u>watchable</u> category because they are generally those girls out of the past and you do not mention them to your wife or current date. They are _____ only in visions or dreams.
19 watched	20-The NOCTURNALS are those beauties who are always falling asleep on a date or early in the evening. The _____ are very poor ones for drive-movies, but can be observed drowsing in their favorite park or on the beach.
20- Nocturnals in	21-The SOCIABLES are not always drinking PEPSI, but are usually flitting about like a _____ fly in spring; at parties and _____ events. The Sociables are very good to watch as they provide a variety of entertainment.
	57

MISCELLANEOUS

H.S. - Adult

PRACTICAL LAW

A Course in Everyday Contracts

WARREN LEHMAN, U.S.I. Educational Science Division

Published by DOUBLEDAY & COMPANY, Inc.,

575 Madison Avenue, New York, New York

Programed text, 377 frames, hard cover, 406 pp.,

8-1/4" x 5-3/8", \$4.95.

Table of Contents, Index.

**Multiple Choice Responses and Branching always used;
no Constructed Responses.**

DEVELOPMENTAL (FIELD TEST) POPULATION(S):

Prerequisites: High school education.

Average Time: 6-8 hours (est.).

Next Revision: "Not scheduled."

(1 sample page)

MISCELLANEOUS

PRACTICAL LAW
Lehman; DOUBLEDAY & COMPANY
one sample page:

Sample from Practical Law

19
(from page 22)

YOUR ANSWER: The court would say that certain warranties about the milk were implied in the sales contract and would proceed to consider your case on its merits.

Correct. The law assumes that there are implied warranties applicable to the sales contracts entered verbally every day. Among the implied warranties listed in the Uniform Sales Act, adopted by most states, are the following:

The seller is the true owner or his agent and has the legal right to dispose of the goods.

If sale follows the inspection of a sample, the bulk will conform to the sample.

Goods sold by description -- that is, without the purchaser having the opportunity to examine them -- will conform to the description and be of average quality.

Goods sold with the seller's knowledge that they are to be used for a specific purpose will be fit for that purpose, e.g., fit for human consumption in the case of food.

Goods will be delivered within a reasonable time.

The words of a contract, unless the subject is highly technical, will be interpreted according to common usage.

Those doing business or providing services are also responsible for the safety of their customers. For instance, in those states that will not consider fitness an implied warranty in the purchase of food in a restaurant, the person who is given tainted food has recourse to the charge that the restaurant was negligent in its responsibility for his safety.

Now let's suppose that the milkman surprises you by answering your note with two quarts of fresh, wholesome goat's milk.

There would be legal basis for complaint. page 23

There would be no legal basis for complaint. page 26

MISCELLANEOUS

H.S.-Adult

RADIOACTIVITY FROM ROENTGEN TO ROCKETS

Fallout Protection

MARSHALL ARKY, et al., Roto-Vue

Published by MODEL PUBLISHING Company,

1602-08 Hodiamont Street, St. Louis 12, Missouri

**Programed text, 500 frames, paperback, 60 pp., 7"x10 1/2",
available in 2 separate units at \$2.50 each.**

Answer Sheets included.

Final Test available.

**Constructed Responses always used; no Multiple Choice;
no Branching.**

DEVELOPMENTAL (FIELD TEST) POPULATION(S):

**"Selected individuals for development. High school
and adult classes for field test."**

Prerequisites: General science course.

**Additional material required: "Geiger counter, electroscope,
radioactive isotopes, some photographic equipment,
cloud chamber, etc. would be helpful."**

Average Time: 4 hours (est.).

Next Revision: August, 1963.

(1 sample page)

MISCELLANEOUS

RADIOACTIVITY FROM ROENTGEN TO ROCKETS
Arky; MODEL PUBLISHING

one sample page:

RADIOACTIVITY FROM ROENTGEN TO ROCKETS

92

1. All the material in the whole world is made up of only 92 kinds of fundamental natural substances plus small amounts of material that have been produced artificially. Almost all the material in the whole world can be broken down into one or more of the _____ kinds of fundamental natural substances.

elements

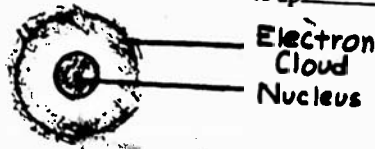
2. The 92 natural substances, plus a few that have been constructed from some of these, are the most elementary things into which any other substance can be decomposed without an atomic device. Since these elementary materials are the elements of which all other substances are made, they are called _____.

iron

3. The smallest part of an element is an atom. Gold is an element. It is made of gold atoms. Iron is an element. It is made of _____ atoms.

4. The atoms of any element consist mainly of a central part called the nucleus and an electron cloud around the nucleus. A nucleus surrounded by an electron cloud makes up _____.

Atom



an atom

nucleus

5. The nucleus of an atom may contain many kinds of tiny particles. One of the largest of these is called a proton. A proton is a particle that is located in the _____ of an atom.

nucleus

6. Every element has at least one proton located in its _____.

92

7. The number of protons in the nuclei of any atoms of the same element is always the same. All hydrogen atoms have one proton each. Uranium is an element. If one atom of uranium has 92 protons, all other uranium atoms have _____ protons.

92

8. The number of protons that an atom of an element has is the same as its atomic number. Hydrogen has one proton in each of its atoms. Its atomic number is 1. The atomic number of uranium is 92. Each atom of uranium contains _____ protons.

MISCELLANEOUS

H.S.-Adult

YOUR LIFE INSURANCE

**BARBARA H. HATHAWAY, U.S.I. Educational Science
Division.**

**Published by DOUBLEDAY & CO., Inc.,
575 Madison Avenue, N.Y.C.**

**Programed text, 383 frames, hard cover, 413 pp.,
8 1/4" x 5 3/8", \$5.95.**

Table of Contents, Index.

**Multiple Choice Responses and Branching always used;
no Constructed Responses.**

DEVELOPMENTAL (FIELD TEST) POPULATION(S):

Prerequisites: High school education.

Average Time: 6-8 hours (est.).

**Next Revision: "Dependent on publisher requirements."
(1 sample page)**

MISCELLANEOUS

YOUR LIFE INSURANCE Hathaway; DOUBLEDAY & CO. one sample page:

Sample from Your Life Insurance

6
(from page 1)

PERSONAL VS. PROPERTY INSURANCE

As early as 900 B. C., many merchants contributed a little to make up the value of the loss faced by one trader when his ship was wrecked. They shared the risk.

Risk sharing is the basis of insurance. To insure against loss or damage is to guarantee that values will be safeguarded in case certain unfortunate events occur.

This is accomplished today by means of a contract between a single party and an INSURER, who promises to pay a fixed sum in the event that the contributor suffers a specified loss or damage.

(We call an insurance contract a policy — from the Italian word "polizza," meaning a promise or understanding.)

In the beginning, the merchandise merited more concern than the mariners. But, gradually, insurance contracts were written on persons as well as property. Human life became valuable, too.

Insurance is still divided into two parts — property and personal.

When you take out property insurance, you are insuring against the loss or damage of something that belongs to you.

When you take out personal insurance, you are insuring against the loss or disability of you.

Here's a problem that will clarify the difference.

You accidentally step on a girl's sandal-clad foot in a crowded bus, breaking her toe. The insurance you carry to pay for the damage falls into which of these two categories? (Pick your answer, then turn to the appropriate page.)

Property insurance. page 10

Personal insurance. page 15

MUSIC

Elem. +

FUNDAMENTALS OF MUSIC

LLOYD E. HOMME

DONALD T. TOSTI, both of Teaching Materials Corporation.

Published by **TEACHING MATERIALS CORPORATION**,
575 Lexington Avenue, New York 22, N.Y.

Programed text, 895 frames, paperback, 201 pp., 8-1/2" x
11", \$8.50.

For use in **MIN/MAX II** machine, \$25.00; program re-usable, \$7.50.

Teacher's Manual: General Manual for all TMI-Grolier programs available.

Table of Contents.

Unit and Final Test(s) included.

Multiple Choice Responses always used; no Constructed Responses; no Branching.

DEVELOPMENTAL (FIELD TEST) POPULATION(S);

"5th, 6th, 7th grade students; all had no prior knowledge of subject."

Prerequisites:

Average Time: 6-8 hours (based entirely on data); standard deviation, .262 hours.

Next Revision: March, 1964.

(1 sample page)

MUSIC

FUNDAMENTALS OF MUSIC
 Homme; Tosti; TEACHING MATERIALS CORPORATION
 one sample page:

141

701. Write the meanings of these: *pp* (wd) _____
f (wd) _____

soft loud	(wd) _____ (wd) _____
--------------	--------------------------

702. (1) The key is (sym) _____ (wd) _____.
 (2) There are (nbr) _____ beats in each measure.
 (3) A (wd) _____ note gets one beat.
 (4) *mf* means (WDE) _____.



(1) E major (2) 4 (3) quarter (4) medium loud	(1) (sym) _____ (wd) _____ (2) (nbr) _____ (3) (wd) _____ (4) (WDE) _____
--	--

703. 1. Which measure has an error in it? (nbr) _____
 2. How many sixteenth notes are there in the music? (nbr) _____
 3. What key is this in? (sym) _____ (wd) _____
 4. How many beats does the dot in the last measure get? (nbr) _____



1. (2) 2. 10 3. G major 4. 1	
---------------------------------------	--

704. 1. What key is this in? (sym) _____ (wd) _____
 2. How many beats are in each measure? (nbr) _____
 3. What does *mf* mean? (WDE) _____
 4. What kind of note gets one beat? (wd) _____



1. F major 2. 8 3. medium loud 4. eighth	
---	--

705. 1. What kind of rest does the second measure have? (wd) _____
 2. Name the flats in the key signature. (sym) _____
 3. This clef is called the (wd) _____ clef.
 4. What does *pp* mean? (wd) _____



1. quarter 2. B E A D 3. treble 4. soft	
--	--

MUSIC

Third Grade

MUSIC MAKERS

WINIFRED NEAL, Programmer, Learning, Inc.
Published by LEARNING INCORPORATED,
1317 West Eighth Street, Tempe, Arizona.

Programed text, 33 frames, \$.15.

Constructed Responses always used; no Multiple Choice;
no Branching.

DEVELOPMENTAL POPULATION(S): Grade 3.

Prerequisites: Grade 3 reading level.

Average Time: 24.2 minutes (based entirely on data);
standard deviation, 6.5 minutes.

Next Revision: "The program is the final revision."
(1 sample page)

MUSIC

MUSIC MAKERS
Neal; LEARNING INCORPORATED
one sample page:

Music Makers
by Winifred Neal

1. We are walking.
walk walk walk walk
♪ says w _ _ _ .
walk
2. We are running.
run run run run
♪ says r _ _ .
run
3. We are skipping.
skip skip skip skip
♪♪ says s _ _ _ .
skip
4. Walking notes look like this ♪ .
Draw a walking note.

5. Running notes look like this ♪ .
Draw a running note.

6. Skipping notes look like this ♪♪ .
Draw skipping notes.

MUSIC EDUCATION

Elem.-Adult Ed.

MUSICAL NOTATION

JOHN BATCHELLER, Author

**BETTY LOU C. DUBOIS, Editor, General Programmed
Teaching Corporation**

**Published by ENCYCLOPAEDIA BRITANNICA PRESS,
425 N. Michigan Avenue, Chicago 11, Illinois**

**Programed text, 1042 frames, paperback, 131 pp.,
8-1/2" x 11", \$ _____.**

**Teacher's Manual: "Instructions to teacher included in the
preface."**

Table of Contents.

Final test available.

**Constructed Responses usually used; some Multiple
Choice responses; no Branching.**

DEVELOPMENTAL (FIELD TEST) POPULATION(S):

"Developmental testing: 5th through 10th graders.

Field testing: Elementary students."

Prerequisites: None.

Average Time: 6 hours (based entirely on data).

Next Revision: Undetermined.

(1 sample page)


MUSIC EDUCATION

MUSICAL NOTATION

Batcheller, Dubois; ENCYCLOPAEDIA BRITANNICA PRESS

one sample page:

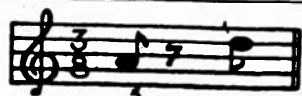
581 How many beats does the quarter rest receive?




Circle.

1 2 3

582 Circle the eighth rest below.



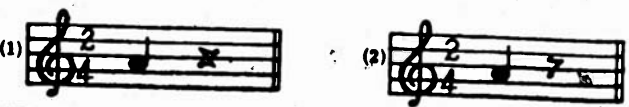
583 How many beats does the eighth rest receive?



Circle.

1 2 3

584 Which illustration is correct?



Circle.

(1) (2)

PROGRAMING

Elem.-Adult

APPLICATIONS OF PROGRAMED INSTRUCTION

TECHNICAL STAFF, General Education, Inc.

Published by GENERAL EDUCATION, Inc.,

96 Mt. Auburn Street, Cambridge 38, Mass.

**For use in a MAIL-A-TUTOR, program reusable,
23 frames, machine and program, \$.25.**

**Constructed Responses usually used, some Multiple
Choice, no Branching.**

DEVELOPMENTAL (FIELD TEST) POPULATION(S):

**"Tested on members of General Education, Inc.
Office staff."**

Prerequisites: "Ability to read and smile."

Average Time: Three to five minutes (est.).

Next Revision: "None planned as yet."

(1 sample page)

PROGRAMING

APPLICATIONS OF PROGRAMED INSTRUCTION Technical Staff; GENERAL EDUCATION one sample page:

<p>1. This is a teaching machine program. You can tell that it is a t_____ m_____ p_____ because it has blanks in it (like those you just "filled in"). (Now turn the knob.)</p>	<p><u>teaching machine program</u> (The correct answer appears here. Compare it with what you "filled in".)</p>
<p>2. When you "filled in" the blanks in the last item, you learned something. Whether or not you intended to, you learned that this funny little box contains . . . (just another advertising gimmick/a teaching machine program). (Choose one alternative and turn the knob.)</p>	<p>a teaching machine program</p>
<p>3. We may be prejudiced, but we'd say that the hottest thing in programed instruction is called General Education. G_____, Inc., that is. That's our company.</p>	<p><u>General Education</u> (Inc.)</p>
<p>5. General Education is located in Cambridge, Mass., in the center of Harvard-M.I.T. community. Obviously, consultants on any subject matter area are . . . (readily accessible/imported by camel train).</p>	<p>readily accessible</p>
<p>6. Don't forget: our name is . . . (General/Specific) Education, Inc., and we . . . (sell risqué' postcards/ write teaching machine programs).</p>	<p>General; write teaching machine programs</p>
<p>8. Among Gen Ed's satisfied clients are the Harvard Business School, Monsanto Chemical Company, and Arthur Wiesenberger & Company, member firm of the New York and American Stock Exchanges.</p>	<p>No answer required</p>



PROGRAMING

H.S.+

**EXPLAINING "TEACHING MACHINES" AND
PROGRAMMING**

DAVID CRAM, Audio-visual Dept., San Jose State College.

Published by FEARON PUBLISHERS, Inc.

828 Valencia Street, San Francisco 10, California

**Programed text, 50 liner frames and 40 pp. branched,
5 1/2" x 8 1/4", paperback, \$2.00.**

Table of Contents.

Unit Test(s) included.

**Constructed Responses usually used; some Multiple Choice
Responses; some Branching.**

DEVELOPMENTAL (FIELD TEST) POPULATION(S):

Prerequisites: High school reading level.

Average Time: 2 hours (est.).

Next Revision:

(1 sample page)

PROGRAMMING

EXPLAINING "TEACHING MACHINES" AND PROGRAMMING

Cram; FEARON PUBLISHERS
one sample page:

Objectives

When you have finished reading this book, you should be able to define the term "teaching machine," and distinguish between devices that fit the definition and those that don't. You should be able to describe the relationship between the machine and its program with some understanding of the relative importance of each. You will have had practice in working through two styles of programming and will have an acquaintance with some of the rationale and advantages of these two styles. You will have read about two other programming styles and, finally, will have been introduced to some advantages, actual and potential, of the machines themselves.

(From page 3)

The educational motion picture, as it is normally made, does not present factual information but does not satisfy any of the other conditions set down for a "teaching machine": no response is called for, no feedback is given, and the student has no control over his rate of progress.

The standard educational motion picture, then, is similar to a well-prepared lecture, but is not a "teaching machine."

Please read the conditions on page 8 again and then select the other alternative.

22

linear

A

This program could be visualized as follows, each number representing a frame and the arrow representing the response:



We shall see that great effort is taken to insure that the student will make the correct response. This again is a _____ program.

(Go to 27A)

PROGRAMING

Coll.+

**A PROGRAMED GUIDE TO WRITING AUTO
INSTRUCTIONAL PROGRAMS**

JAMES L. BECKER, RCA

Published by **RCA EDUCATIONAL SERVICES,
RADIO CORPORATION OF AMERICA,
Camden 8, N. J.**

Programed text, 1,200 frames, paperback, 150 pp.,
8 1/2" x 11", \$6.50.

Table of Contents.

"Test consists of writing programs. Arrangements can be
made with RCA for evaluation."

Constructed Responses usually used; some Multiple
Choice Responses and Branching.

DEVELOPMENTAL (FIELD TEST) POPULATION(S):

"Secondary school teachers and RCA seminar
participants."

Prerequisites: "Some training experience. A general
knowledge of what an auto instructional program is."

Additional equipment required: pencil and paper for
writing frames.

Average Time: 24 hours (est.).

Next Revision: Undetermined.

(1 sample page)

PROGRAMING

A PROGRAMED GUIDE TO WRITING AUTO INSTRUCTIONAL PROGRAMS

Becker; RCA EDUCATIONAL SERVICES
one sample page:

Chapter 5

The Dynamics of a Frame

This chapter is presented in a vertical format. Using a blotter or a blank sheet of paper uncover a frame at a time; by moving the paper slightly further you will receive your confirmation.

1. If learning is defined as a change in behavior, teaching is an interaction with the student that effects this

change in behavior

2. Teaching generally entails an _____ with the student.

interaction

3. In order for a program to teach effectively it must _____ with the student.

interact.

4. The basic unit of a program is a frame. The f _____ teaches by interacting with the student.

frame

5-1

PROGRAMING

Open

PROGRAMMED INSTRUCTION

The Process

JAC D. MEACHAM, president, Graficroll Systems, Inc.

Published by GRAFICROLL SYSTEMS, INC.

4215 Calavo Drive, La Mesa, California.

Programed text, 110 frames, paperback, 120 pp.,
5 1/2" x 8", \$2.95.

Table of Contents.

Final Test available.

Branching usually used; some Constructed Responses;
some Multiple Choice.

DEVELOPMENTAL (FIELD TEST) POPULATION(S):

"Teachers, writers, engineers, psychologists."

Prerequisites: None

Average Time: 3 hours (est.).

Next Revision: February, 1963.

(1 sample frame)

PROGRAMING

PROGRAMMED INSTRUCTION, The Process
Meacham; GRAFICROLL SYSTEMS
one sample frame:

From page 5.

You selected - The present method of teaching the subject. This will result in three conditions:

- 1- The subject is not being taught
- 2- The present method of teaching is satisfactory
- 3- The present method of teaching is unsatisfactory

If you find No.1 is the case, you are in good shape to introduce programmed instruction into the system. You cannot measure the difference between programmed instruction and conventional methods.

If you find No.2 to be the case, and it is doing a bang-up job, then your problems are over and you should select another subject.

If you find No.3 is the condition at the time, then by all means, consider programmed instruction as a possible solution. Any area that is hard to teach is a good area to program. Plus you have a basis for a good comparison to conventional methods.

The most desirable situation to consider for programming a subject is: (select one)

_____ When the subject is not being taught..
...turn to Page 8

_____ When the present method of teaching
the subject is not satisfactory.....
...turn to Page 10

6

PROGRAMING

Coll.-Adult

**PROGRAMED INSTRUCTION: A NEW APPROACH TO
TEACHING AND LEARNING**

**RICHARD E. RIPPLE: School of Education, Cornell
University**

**Published by SCHOOL OF EDUCATION, CORNELL
UNIVERSITY,
Ithaca, New York**

**Programed text, 134 frames, paperback, 56 pp., 5 1/2" x
8 1/2", \$.50.**

**Constructed Responses always used; no Multiple Choice;
no Branching.**

DEVELOPMENTAL (FIELD TEST) POPULATION(S):

**"Field tested on introductory psychology class of 300
students at Cornell University."**

Prerequisites: None.

**Average Time: 40 minutes (based entirely on data);
standard deviation; 5 minutes.**

**Next Revision: "None contemplated."
(1 sample page)**

PROGRAMING

PROGRAMED INSTRUCTION: A NEW APPROACH TO
TEACHING AND LEARNING
Ripple; SCHOOL OF EDUCATION, CORNELL UNIVERSITY
one sample page:

p 20

32. actively

33. involved

To summarize: in programed instruction, a new teaching _____, learning efficiency is increased by presenting subject matter to the student in a series of logically ordered _____, requiring the student to be _____ in the learning process by making a correct _____ to each step, and _____ his responses by providing him with _____.

34. technique or method

35-36. small steps

37-38. actively involved

39. response

40. reinforcing

41-42. immediate feedback

21

Programing Techniques

In programed instruction it is essential that the student make a correct response. One of the ways to insure that the student makes a correct _____ is to present the subject matter in a series of small steps, called frames. Each step in a program is called a _____.

PROGRAMING

Open

**PROGRAMED INSTRUCTION AND PROGRAMING
TECHNIQUE**

A Manual for Programers

DALE M. BRETOWER, University of Michigan

**Published by EDUCATIONAL METHODS, Inc.,
612 North Michigan, Chicago, Illinois.**

**Programed text, 500 frames, paperback and hardbound,
150 pp., 8 1/2" x 11", \$7.50 (hardbound), \$3.50
(paperback).**

Table of Contents, Index.

**Constructed Responses always used; no Multiple Choice
Responses; no Branching.**

DEVELOPMENTAL (FIELD TEST) POPULATION(S):

**"Several hundred participants from both industry and
education in University of Michigan workshops on
programed instruction."**

Prerequisites: None.

Average Time: 5 hours (est.).

Next Revision: 1964.

(1 sample page)

PROGRAMING

PROGRAMED INSTRUCTION AND PROGRAMING TECHNIQUE

Brethower; EDUCATIONAL METHODS
one sample page:

- 101 If you were able to answer the previous item it was in large part because of the f similarity between the definition of formal and thematic prompts. (f)ormal
- 102 An example of a formal prompt in this item and the previous one is the underlining of _____ formal
- 103 Prompts are S^Ds chosen to _____ the probability of particular responses. increase
- 104 Prompts are named according to the particular characteristics of the discriminative _____ the probability of whose response we wish to influence. stimuli
stimulus
- 105 If the form of the stimulus is selected to increase the probability of the response we call the prompt a _____ prompt. formal
- 106 By the form of the stimulus we mean something about the way it is spelled, or the way it is pronounced, or its size, or its color, or its shape. We call stimuli formal prompts because of something about the _____ of the stimuli. form
- 107 In verbal programs formal _____ are almost always present. The grammatical structure of the sentence serves as a _____, telling the student, in effect, whether a noun, verb, or other part of speech is required. prompts
formal prompt

PROGRAMING

Open

PROGRAMED INSTRUCTION

What It Is and How It Works

OHMER MILTON, Dept. of Psychology, University of Tennessee

LEONARD J. WEST, Dept. of Business Education, Southern Illinois University

Published by HARCOURT, BRACE & WORLD, Inc., 750 Third Avenue, New York 17, New York

Programed text, 65 frames, paperback, 32 pp., 3 3/4" x 8 3/4", \$.60.

Constructed Responses always used; no Multiple Choice; no Branching.

DEVELOPMENTAL (FIELD TEST) POPULATION(S):

Prerequisites: None.

Average Time: 1/2 hour (based entirely on data).

Next Revision: "Probably will not be revised."

(1 sample page)

PROGRAMING

PROGRAMED INSTRUCTION
Milton, West; HARCOURT, BRACE & WORLD
one sample page:

From Programed Instruction: What It Is and How It Works by Omer Milton and Leonard J. West, © 1965 by Harcourt, Brace & World, Inc., and reprinted with their permission.

Exercises deal with teaching and learning. Other things being equal, the better the teaching the greater the _____

learning

The piano student does not learn a new "piece" just by silently reading the music, he plays it. He makes active responses to the printed notes which serve as _____

stimuli

14

14

To review a bit: The first two important conditions for learning are: (1) To each _____ the learner must make an _____ response. (2) Subject matter must be organized into a series of steps which are _____ in size and in _____ order.

stimulus
active
small
logical

27

27

If a child says, " $12 + 6 = 17$ " and his teacher replies, "No, it's 18," the child has been given _____

_____ but his response has not been _____ because it was not correct.

immediate knowledge of results
reinforced

40

40

As a second condition, to each _____ the learner makes an _____ response. Another condition is that each response is followed by _____

stimulus
active response
immediate knowledge of results

53

PROGRAMING

Open

A PROGRAMED PRIMER ON PROGRAMING

Vol. I and Vol. II

**SUSAN MEYER MARKLE, Research Educationist,
University of Southern California**

LEWIS D. EIGEN, Center for Programed Instruction

P. KENNETH KOMOSKI, Center for Programed Instruction.

Published by THE CENTER FOR PROGRAMED

INSTRUCTION, Inc.,

365 West End Avenue, New York 24, New York.

**Programed text, 343 frames, paperback, 72 pp., 8 1/2" x 11",
bound in 2 separate volumes at \$1.00 each.**

**Constructed Responses usually used; some Multiple Choice
Responses; some Branching.**

DEVELOPMENTAL (FIELD TEST) POPULATION(S):

"Over a hundred teachers and educators."

Prerequisites: 11th grade reading level.

Average Time: 2 1/2 hours (est.).

Next Revision: 1964.

(1 sample page)

PROGRAMING

A PROGRAMED PRIMER ON PROGRAMING --Markle, Eigen, Komoski; THE CENTER FOR PROGRAMED INSTRUCTION one sample page:

<p>34. Either answer is correct, already in his repertoire (learned, probable, available or equivalent) or the only response in his repertoire that matches the given form</p>	<p>34. "Cats familiar is man's best friend. Cats familiar is a technical name for the animal called a []" a) A student who knows which animal is called man's best friend (will--will not) answer this item correctly. b) In the student told anything about the sound or spelling of the correct answer? _____</p>
<p>35. will No</p>	<p>35. "Cats familiar is man's best friend." Because the student is told nothing about the form of the required response, the prompt "man's best friend" (can--cannot) be called a <u>formal</u> prompt.</p>
<p>36. cannot</p>	<p>36. "The 49th state to join the Union was the territory, made infamous by Geronimo. In 1912 [] joined the Union." For the student of Indian lore or the avid watcher of TV Westerns, this item contains a _____ prompt.</p>
<p>37. thematic</p>	<p>37. "A two-letter word meaning 'a guess based on theory or a working assumption' is []" The definition "guess or assumption" is the terminal stimulus. We want the student to respond with the correct word when only this stimulus is given (i.e., without prompts). The frame contains the terminal stimulus (the definition) and a weak _____ prompt.</p>
<p>37. formal (Telling the student the word has 10 letters is as good as giving him 10 blanks.)</p>	<p>37. Do it yourself. Take the thematic prompt "Diamonds are a girl's best friend." Use this prompt to get the student to respond correctly to "The hardest substance in nature is []"</p>

31. Evaluate your item:
1. The word "diamond" should not be mentioned.
 2. The prompt "girl's best friend" comes before the blank.
- E.g., "The hardest substance in nature has been said to be a girl's best friend. It is the []"



APPLIED SCIENCE

Coll.-Tech. Ed.

A PROGRAMMED COURSE IN BASIC ELECTRICITY
ALEXANDER SCHURE, New York Institute of Technology.
Published by **McGRAW-HILL BOOK COMPANY, Inc.,**
330 West 42nd Street, New York City.

Programed text, 1800 frames, hardcover, 414 pp.,
7 1/2" x 9 7/8", \$ ____.

Table of Contents.

Constructed Responses always used; no Multiple Choice
Responses; no Branching.

DEVELOPMENTAL (FIELD TEST) POPULATION(S):
“(1) Industry, (2) Technical Institute-Community
Colleges.”

Prerequisites: Elementary Algebra.

Average Time:

Next Revision:

(1 sample page)

APPLIED SCIENCE

A PROGRAMMED COURSE IN BASIC ELECTRICITY

Schure; McGRAW-HILL BOOK COMPANY

one sample page:

11-86 (pulsating) The rectifier shown in Fig. 11-83 is a copper-oxide type, utilizing certain important properties of crystals to produce unidirectional current flow. Units made of selenium, silicon, and other semiconductors may be used instead of the copper-oxide type, hence these units must also have the ability to _____ a-c

11-87 (rectify) A thermocouple meter utilizes a different principle. A thermocouple consists of a junction of two dissimilar metals, usually iron and an alloy called _____ (Fig. 11-87)

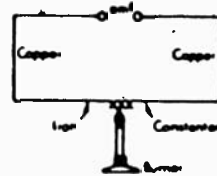


Fig. 11-87

11-88 (constantan) When the junction is heated, an emf appears across the open ends. If a d'Arsonval movement is connected across the open ends (Fig. 11-88), and the burner is replaced by a piece of resistance wire that becomes hot when current flows through it, the resulting meter system can measure _____ as well as d-c

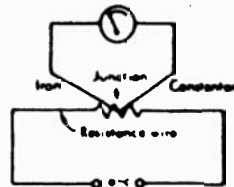


Fig. 11-88

11-89 (A-C) This is so because a-c is just as capable as d-c of producing _____ in a piece of resistance wire

11-89 (heat)

Energy losses in capacitors

Capacitors in a-c circuits suffer from four types of energy losses. In high quality capacitors, all four kinds of losses are made as small as good manufacturing techniques will permit. These losses are:

1. *Resistance loss*. Loss due to the resistance of the capacitor wires and plates. This loss is usually small and is calculated from I^2R considerations. Resistance loss is measured in watts.
2. *Leakage loss*. Loss due to leakage of current through the dielectric and the consequent development of heat.
3. *Dielectric-absorption loss*. Loss due to the retention of charges by a dielectric which fails to return the charges to the circuit.
4. *Dielectric-hysteresis loss*. Loss due to the additional energy demanded by the dielectric to make it reverse its atomic-distortion pattern as the electric field in an a-c circuit reverses its direction.

59

BASIC INDUSTRIAL ELECTRICITY

Volumes 1 and 2 with "Programed Training Package Supplement," No. 318-Q

VAN VALKENBURGH, NOOGER & NEVILLE, Inc.

Published by **VAN VALKENBURGH, NOOGER & NEVILLE, Inc.,**

15 Maiden Lane, New York 38, N.Y.

Programed text, 253 frames, paperback, 253 pp., 6" x 9",
\$3.50 per Vol.

Table of Contents, Index.

Unit and Final and Diagnostic Test(s) available.

Constructed Responses used sometimes; no Multiple Choice;
no Branching.

DEVELOPMENTAL (FIELD TEST) POPULATION(S):

Prerequisites: Background of BASIC ELECTRICITY by
same authors.

Average Time:

Next Revision: New Publication.

(1 sample page)

APPLIED SCIENCE

BASIC INDUSTRIAL ELECTRICITY

Van Valkenburgh, Nooger & Neville; VAN VALKENBURGH,
NOOGER & NEVILLE

one sample page:

The TRAINER TESTER Technique
This innovative true-procturing and simulation method allows you to do on paper what you could only do before by means of hardware. Yet it provides the degree of accuracy necessary for most types of responses.
TRAINER TESTER is a device which can be used to record problem data responses, and to provide immediate feedback to the user, and as you read the instructions, you can see the way that the device is adjusted to your choice.
VAN VALKENBURGH, NOOGER & NEVILLE, INC. 150 W. 42ND ST. NEW YORK 36, N.Y.

THEORY OR ACQUISITION OF KNOWLEDGE AREA

SAMPLE FEEDBACK DEVICE

(True-false; multiple-choice; matching)
Conventional multiple-choice question —

EXAMPLE:

Question No. 1: How would you go after a raise in pay?

- (a) Laugh at the boss's jokes
- (b) Marry the boss's daughter
- (c) Ask for more money
- (d) Work hard and diligently

TEST ITEM NUMBER	ANSWER FEEDBACK
1	(a) Right (b) Wrong (c) Silly (d) Right

AUTO-INSTRUCTIONAL DEVICE

Course of Instruction: Latin-American History
Textbook: "Mexican History" by Lowes
Conventional multiple-choice question with text referral response if wrong.

Question No. 2: Mexico is divided into _____?

- (a) Districts
- (b) Provinces
- (c) States
- (d) Territories

TEST ITEM NUMBER	INSTRUCTIONAL FEEDBACK
2	(a) Wrong (b) Right (c) Wrong (d) Right



**SECONDARY SCIENCE SERIES - FUNDAMENTALS
OF ELECTRICITY, D.C.**

**DONALD T. TOSTI, Teaching Materials Corporation.
Published by TEACHING MATERIALS CORPORATION.
575 Lexington Avenue, New York 22, N.Y.**

**Programed text, 1,453 frames, paperback, 313 pp.,
8 1/2" x 11", \$11.00.**

**For use in MIN/MAX II machine, \$25.00; program
reusable, \$10.00.**

**Teacher's Manual: General Manual available for all
TMI-Grolier programs.**

Table of Contents.

Unit and Final Test(s) included.

**Constructed Responses always used; no Multiple Choice
Responses; no Branching.**

DEVELOPMENTAL (FIELD TEST) POPULATION(S):

"10th, 11th and 12th grade students."

**Prerequisites: "A grade school education, including
seventh grade knowledge of arithmetic."**

**Average Time: 15-20 hours (based entirely on data);
standard deviation, 6.86 hours.**

Next Revision: September, 1964.

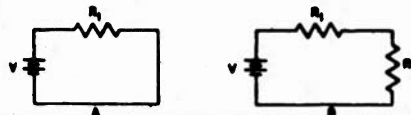
(1 sample page)

APPLIED SCIENCE

SECONDARY SCIENCE SERIES - FUNDAMENTALS OF ELECTRICITY, D.C.

Tosti; TEACHING MATERIALS CORPORATION
one sample page:

1571 If we add more resistance to a circuit, less current will flow. More current will flow in circuit () than in circuit ().

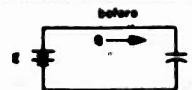


1572 From the equation $t = \frac{Q}{I}$, we see that if less current flows it will take longer for the same amount of charge to flow. How long will it take for 40 coulombs to flow if the current is 2A? _____ If the current is 1/2A? _____

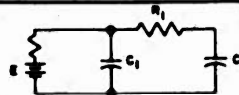
$t = \frac{Q}{I} = \frac{80}{2} = 40 \text{ sec.}$ Note: We see that it takes four times longer for the charge to flow.
 $t = \frac{Q}{I} = \frac{80}{\frac{1}{2}} = 160 \text{ sec.}$

1573 If ~~less~~ current flows, it will take _____ time for the same charge to flow.

less
1574 If we put a resistor in, it will take more time for _____ to flow to the capacitor.



charge
1575 The more resistance we put in series, the longer it takes to charge the capacitor. It takes longer to charge capacitor () than capacitor ().



APPLIED SCIENCE

Coll.

CAPACITANCE & CAPACITORS

ROBERT H. KANTOR, Varian Associates

Published by **VARIAN ASSOCIATES,**
611 Hansen Way, Palo Alto, California.

Programed text, 115 frames, paperback, 120 pp.,
6" x 9", \$3.00.

Table of Contents.

Final and Diagnostic Test(s) included.

Multiple Choice Responses and Branching always used;
no Constructed Responses.

DEVELOPMENTAL (FIELD TEST) POPULATION(S):

"Thirty college-level physics students who had mastered the prerequisite material, but who had not formally studied capacitance and capacitors." From the Preface, First Edition.

Prerequisites: "First part of an elementary college course in electricity and magnetism (more specifically, the first seven chapters of Electricity and Magnetism by Sears, or equivalent text.")

Average Time: 2 hours (based entirely on data).

Next Revision:
(1 sample page)

APPLIED SCIENCE

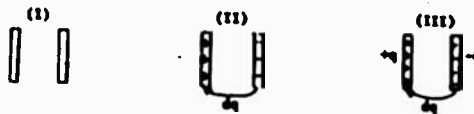
CAPACITANCE & CAPACITORS

Kantor; VARIAN ASSOCIATES

one sample page:

We are now ready to study ENERGY relationships in a capacitor. The process of charging a capacitor consists of transferring charge from the plate at lower potential to the plate at higher potential? The charging process therefore requires the expenditure of ENERGY.

Imagine the charging process to be carried out by starting out with both plates completely uncharged, and then repeatedly removing small positive charge dq from one plate and transferring them to the other plate.



At a stage of this process when the total quantity of charge transferred has reached an amount q , (picture III above) the potential difference between the plates is

$$v = \frac{q}{C}$$

and the work dW necessary to transfer the next charge dq is

$$dW = -v \, dq = \frac{q}{C} \, dq$$

What do you think we should do now?

- (a) Integrate page 69
- (b) Express C in terms of q , then integrate page 71

RELAYS

ROBERT H. KANTOR

ROBERT F. MAGER, both of Varian Associates.

Published by **VARIAN ASSOCIATES**,
611 Hansen Way, Palo Alto, California.

Programed text, 95 frames, paperback, 100 pp.,
5 1/2" x 8 1/2", \$.85.

Final and Diagnostic Test(s) included.

Multiple Choice Responses and Branching usually used;
some Constructed Responses.

DEVELOPMENTAL (FIELD TEST) POPULATION(S):

Prerequisites: "Can pass quiz on gross concept of a
circuit (not included). Can pass quiz on switches
(included)."

Average Time: 75 minutes (based entirely on data).

Next Revision:
(1 sample page)

APPLIED SCIENCE

RELAYS

Kantor, Mager; VARIAN ASSOCIATES
one sample page:

Step 1

This book has been constructed on the basis of three assumptions. It assumes that you:

1. Understand the concept of a circuit.

If you are not sure that you do know what an OPEN and a CLOSED circuit are, turn now to Page 3 for a brief review.

2. Have read Volume 1 on Switches.

If you have not, or if that volume is not available to you, you will find a concise summary of important ideas on Page 4.

3. Understand the basic operation of an electromagnet.

A brief explanation can be found on Page 6, and you should turn to that page now if you do not know how a simple electromagnet is made, and how it operates.

If you think you meet the three prerequisites listed above, turn to Page 7.

Step 2

You did not follow instructions. Nowhere in this book are you directed to this page.

In this kind of book you do not read pages consecutively, as you do in ordinary books. Material is sequenced to allow everyone to learn at the rate best for him, by directing him to the pages that contain the information he needs.

Now go back to Page 1 and try again.



344

560

SWITCHES

ROBERT F. MAGER, Varian Associates

Published by VARIAN ASSOCIATES,

611 Hansen Way, Palo Alto, California.

Programed text, 58 frames, paperback, 66 pp.,

5 1/2" x 8 1/2", \$.75.

Final and Diagnostic Test(s) included.

**Multiple Choice Responses and Branching always used;
no Constructed Responses.**

DEVELOPMENTAL (FIELD TEST) POPULATION(S):

**Prerequisites: "Can pass quiz (not included) on gross
concept of a circuit."**

Average Time: 40 minutes (based entirely on data).

Next Revision:

(1 sample page)

APPLIED SCIENCE

SWITCHES Mager; VARIAN ASSOCIATES one sample page:

Page 9

In this book you will learn how to NAME some of the switches used in electrical and electronic circuits, and you will learn the SYMBOLS used to represent these switches on circuit diagrams.

When you have successfully finished the book, you will be able to:

- tell what a switch is and what it does,
- name the important parts of a switch,
- designate (name) a switch by looking at its schematic symbol.

(You will NOT be expected to be able to draw switches schematically, though you could even do this with a little guided practice.)

This material is not at all difficult, so let's begin.

A SWITCH is a mechanical device for controlling the flow of electricity through a circuit. When a switch allows electricity to flow through it, we say that the switch is ON, or CLOSED. When no electricity is allowed through the switch, we say the switch is OFF, or OPEN.

If you operated the light switch on your wall and the light came on, would the switch be OPEN or CLOSED?

If your answer is OPEN, turn to page 8.

If your answer is CLOSED, turn to page 12.

Page 8

Your answer was "OPEN."

Let me explain again. When electricity is allowed through a switch, and the circuit is operating, we say the switch is CLOSED. When a switch is OPEN, the circuit is OFF, or not operating.

Now return to page 9 and read the page again.

Page 12

You answered "CLOSED."

RIGHT you are! When the switch is closed, electricity can pass through the switch and the circuit controlled by the switch can operate.

A switch has two or more contacts, depending on the number of circuits it is built to control. The stationary contact is indicated schematically by a dot, and the movable contact is indicated by a dot with an arrow extending from it.

A switch will always have at least one stationary contact, and at least one movable contact.

In the switch shown schematically below, which is the movable contact?



PG. 7 a
PG. 10 b

BASIC ELECTRONICS

Printed Programing Device

VAN VALKENBURGH, NOOGER & NEVILLE, Inc.

Published by **VAN VALKENBURGH, NOOGER &
NEVILLE, Inc.**

15 Maiden Lane, New York 38, N.Y.

Programed text, 400 frames, 130 pp., 6" x 9", \$ _____.

Diagnostic Test(s) available.

Branching always used; no Constructed Responses;
no Multiple Choice.

DEVELOPMENTAL (FIELD TEST) POPULATIONS(S).

Prerequisites:

Average Time: 1 hour per unit (est.)

Next Revision:

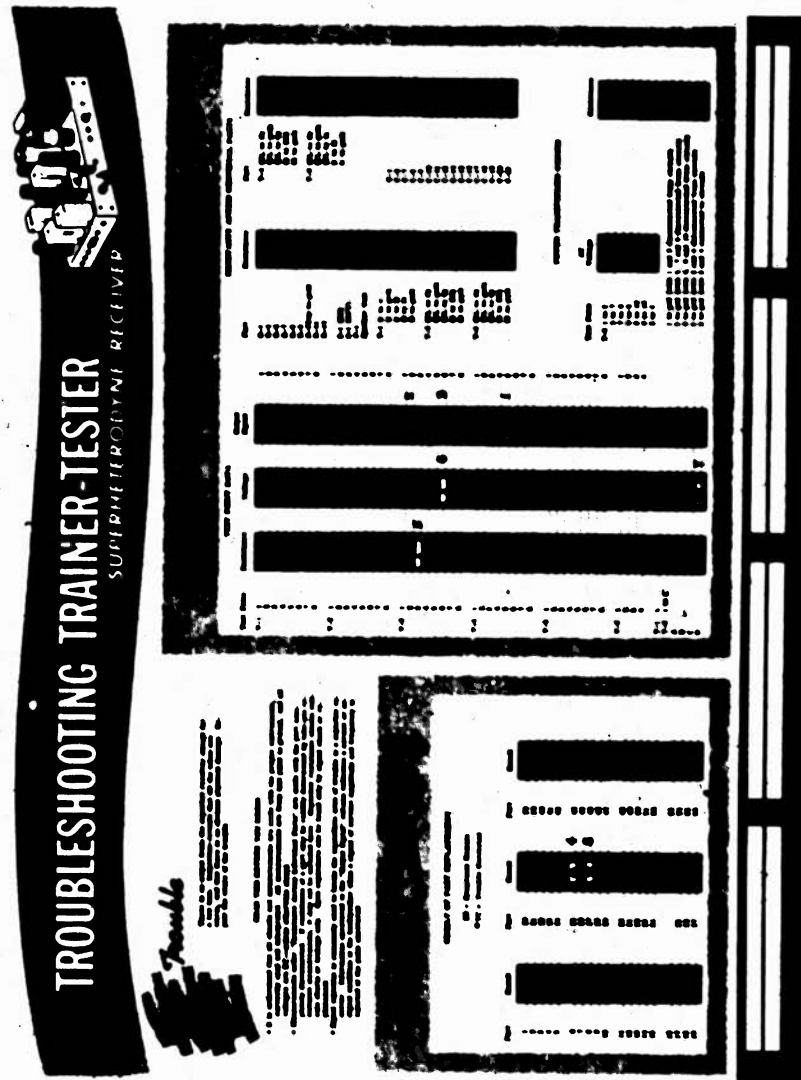
(1 sample page)

APPLIED SCIENCE

BASIC ELECTRONICS

Van Valkenburgh, Nooger & Neville; VAN VALKENBURGH,
NOOGER & NEVILLE

one sample page:



APPLIED SCIENCE

H.S.

BASIC ELECTRONICS 07

Published by **EDUCATION ENGINEERING, Inc.**,
381 West 7th Street, San Pedro, California.

Programed text, 7560 frames, paperback, 252 pp.,
5" x 7", available in 7 separate units at \$3.75 each.
For use in **SPEED** machine, program reusable, \$70.00
Teacher's Manual available, \$4.00 per unit.
Unit, Final, Diagnostic Test(s) available, \$3.75 each.
Multiple Choice Responses always used; no Constructed
Responses; no Branching.

DEVELOPMENTAL (FIELD TEST) POPULATION(S):

Prerequisites: Arithmetic, elementary algebra.

Additional material required: **SPEED** machine, \$700 & \$850.

Average Time: 14 hours (est.).

Next Revision:

(1 sample page)

APPLIED SCIENCE

BASIC ELECTRONICS 07 EDUCATION ENGINEERING one sample page

OHM'S LAW

In 1826, Simon Ohm, a German physicist, discovered that a definite relationship exists between current, voltage and resistance. Using very poor and delicate apparatus, he devised what is known as Ohm's law, a very powerful tool in solving electrical circuit problems.

Ohm's law states that the current in an electrical circuit is proportional to the voltage and inversely proportional to the resistance.

Ohm's law is represented in three forms. One form is that the current equals the voltage divided by the resistance, that is:

$$\text{Current} = \frac{\text{Voltage}}{\text{Resistance}}$$

or in symbol form:

$$I = \frac{E}{R}$$

where the units are:

ampere for I

volt for E

Ohm for R

To summarize:

$$\text{Current} = \frac{\text{Voltage}}{\text{Resistance}}$$

(ampere) = $\frac{\text{V (voltage)}}{\text{W (ohms)}}$

0701-001

1. Volt represents the symbol _____ in Ohm's law.
2. Ohm represents the symbol _____ in Ohm's law.
3. Ampere represents the symbol _____ in Ohm's law.
4. Ohm's law states that the current is equal to the voltage divided by the _____.
5. A battery in a circuit would represent the _____ in Ohm's law.

6. _____
7. Voltage
8. R
9. Resistance
10. Current
11. Ohms
12. I
13. C
14. O
15. E
16. V

0701-001

APPLIED SCIENCE

Jr. H.S.-Coll.
Tech. Ed.

FIRST YEAR ELECTRONICS (Volume I-V)

Vol. I - Direct Current; Vol. II - Alternating Current;
Vol. III - Reactive Circuits; Vol. IV - Principles of
Vacuum Tubes & Transistors; Vol. V - Special
Purpose Tubes

PETER PIPE, et al., Educational Science Division,
U.S. Industries.

Published by EDUCATIONAL SCIENCE DIVISION,
U.S. INDUSTRIES,
250 Park Avenue, New York, New York

FOR USE IN AUTOTUTOR MARK II machine, \$1,250;
program reusable, 5500 information frames, 13500
film images, Vol. I-V, \$375.

Teacher's Manual available, free.

Table of Contents.

Unit Test(s) available.

Multiple Choice Responses and Branching always used;
no Constructed Responses.

DEVELOPMENTAL (FIELD TEST) POPULATION(S):

"Air Force electronics trainees."

Prerequisites: High school education.

Average Time: 120-150 hours (est.).

Next Revision: "Unscheduled."

(1 sample page)

APPLIED SCIENCE

FIRST YEAR ELECTRONICS
Peter Pipe, et al.; EDUCATIONAL SCIENCE DIVISION,
U.S. INDUSTRIES
one sample page:

Sample from First Year Electronics

580

YOUR ANSWER: AC current changes in polarity and magnitude at a periodic rate.

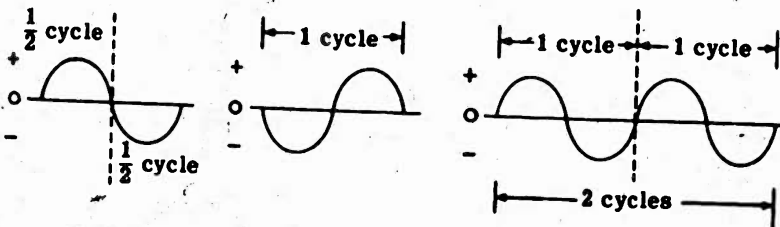
Correct.

Let's reiterate a few basic points just to insure that you understand a-c current:

The change in polarity and magnitude is symmetrical in standard a-c current.

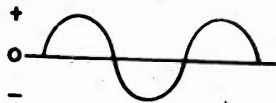
The number of times each change takes place is uniform; each a-c cycle will recur at a fixed frequency.

Now, each complete positive or negative swing of a-c current is called a half-cycle.



Each complete positive and negative swing of a-c current is called one cycle.

How would you identify the illustration below?



The illustration shows two cycles of a-c current.

C

The illustration shows three cycles of a-c current.

B

The illustration shows one and one-half cycles of a-c current.

A

INTRODUCTION TO ELECTRONICS

ROBERT J. HUGHES

PETER PIPE

PAUL SANBORN*

JAMES B. OWENS*, all of U.S. Industries Educational
Science Division

Published by **DOUBLEDAY & COMPANY, Inc.**,
575 Madison Avenue, New York, New York.

British Edition published by **THE ENGLISH UNIVERSITIES
PRESS, Ltd.**

Programed text, 400 frames, hardcover, 418 pp.,
8 1/4" x 5 3/8", \$4.95.

A similar program, **ELEMENTARY ELECTRONICS**, is
available in TM format.

Published by **EDUCATIONAL SCIENCE DIVISION,
U.S. INDUSTRIES,**
250 Park Avenue, New York, N.Y.

For use in **AUTOTUTOR MARK II** machine, \$1,250; pro-
gram reusable, 439 information frames, 1233 film
images, \$100.

Table of Contents (text and machine); Index (text).

Unit Test(s) available (machine).

*Multiple Choice Responses and Branching always used; no
Constructed Responses.

DEVELOPMENTAL (FIELD TEST) POPULATION(S):

Prerequisites: Text: High school education. Machine: High
school level reading ability.

Average Time: Text: 10-12 hours (est.). Machine: 12-14
hours (est.).

Next Revision: Text: "Dependent on publisher's sales
needs." Machine: "Not scheduled."

(1 sample page)

*Machine version only.

APPLIED SCIENCE

INTRODUCTION TO ELECTRONICS Hughes, Pipe, Sanborn, Owens; DOUBLEDAY & COMPANY one sample page:

Sample from Introduction to Electronics

47
(from page 37)

YOUR ANSWER: When resistance is cut in half, current increases.

Right.

Now see what we know. To calculate an electric current, you must take into account two factors: voltage and resistance. The greater the voltage, the greater the current. The greater the resistance, the less the current. This is Ohm's Law.

Expressed formally, a steady electric current in a circuit is directly proportional to the applied voltage and inversely proportional to the resistance.

And finally, expressed as a useful formula:

$$\text{Current (in amperes)} = \frac{\text{voltage (in volts)}}{\text{resistance (in ohms)}} \quad \text{or} \quad I = \frac{E}{R}$$

Using Ohm's Law, pick the correct answer to the following: If an e. m. f. of 100 volts is applied to a conductor with a resistance of 20 ohms, the current flowing is:

1/5 ampere. page 56

5 amperes. page 58

APPLIED SCIENCE

GYRO FUNDAMENTALS

**STANLEY L. LEVINE, Vice President, Training Systems,
Inc.**

**Published by TRAINING SYSTEMS, Inc.,
12248 Santa Monica Blvd., Los Angeles 25, California.**

**Programed text, 103 frames, plastic coated paper cover,
128 pp., 5" x 7", \$4.95.**

Table of Contents.

**Constructed Responses usually used; some Multiple Choice;
no Branching.**

DEVELOPMENTAL (FIELD TEST) POPULATION(S):

Prerequisites: None

Average Time: 2 hours (based entirely on data).

Next Revision: 1965.

(1 sample page)

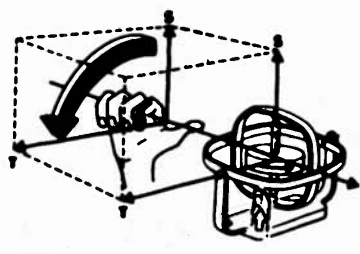
APPLIED SCIENCE

GYRO FUNDAMENTALS
Levine; TRAINING SYSTEMS
one sample frame:

FRONT OF PAGE
frame 70

70

Using the Right Hand Rule, your thumb points in the direction of the PRECESSION VECTOR if your fingers are placed in the direction of rotating the _____ VECTOR into the _____ VECTOR.




Student RESPONSE AREA

BACK OF PAGE
frame 70

Folded over RESPONSE AREA

CORRECT ANSWER to frame 70




REVIEW

Each of the three vectors lies along one of the three axes of the gyro.

The SPIN vector always lies along the rotor axis.

Therefore, if the TORQUE vector lies along one gimbal axis, the PRECESSION vector lies along the other.



INNER GIMBAL AXIS ROTOR AXIS OUTER GIMBAL AXIS

REVIEW if student makes incorrect response, optional if student makes correct response

APPLIED SCIENCE

Open

KLYSTRONS

ROBERT H. KANTOR

ROBERT F. MAGER, both of Varian Associates.

Published by **VARIAN ASSOCIATES,**
611 Hansen Way, Palo Alto, California.

Programed text, 85 frames, paperback, 93 pp.,
5 1/2" x 8 1/2", \$2.00.

Table of Contents.

Final and Diagnostic Test(s) included.

Multiple Choice Responses and Branching usually used;
some Constructed Responses.

DEVELOPMENTAL (FIELD TEST) POPULATION(S):

- "[26] adult young ladies who [were] either employees,
or wives of employees, of Varian Associates."

Prerequisites: None

Average Time: 50 minutes (based entirely on data).

Next Revision:

(1 sample frame)

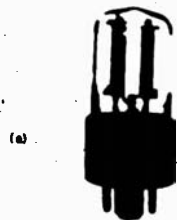
APPLIED SCIENCE

KLYSTRONS Kantor, Mager; VARIAN ASSOCIATES one sample page:

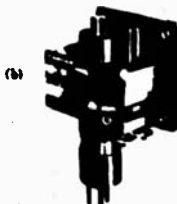
Page 2

As we have said, a klystron is an electron tube which is similar to the tubes you have seen in at least one or more electronic appliances.

For example, which of the items shown below looks like an ordinary radio tube?



..... turn to page 4.



..... turn to page 6.

Page 4

You said this was a radio tube



You are correct! It is a very common tube found in many radios and TV sets. The tubes shown below are all klystrons of one sort or another.



Turn to the next page.

Page 6

Congratulations! You're getting ahead of the game. The picture you identified as an ordinary radio tube was a picture of a klystron. Although the radio tube has some pins sticking out of the bottom of it, it is much plainer in external design than is the klystron. Go back to page 2 and answer the question correctly.



GENERAL SCIENCE

Elem.-Jr. H.S.

THE AGE OF THE DINOSAURS

Life 100 Million Years Ago

ARLENE GINSBERG, Programmer

Published by HONOR PRODUCTS COMPANY,
20 Moulton Street, Cambridge, Mass.

For use in HONOR TEACHING MACHINE, \$20 (approx.);
program reusable, 200 frames, \$2.00-\$2.50. (Machine
may be marketed in retail channels at this \$20 com-
bination price including 3 or 4 programs.)

Constructed Responses usually used; some Multiple Choice
responses; some Branching.

DEVELOPMENTAL (FIELD TEST) POPULATION(S):

"Public and private schools."

Prerequisites:

Average Time: 1 1/2-2 hours (est.).

Next Revision:

(1 sample page)

GENERAL SCIENCE

THE AGE OF THE DINOSAURS Ginsberg; HONOR PRODUCTS COMPANY one sample page:

<p>The exciting history of the plant and animal life of 100 million years ago was found in fossils.</p>	plants (and) animals
<p>The fossils told geologists the secrets of the _____ and _____ that lived during the Age of Dinosaurs.</p>	plants (and) animals
<p>The geologists, who studied the remains of animals and plants found in the _____, could tell from the fossil bones what the animals looked like; from the fossil teeth what the animals ate; and from the fossil plants what the climate was like.</p>	fossils
<p>What were the secrets told by the fossils? Geologists learned that the earth 100 million years ago was hot and humid. They learned about the climate by studying the remains of: a. bones b. leaves</p>	a. bones
<p>Press and hold the button of your choice. Do not be disturbed if you skip some of the material.</p>	a. bones
<p>No. The bones tell the story of animals. Geologists learned that the earth 100 million years ago was hot and humid. They learned about the climate by studying the remains of: a. bones b. leaves.</p>	b. leaves
<p>Press and hold the button of your choice.</p>	b. leaves
<p>Right! The fossil bones and footprints told the story of the animals, and the leaves showed that the climate 100 million years ago was _____ and _____.</p>	hot (and) humid

GENERAL SCIENCE

Elem.-Jr. H.S.

AMPHIBIANS AND REPTILES

WILLIAM L. EARLEY, Consultant Programmer
Published by **HONOR PRODUCTS COMPANY,**
20 Moulton Street, Cambridge, Mass.

For use in **HONOR TEACHING MACHINE, \$20 (approx.);**
program reusable, 200 frames, **\$2.00-\$2.50** (Machine
may be marketed in retail channels at this \$20 combi-
nation price including 3 or 4 programs).

Constructed Responses usually used; some Branching;
no Multiple Choice.

DEVELOPMENTAL (FIELD TEST) POPULATION(S):

"Public and private schools."

Prerequisites:

Average Time: 1 1/2-2 hours (est.).

Next Revision:

(1 sample page)

GENERAL SCIENCE

AMPHIBIANS AND REPTILES Earley; HONOR PRODUCTS COMPANY one sample page:

<p>After a few weeks of growth, the body of the tadpole gradually takes on the shape of the adult frog or toad; the tail drops off; and the gills begin to seal over as air-breathing lungs develop. The tadpole is changing from a creature who lives in the _____ to a creature adapted for life on land.</p>	water
<p>Finally, the tadpole leaves its home in the water. By this time, the lungs are fully developed for breathing, and the diet has changed from plants to insects. The frog or toad is now ready to begin living on _____.</p>	land
<p>As young adults, frogs and toads spend their first summer near warm water and sunny places because, like all other amphibians, they are cold-blooded. Being _____-blooded means that they depend on outside heat to warm their bodies.</p>	cold
<p>In cool climates, toads and frogs spend their winters in complete hibernation. This means that they crawl into holes or mud and sleep through the cold winter months.</p> <p>They hibernate because they are _____ animals and there is no outside heat to keep them warm.</p>	cold-blooded
<p>In the spring, as soon as the water is warm enough to arouse the toads and frogs, they emerge from their long sleep, or _____. Then, as full grown adults, they return to an active life, mate, and start the life cycle of their species all over again.</p>	hibernation
<p>Water moccasins are much like the last two species of snakes mentioned but as their name states, they live in swamps or other bodies of slow-moving water. They are the only poisonous snakes that live in or near the _____. They are also known as cottormouths because of the very white, puffy flesh of the mouth cavity.</p>	water

**THE BIGGEST REPTILES: ALLIGATORS AND
CROCODILES**

**MARTA ZABORSKA, Programmer, Learning, Inc.
Published by LEARNING INCORPORATED,
1317 West Eighth Street, Tempe, Arizona.**

Programed text, 30 frames, \$.15.

**Constructed Responses always used; no Multiple Choice;
no Branching.**

**DEVELOPMENTAL (FIELD TEST) POPULATION(S):
Grade 5.**

Prerequisites: Grade 5 reading level.

**Average Time: 19 minutes (based entirely on data);
standard deviation, 2.5 minutes.**

**Next Revision: "The program is the final revision."
(1 sample page)**

GENERAL SCIENCE

THE BIGGEST REPTILES: ALLIGATORS AND CROCODILES

Zaborska; LEARNING INCORPORATED
one sample page:

9. The nose of an alligator is _____ and _____.
short; wide (either order)
10. Compared to an alligator, the crocodile has a long and narrow _____.
nose
11. The nose of a crocodile is _____ and _____.
long; narrow (either order)
12. Besides looking different, the 2 biggest reptiles are found in different parts of the world. Most alligators are found in America, but in Africa we find the _____.
crocodiles
13. Crocodiles are found in A(_____.
Africa
14. If the reptile is over 10 feet, has a long narrow nose and lives in Africa, it's the _____.
crocodile
15. If the reptile is about 10 feet long, with a wide nose and lives in A_____, it's the alligator.
America
16. Traveling in Africa you are likely to see _____, but in Florida you would see _____.
crocodiles; alligators
17. Some of the differences between crocodiles and alligators are _____, shape of the _____, and places where they _____.
size; nose; live
18. Both crocodiles and alligators have big, powerful jaws full of teeth. The jaws of alligators and crocodiles are full of sharp _____.
teeth
19. Crocodiles and alligators have powerful _____ full of teeth.
jaws
20. Both alligators and crocodiles have a tough, leather-like skin. It is very difficult to break through a crocodile's or alligator's _____.
skin
21. Crocodiles and alligators have tough, leathery _____, and big, powerful _____.
skin; jaws

GENERAL SCIENCE

Jr. H.S.-H.S.

BIRD MIGRATION

WILLIAM L. EARLEY, Consultant Programmer
Published by HONOR PRODUCTS COMPANY,
20 Moulton Street, Cambridge, Mass.

For use in HONOR TEACHING MACHINE, \$20 (approx.);
program reusable, 200 frames, \$2.00-\$2.50. (Machine
may be marketed in retail channels at this \$20 com-
bination price including 3 or 4 programs.)

Constructed Responses usually used; some Multiple Choice;
some Branching.

DEVELOPMENTAL (FIELD TEST) POPULATION(S):

"Public and private schools."

Prerequisites:

Average Time: 1 1/2-2 hours (est.).

Next Revision:

(1 sample page)

GENERAL SCIENCE

BIRD MIGRATION

Earley; HONOR PRODUCTS COMPANY

one sample page:

<p>Migration southward is more likely to be influenced by which of these two factors?</p> <ol style="list-style-type: none">The approach of cold weather and the desire for warmer climates.The effect of the weather on the availability of food. <p>Press and hold the button of your choice.</p>	<p>a.</p>
<p>Not quite! Most birds can withstand quite low temperatures, so the weather is probably not the most likely reason for migration.</p> <p>Fall migration is more likely to be influenced by:</p> <ol style="list-style-type: none">The approach of cold weather and the desire for warmer climates.The effect of the weather on the availability of food.	<p>b.</p>
<p>Right you are! It seems reasonable to assume that fall migration is influenced by the fact that colder weather affects the kind and amount of food that is available. Most birds can withstand low temperatures, so the cold weather, as such, probably is not a serious factor.</p>	<p>No answer needed</p>
<p>In almost all parts of the United States, great flocks of birds can be seen migrating _____ during the fall flights.</p>	<p>southward</p>
<p>The departure time varies greatly with different species, but members of one flock in any given area gather at the same time for the fall migration. They prepare for the long flight ahead by taking brief feeding and "training" flights for the benefit of the fledglings. Remember, the fledglings, or "children", are only a few weeks old, so this is their _____ migration.</p>	<p>first</p>

GENERAL SCIENCE

Elem.-H.S.

ELEMENTS OF THE WEATHER

Reasons for Weather Conditions

DIANE CUMMINGS, Programmer

JEAN ANWYLL, Director of Programing

Published by HONOR PRODUCTS COMPANY,

20 Moulton Street, Cambridge, Mass.

For use in HONOR TEACHING MACHINE, \$20 (approx.);
program reusable, 200 frames, \$2.00-\$2.50. (Machine
may be marketed in retail channels at this \$20 com-
bination price including 3 or 4 programs.)

Constructed Responses usually used; some Multiple Choice;
some Branching.

DEVELOPMENTAL (FIELD TEST) POPULATION(S):

"Public and private schools."

Prerequisites:

Average Time: 1 1/2-2 hours (est.).

Next Revision:

(1 sample page)

GENERAL SCIENCE

ELEMENTS OF THE WEATHER

Cummings, Anwyll; HONOR PRODUCTS COMPANY
one sample page:

<p>The atmosphere is quite dense near the earth. Up where airplanes fly, the atmosphere is:</p> <p>a. less dense. b. more dense.</p> <p>Press and hold the button of your choice. Do not be disturbed if you skip some of the material.</p>	<p>b. more dense.</p>
<p>No, not quite. The air gets less crowded as you move away from the earth. This means that up where airplanes fly the air is:</p> <p>a. less dense. b. more dense.</p> <p>Press and hold the button of your choice.</p>	<p>a. less dense.</p>
<p>Good for you! As you get farther away from the earth, the gases, water vapor, and impurities become less crowded together.</p> <p>Airplanes fly in a less _____ part of the atmosphere.</p>	<p>(less) dense</p>
<p>Rockets can fly even higher than airplanes.</p> <p>The farther away from the earth you go, the less _____ the atmosphere becomes.</p>	<p>(less) dense</p>
<p>As you go farther and farther away from the earth, the atmosphere becomes less and less dense until eventually, there is no air at all.</p> <p>Do you think that this place with no air at all is a part of the earth's atmosphere?</p> <p>a. yes b. no</p> <p>Press and hold the button of your choice.</p>	<p>a. yes</p>

GENERAL SCIENCE

Elem.

EXPERIMENTS WITH SOUND

SHEILA LEVINSKY, Programmer, Learning Incorporated.

**Published by LEARNING INCORPORATED,
1317 W. Eighth Street, Tempe, Arizona.**

Programed text, 23 frames, \$.15.

**Constructed Responses usually used; some Multiple
Choice; no Branching.**

DEVELOPMENTAL POPULATION(S): Grades 3, 4, 5.

Prerequisites: Grade 4 reading level.

**Average Time: 25.3 minutes (based entirely on data);
standard deviation, 2.6 minutes.**

**Next Revision: "The program is the final revision."
(1 sample page)**

GENERAL SCIENCE

EXPERIMENTS WITH SOUND Levinsky; LEARNING INCORPORATED one sample page:

10. The sounds you make when you speak come from the vocal cords in your throat. Press your finger against your throat and hum While you are humming you can feel your _____ vibrating.

vocal cords

11. Do the experiment again. Keep your finger against your throat while you hum, then stop, and hum again When you are not humming you _____ (can/cannot) feel your vocal cords vibrating.

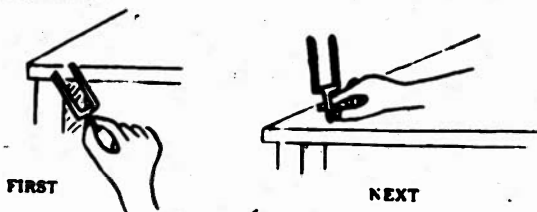
cannot

12. While they made a sound the rubber band and your vocal cords were both moving quickly back and forth. While they made a sound, they were both v b i r a t i n g.
vibrating

13. A tuning fork can be used for sound experiments. A tuning fork looks something like an ordinary fork. Both have handles to hold them with, but a tuning fork has only _____ (how many?) prongs.

two (2)

14.



Hold a tuning fork by the handle and hit one prong hard against the edge of the desk. Quickly stand it up on the desk and hold it there until the sound stops (REPEAT THIS UNTIL YOU CAN DO IT EASILY) You were probably surprised that the sound lasted such a _____ time.

long

15. Is the tuning fork vibrating while it is sounding? To find out, hit one prong hard against the desk and dip both prongs into the glass of water. Watch the water carefully. The fork makes the _____ splash.

water

16. The fork makes the water splash because the prongs are moving quickly b _____ and f _____. To say it in a scientific way, the prongs are _____.

back (and) forth; vibrating

17. When the tuning fork makes a sound, it is vibrating. This means that the prongs are moving quickly _____ and _____.

back (and) forth

18. You can do another experiment with the tuning fork. Strike it and stand it on the desk. While it is sounding, touch one of the prongs. When you touch the p r o n g, the sound _____ stops

19. When you touch one of the prongs, it stops vibrating. If the fork does not vibrate, it cannot make any _____ sound

GENERAL SCIENCE

Sixth Grade

FLOWER PARTS

**JANE LARIMORE, Programmer, Learning, Inc.
Published by LEARNING INCORPORATED,
1317 West Eighth Street, Tempe, Arizona.**

**Programed text, 34 frames, \$.15.
Constructed Responses usually used; some Multiple
Choice; no Branching.**

**DEVELOPMENTAL (FIELD TEST) POPULATION(S):
Grades, 5, 6.**

Prerequisites: Fifth grade reading vocabulary.

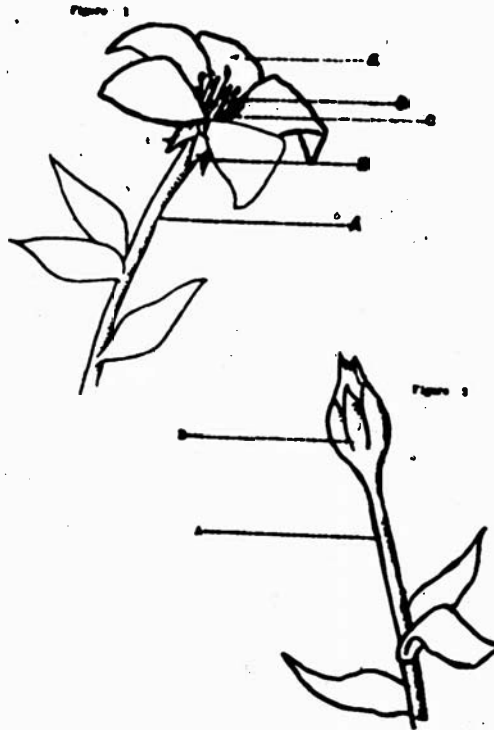
Average Time: 30 minutes (est.).

**Next Revision: "The program is the final revision."
(1 sample page)**

GENERAL SCIENCE

FLOWER PARTS

Larimore; LEARNING INCORPORATED
one sample page:



Flower Parts

1. The upper drawing is a picture of a _____ .
flower
2. Before this flower blossomed it looked like the lower drawing and was called a flower b ____ .
bud
3. The green flower parts covering the flower bud are called sepals. The sepals are _____ (what color?)
green
4. The sepals protect the bud until it blossoms into a _____ .
flower

GENERAL SCIENCE

Elem.-Jr. H.S.

FUNDAMENTALS OF ROCKETS AND SPACE TRAVEL

Introduction to the Space Age

PAUL H. BUCKLEY, Programmer

Published by HONOR PRODUCTS COMPANY,

20 Moulton Street, Cambridge, Mass.

For use in HONOR TEACHING MACHINE, \$20 (approx.);
program reusable, 200 frames, \$2.00-\$2.50. (Machine
may be marketed in retail channels at this \$20 com-
bination price including 3 or 4 programs.)

Constructed Responses usually used; some Branching; no
Multiple Choice.

DEVELOPMENTAL (FIELD TEST) POPULATION(S):

"Public and private schools."

Prerequisites:

Average Time: 1 1/2-2 hours (est.).

Next Revision:

(1 sample page)

GENERAL SCIENCE

FUNDAMENTALS OF ROCKETS AND SPACE TRAVEL Buckley; HONOR PRODUCTS COMPANY

one sample page:

<p>We said <u>pressure</u>, but what is <u>pressure</u>? Pressure is how much push there is on the inner walls of the rocket.</p>	pressure
<p>For instance, your stomach gets bigger and feels full if you eat too much, because the food pushes and builds up _____ against the inner walls of your stomach.</p>	
<p>When you blow up a balloon more air goes in with each breath and no air is allowed to get out. The balloon gets bigger because there is more air pressure _____ the balloon than there is <u>outside</u> the balloon.</p>	inside
<p>What happens if you keep putting air into the balloon? The balloon explodes, because the rubber is not strong enough to hold so much air _____.</p>	pressure
<p>As the fuel in a rocket burns, more gas is made than can leave by the exhaust nozzle. Because there is more gas, the pressure on the rocket's inside walls (increases/decreases) _____.</p>	increases
<p>If you want to try a pressure experiment, get a balloon and attach the open end to the faucet in your sink. Put only a little water in and, then, use a small needle to make a hole in the side of the balloon. Now, turn on the water all the way.</p>	No answer needed
<p>Did you get wet? The balloon breaks because the water comes <u>into</u> the balloon <u>faster</u> than it can <u>leave</u>. As a result the water pressure in the balloon must have _____.</p>	increased (gotten bigger)

**GENERAL SCIENCE PROGRAMMED LEARNING
LABORATORY**

**Matters in Motion, Flow of Energy, Structure of the
Universe, Patterns of Life, Science at Work**

JAMES MACRAE

FRANCIS A. EARL

**RODRIGO PANARES, all of Accelerated Instruction
Methods Corp.**

**Published by ACCELERATED INSTRUCTION METHODS
CORPORATION,**

179 North Michigan Avenue, Chicago 17, Illinois.

Programed text, 8500 frames, paperback, 96 pp. per book,
7 1/2" x 9 1/4", available in 20 separate units at
\$.72 each.

Teacher's Manual available, 1 per book, \$.96.

Table of Contents, Index.

Unit Test(s) available, included in Teacher's Manual.

Constructed Responses always used; no Multiple Choice
Responses; no Branching.

DEVELOPMENTAL (FIELD TEST) POPULATION(S):

"Junior high school students, bright sixth graders."

Prerequisites: "Junior high school reading ability."

Average Time: 65-70 hours (est.).

Next Revision: "Unknown."

"Results available on request from publisher of final
testing Jefferson County School District, Colorado."

(8 sample pages)

GENERAL SCIENCE

GENERAL SCIENCE PROGRAMMED LEARNING LABORATORY

Macrae, Earl, Panares; ACCELERATED INSTRUCTION
METHODS CORPORATION

8 sample pages:

General Science

PROGRAMMED LEARNING LABORATORY

Volume 1 Matter in Motion

- 1 Matter
- 2 Force
- 3 Energy and Work
- 4 Simple Machines

Volume 2 Flow of Energy

- 5 Sound
- 6 Heat
- 7 Light
- 8 Electricity and Magnetism

Volume 3 Structure of the Universe

- 9 Inside the Atom
- 10 Molecular
- 11 Earth
- 12 Universe

Volume 4 Patterns of Life

- 13 Units of Life
- 14 Chain of Life
- 15 Human Body
- 16 Behavior

Volume 5 Balance of Work

- 17 Adaptation
- 18 Resources and Industry
- 19 Communication
- 20 Functions of Balance

SIMPLE MACHINES

1. Machines are so useful and so much a part of everyday life that some people imagine that one day we may be ruled by MACHINES.
2. A machine is a device that in one way or another helps man do work with greater ease or greater speed or both. Simple machines and complex machines help us do EVERYTHING every hour of the day.
3. Your mother's sewing is done rapidly and well with the help of a sewing SEWING MACHINE. If you are not around to help, a dishwashing DISHWASHER may be helping her by washing the dishes.
4. Some things we use to help do EVERYTHING are easily recognized as TOOLS. Lawnmowers, can openers, typewriters, and eggbeaters are examples of TOOLS.
5. There are also many things that we use every day that most people would not think of as machines. A fishing pole, a rope, or a door key are also TOOLS because they help us do EVERYTHING.
6. A MACHINE IS ANY DEVICE THAT HELPS DO WORK WITH GREATER EASE OR GREATER SPEED.
If we remember our scientific meaning of WORK, then we will have no difficulty in determining if a device is a TOOL.

239. A counterclockwise torque is a POSITIVE TORQUE.

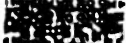
Physicists and engineers represent it by this symbol: (+)

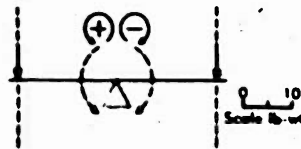
A clockwise torque is a NEGATIVE TORQUE.

Physicists and engineers represent it by this symbol: (-)

The torque of a force may be either

_____ or



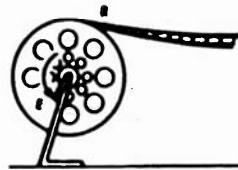


396. The advantage gained with a wheel and axle like this one is _____

A. The resistance moves through a much greater distance than the effort.

B. The effort force is increased.

*A or B



397. When the effort acts at the circumference of the wheel, the TMA is always _____ 1.

<, =, or >

398. The advantage we gain with a wheel and axle like this one is _____.

A. The resistance moves through a greater distance than the effort force.

B. The effort force is increased.

*A or B



399. We take friction into account when we calculate actual mechanical advantage. To calculate AMA we use this formula:

$$AMA = \frac{F_o}{F_i} = \frac{\text{Output Force}}{\text{Input Force}}$$

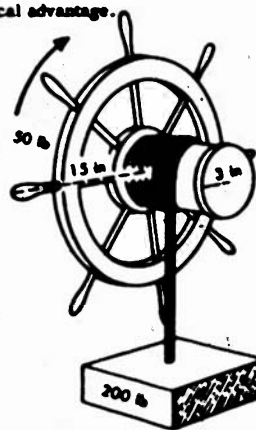
*effort force or output force

400. An effort force (F_i) of 50 pounds-weight rotates this wheel and axle and slowly raises a 200-pound-weight load. Therefore, its AMA is:

$$AMA = \frac{F_o}{F_i} = \frac{200 \text{ pounds-weight}}{50 \text{ pounds-weight}} = 4$$

401. Notice the lengths of r_o and r_i . Although the AMA is 4, the TMA is:

$$TMA = \frac{r_o}{r_i} = \frac{15 \text{ inches}}{3 \text{ inches}} = 5$$



349. A MOVABLE pulley, unlike a fixed pulley, does move up or down with the resistance as a force is supplied.

This pulley is a movable pulley.

*fixed or movable



350. A fixed pulley is a modified first class lever.

*first or second



First Class

Second Class

Third Class

351. A movable pulley is a modified second class lever.



418. Suppose you wanted to exert the least amount of effort force to roll a barrel onto a truck.

Which inclined plane would you choose? B

*A or B



419. The TMA of an inclined plane depends upon how steep it is.

Which inclined plane is the steeper? A

Which inclined plane has the greater TMA? B

*A or B



420. We calculate the TMA of an inclined plane from its steepness, that is, we compare its LENGTH with its HEIGHT.

$$TMA = \frac{LENGTH}{HEIGHT}$$

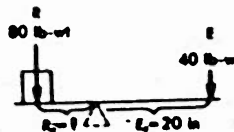
The TMA of this inclined plane is:

$$TMA = \frac{L}{H} = \frac{12}{2} = 6$$



284. The magnitude of the effort force (E) that balances the lever is _____ pounds-weight.

285. Suppose we know the values of E , E_0 , and R and want to find the value of R_0 . R_0 is the length of the balanced lever's _____.



286. To find the value of R_0 we write the formula this way:

$$E \times E_0 = R \times R_0$$

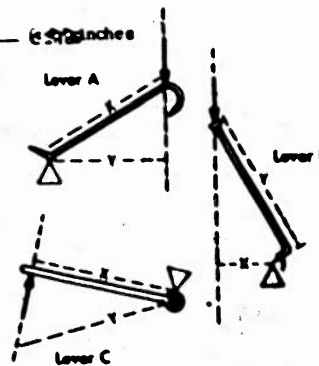
$$R_0 = \frac{E \times E_0}{R} = \frac{40 \text{ pounds-weight} \times 20 \text{ inches}}{80 \text{ pounds-weight}} = \underline{\quad 10 \text{ inches} \quad}$$

287. Suppose we want to measure the torque arms of the forces acting on these levers.

For lever A we measure distance _____

For lever B we measure distance _____

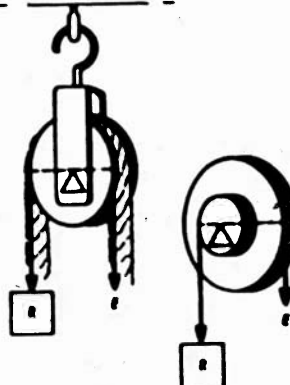
For lever C we measure distance _____



288. If we draw a straight line through the fulcrum of a pulley, we can see that it is really a modified first-class _____.

289. A wheel and axle is also a modified first-class lever.

If we remember that the pulley and the wheel and axle are modified _____, we can easily calculate the torque of forces acting on them.



290. In a pulley or wheel and axle, just as in a lever:

TORQUE = THE _____ OF THE FORCE
X THE TORQUE ARM OF THE FORCE.



567 Strictly speaking, you could never measure any quantity at an instant in time.

Before you could start and finish the measurements, the _____ in time would no longer be.

568 Even in an interval of one second, there are instants in time.

We can say the tiny interval of a second contains many, many _____ in time.

569 In practice, the best we can do to measure speed or velocity at an instant is to use the tiniest interval possible, which we know contains that instant in _____.

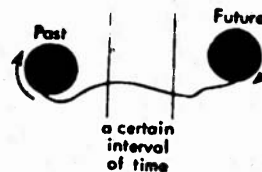
570 Suppose we could represent time by two balls of string.

Look at the picture.

The ball winding up could represent past time.

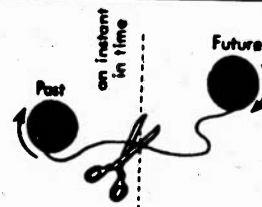
The ball unwinding could represent _____ time.

A piece of string could represent an _____ of time.



571 An interval of time contains many, many _____ in time.

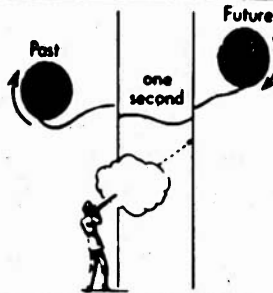
572 We could represent one of the many, many _____ that an interval contains by any place we cut the string.



578 Whenever we measure an object's velocity over an interval of time, however tiny the interval may be, we are measuring its _____.

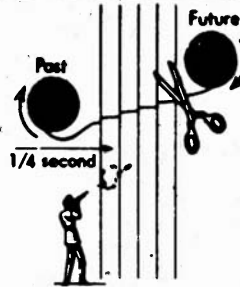
579 A second is a very short interval of time, but if we measured the speed and direction of a bullet during an _____ of one second, we would still be measuring its _____ velocity.

average or instantaneous



580 Suppose we kept making the interval shorter and shorter as we measured the bullet's velocity.

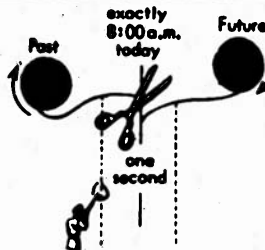
We would still be measuring the bullet's _____ as we measured its resultant displacement during shorter and shorter _____ of time.



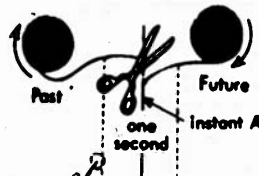
581 Look at the picture. Suppose instant A, at which we wanted to measure a bullet's instantaneous velocity, was exactly 8:00 a.m. today.

"Exactly 8:00 a.m. today" is an _____ in time.

** instant or interval*



582 We know instant A can be found in the _____ of one second that contains 8:00 a.m. today.



ENERGY AND WORK

CHAPTER 7

302. A photographer flashes a flashbulb on Fifth Avenue in New York. In the outer reaches of space a star explodes. Close to us and billions of miles away _____ ~~is~~ is changing from one form to another.

303. The law of _____ ~~of energy~~ of energy tells us that although the energy in the universe may change form many, many times, the total amount of energy in the universe * _____ ~~is~~ constant.

*is or is not

304. A billion years ago the sun was radiating heat energy and light energy. As far as we know, a billion years in the future the sun will still be radiating _____ ~~heat~~ energy and _____ ~~light~~ energy to the earth and the other planets.

305. Millions of years ago plants and trees of the earth's prehistoric forests absorbed heat and light energy from the sun and stored some of this energy as potential chemical energy in their cells.

Just as plants do today, these primeval plants transformed _____ ~~heat~~ and _____ ~~light~~ energy from the sun to _____ ~~potential~~ chemical energy in their cells.

306. The deposits of coal and oil found in the earth today have been formed from layer upon layer of dead plants and animals compressed for millions of years beneath the earth's surface. Today, the potential chemical energy of burning coal and oil is released in the form of _____ ~~heat~~ and light energy, and can be used for doing _____ ~~work~~.

307. Coal and oil can be called **FOSSIL FUELS** because they have been preserved beneath the earth's surface for millions of years. Indirectly, the energy of the gasoline that powers a car came from the sun * _____ ~~of years~~ of years ago. Gasoline, too, could therefore be called a _____ ~~fossil~~ fuel.

*millions, thousands, or hundreds

308. The next time you are at a gas station you might ask the attendant for some fossil fuel. If the attendant is a scientist on a working vacation, he should know that you are asking for _____ ~~energy~~.



191. To slow down, a falling object must spend some of its kinetic energy by doing _____ ~~work~~ on whatever is slowing it down. To stop, a falling object must spend all its _____ ~~kinetic~~ energy by doing _____ ~~work~~ on whatever stops it.

**kinetic or potential*

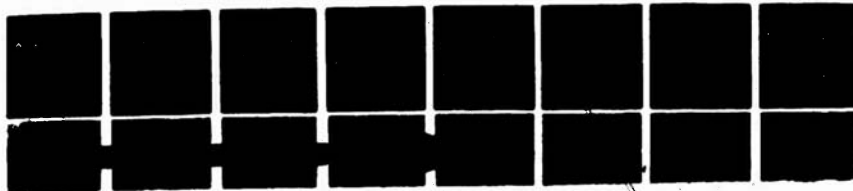
192. A falling rock does _____ ~~work~~ as it strikes the ground because it pays _____ ~~work~~ to the soil as it pushes the soil in front of itself.

193. Luckily, raindrops have spent nearly all their kinetic energy in overcoming air resistance before they reach the earth.

They have done _____ ~~work~~ on the earth's atmosphere on the way down. Otherwise, a raindrop would be traveling with the speed of a bullet, and even a tin roof wouldn't be much of an umbrella!



Professor Aim inspects a racing car's mercury flywheel, used to increase the kinetic energy of the flywheel's rotation once the car is in motion.



GENERAL SCIENCE

Jr. H.S.

GENERAL SCIENCE SERIES—BIOLOGY AND CHEMISTRY

HALMUTH H. SCHAEFER

ARTHUR P. JEFFRIES, both of Teaching Materials Corp.

Published by **TEACHING MATERIALS CORPORATION**

575 Lexington Avenue, New York 22, New York

Programed text, 2,113 frames, paperback, 491 pp.,
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For use in MIN/MAX II machine, \$25.00; program
reusable, \$12.50.

Teacher's Manual: General Manual for all TMI-Grolier
programs available.

Table of Contents.

Final Test included.

Constructed Responses always used; no Multiple Choice;
no Branching.

DEVELOPMENTAL (FIELD TEST) POPULATION(S):

"Eighth grade students, average age 12 years 8 months.

Age range 12-15 years."

Other using population(s): "Review for higher grades."

Prerequisites:






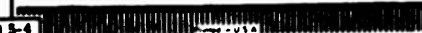
Average Time: 15-25 hours (based entirely on data);
standard deviation, 2.29 hours.



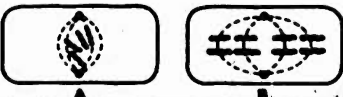

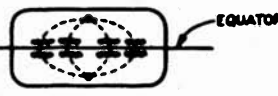

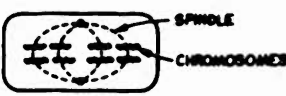

Next Revision: March, 1964.

(2 sample pages)

GENERAL SCIENCE

GENERAL SCIENCE SERIES—BIOLOGY AND CHEMISTRY
Schaefer, Jeffries; TEACHING MATERIALS CORPORATION
2 sample pages:

16	Atoms have a nucleus with _____ arranged in rings or shells around the nucleus.	
	electrons	
17	Some atoms have vacancies in their electron shells. Other electrons can fill these vacancies. These atoms have room for more _____ in their shells.	
	electrons	
18	Atoms with room for more electrons sometimes borrow electrons from other atoms. Electrons, then, can be borrowed from other _____.	
	atoms	
19	If one atom of a particular type of element has need of another electron, <u>all</u> the atoms in that <u>element</u> also need another _____.	
	electron	
20	Chemical reactions depend on the action of electrons. The atomic theory of chemical reactions is based on how _____ act.	
	electrons	

<p>56</p> <p>Period of growth - <u>interphase</u> stage. Process of reproduction - <u>mitosis</u>. There are four stages of <u>mitosis</u>. We have been discussing the _____ which is the first stage of mitosis.</p>	
<p>prophase</p>	
<p>57</p> <p>The second stage of mitosis is the <u>metaphase</u>. The first stage of mitosis is the _____; the second stage is the _____.</p>	
<p>prophase metaphase</p>	
<p>58</p> <p>During the <u>metaphase</u>, the chromosomes arrange themselves along an imaginary line at the center of the cell. Figure _____ shows the <u>prophase</u>. Figure _____ shows the <u>metaphase</u>.</p>	
<p>A B</p>	
<p>59</p> <p>Just as our earth has an imaginary line called the <u>equator</u>, a cell during the <u>metaphase</u> has an imaginary line called the _____.</p>	
<p>equator</p>	
<p>60</p> <p>During the <u>metaphase</u>, the _____ arrange themselves along an imaginary line called the _____.</p>	
<p>chromosomes equator</p>	<p>A 9-12</p> 

GENERAL SCIENCE

Jr. H. S.

**GENERAL SCIENCE SERIES: MEASUREMENT,
METEOROLOGY & ASTRONOMY**

HALMUTH H. SCHAEFER

ARTHUR P. JEFFRIES, both of Teaching Materials Corp.
Published by **TEACHING MATERIALS CORPORATION**,
575 Lexington Avenue, New York 22, New York

Programed text, 1,916 frames, paperback, 450 pp.,
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reusable, \$12.50.

Teacher's Manual: General Manual available for all TMI-
Grolier programs.

Table of Contents.

Final Test included.

Constructed Responses always used; no Multiple Choice
Responses; no Branching.

DEVELOPMENTAL (FIELD TEST) POPULATION(S):

"8th graders, age 12-15, average age 12 years
6 months."

Other using population(s): Review for higher grades.

Prerequisites:


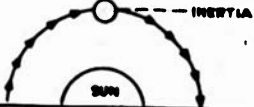

Average Time: 10-20 hours (based entirely on data);
standard deviation, 3.38 hours.

Next Revision: March, 1964.

(1 sample page)

GENERAL SCIENCE

GENERAL SCIENCE SERIES: MEASUREMENT, METEOROLOGY & ASTRONOMY Schaefer, Jeffries; TEACHING MATERIALS CORPORATION one sample page:

71	<p>The planets are pulled toward the sun by gravity. The dotted line in the picture represents _____.</p>	
	gravity	
72	<p>The planets, like all moving bodies, tend to continue in a straight path due to inertia. The broken straight line in the picture represents the _____.</p>	
	inertia	
73	<p>Since _____ would pull the planet to A and _____ would pull the planet to B, the two combined will move it to _____.</p>	
	inertia gravity C	
74	<p>Thus these two forces combined make the planet revolve _____ the sun.</p>	
	around	
75	<p>It is like the boy spinning a ball around at the end of a string. The inertia of the ball tends to make the ball move straight, just as the _____ of a planet causes the planet to <u>tend</u> to move in a straight line.</p>	
	inertia	

C 1-18

GENERAL SCIENCE

Jr. H. S.

GENERAL SCIENCE SERIES—SOUND, LIGHT, ELECTRICITY AND COMMUNICATIONS

HALMUTH H. SCHAEFER

ARTHUR P. JEFFRIES, both of Teaching Materials Corp.

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8-1/2" x 11", bound in 2 separate volumes, \$13.50.**

**For use in MIN/MAX II machine, \$25.00; program
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**Teacher's Manual: General Manual for all TMI-Grolier
programs available.**

Table of Contents.

Final Test included.

**Constructed Responses always used; no Multiple Choice
Responses; no Branching.**

DEVELOPMENTAL (FIELD TEST) POPULATION(S):

**"Eighth graders, age 12-15, average age 12 years
6 months."**

Other using population(s): Review for higher grades.

Prerequisites:

**Average Time: 10-20 hours (based entirely on data);
standard deviation, 2.93 hours.**

Next Revision: March, 1964.

(1 sample page)

GENERAL SCIENCE

GENERAL SCIENCE SERIES—SOUND, LIGHT, ELECTRICITY AND COMMUNICATIONS

Schaefer, Jeffries; TEACHING MATERIALS CORPORATION
one sample page:

11	A circuit in which the electric current flows through all parts of the circuit is a _____ circuit.	
	series	
12	If any part of a _____ is burned out, no electric current will flow through the circuit.	
	series circuit	
13	Series wiring increases the resistance of a circuit. If the electromotive force remains the same and the resistance is increased, the rate of flow will be _____ since the rate of flow decreases when R is increased.	
	decreased	
14	In this diagram the rate of flow is _____ amperes, since the resistance is 10 + 10 or 20 ohms and the electromotive force is 110 volts.	
	$\frac{E}{R} = I$	
	5.5 (or $5\frac{1}{2}$)	
15	The rate of flow is 5.5 amperes, but if we add another lamp the rate of flow would be _____ amperes, since the resistance would now be 10 + 10 + 10 or 30 ohms.	
	3.66 or 3.7	

GENERAL SCIENCE

Jr. H.S.

**GENERAL SCIENCE SERIES: WORK AND MACHINES
HALMUTH H. SCHAEFER**

**ARTHUR P. JEFFRIES, both of Teaching Materials
Corporation**

**Published by TEACHING MATERIALS CORPORATION,
575 Lexington Avenue, New York 22, N.Y.**

**Programed text, 1200 frames, paperback, 278 pp.,
8 1/2" x 11", \$8.50.**

**For use in MIN/MAX II machine, \$25.00; program
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**Teacher's Manual: General manual for all TMI-Grolier
programs available..**

Table of Contents.

Final Test included.

**Constructed Responses always used; no Multiple Choice
Responses; no Branching.**

DEVELOPMENTAL (FIELD TEST) POPULATION(S):

**"Eighth graders, ages 12-15, average age 12 years
8 months."**

Other using population(s): Review for higher grades.

Prerequisites:








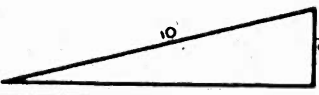

**Average Time: 8-15 hours (based entirely on data);
standard deviation, 2.29 hours.**

Next Revision: March, 1964.

(1 sample page)

GENERAL SCIENCE

GENERAL SCIENCE SERIES: WORK AND MACHINES
 Schaefer, Jeffries; TEACHING MATERIALS CORPORATION
 one sample page:

<p>66 The MA of a pulley is equal to the _____ supporting the resistance (weight)</p>	
<p>number of ropes</p>	
<p>67 This pulley has an MA of _____</p>	
<p>3</p>	
<p>68 The MA of a lever is the length of one end divided by the length of the other end. The MA of this lever is _____</p>	
<p>$\frac{3}{2}$ or 1.5</p>	
<p>69 The MA of a pulley is equal to the number of ropes supporting the weight (resistance). The MA of this pulley is _____</p>	
<p>3</p>	
<p>70 The MA of an inclined plane is equal to the length divided by the height (thickness). The MA of this one is 5 (10 ÷ 2). The MA of an _____ is equal to length ÷ height</p>	
<p>inclined plane</p>	<p>4-14</p> 

GENERAL SCIENCE

Jr. H.S.-H.S.

**GENERAL SCIENCE U-3004
UNIVERSAL ELECTRONICS LABORATORIES
CORPORATION**

**Published by UNIVERSAL TEACHING MACHINE
INSTITUTE,
510 Hudson Street, Hackensack, New Jersey**

**For use in UNIVERSAL MODEL U machine, program
reusable, 2160 frames, machine and program, \$25.00
(school discount).**

Table of Contents.

**Constructed Responses usually used; some Multiple Choice;
no Branching.**

DEVELOPMENTAL (FIELD TEST) POPULATION(S):

"Grade level - 7-11."

Other using population(s): Adult.

Prerequisites: None.

Average Time: 30 to 36 hours (est.).

Next Revision: August, 1963.

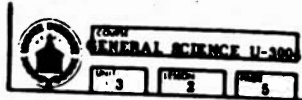
(2 sample pages)

GENERAL SCIENCE

GENERAL SCIENCE U-3004

Universal Electronics Laboratories Corporation; UNIVERSAL TEACHING MACHINE INSTITUTE

2 sample pages:



SPECIFIC INSTRUCTIONS		
421	All material things exert a pull or attraction upon each other. This pull or attraction is a force called _____.	gravity
422	This pull or attraction is called gravity, or _____ pull.	gravitational
423	The planet Earth gradually grew larger because particles called _____ were attracted to it by its gravity.	planetimals
424	All material things exert a _____ pull on each other. Which exerts a greater pull -- a large body or a small body?	gravitational large
425	The Earth is also attracted or influenced by the pull of the other planets in our _____ system. These planets influence each other and are influenced by the pull of the Earth.	solar
426	Our _____ system is affected by the gravitational pull of other _____.	solar systems

<p>475 The gravitational pull of the _____ is only one-sixth that of the earth's pull.</p>			moon
<p>476 This means that if you weigh 150 pounds on the Earth you would weigh one-sixth of that, or _____ pounds on the moon.</p>			25
<p>477 If you jumped two feet on the Earth, the same energy would carry you _____ feet on the moon.</p>			12
<p>478 The pull or force which is being compared between the Earth and the moon is called the _____ pull, or the pull of gravity.</p>			gravitational
<p>479 When we look at the moon through a telescope, the surface of the moon is magnified and can be clearly seen.</p>			GO TO NEXT FRAME
<p>480 Looking at the moon through a _____ which magnifies it, we can see rough and smooth areas on the surface of the moon.</p>			telescope

GENERAL SCIENCE

Elem.

GROUPING ANIMALS: WHAT IS A MAMMAL?
FRANCES UNGER MEADE, Programmer, Learning
Incorporated.

Published by CORONET INSTRUCTIONAL FILMS,
65 E. So. Water Street, Chicago 1, Illinois.

Programed text, 321 frames, paperback, 57 pp., 7" x 10",
\$1.20.

Teacher's Manual included.

Test Set included.

Constructed Responses usually used; some Multiple
Choice; no Branching.

DEVELOPMENTAL (FIELD TEST) POPULATION(S):

"...Small representative samplings at appropriate
grade levels tested informally on one-to-one basis
with programmer. Small representative samplings
under controlled conditions (Dukane Redi-tutor using
35 mm. film) for each revision of program. Program
has been through 4 complete revisions, each revision
based on data obtained from formal machine testing.
Field testing in progress: Classroom testing from 4th
through 7th grades, administered by classroom
teachers. Test areas distributed geographically
from Florida to California. All testing conducted by
Learning Incorporated."

Prerequisites: Grade 4 reading level.

Average Time: 2 hours, 36 minutes (based entirely on
data); standard deviation, 31.1 minutes.

Next Revision: "The published program is the final
revision."

(1 sample page)

GENERAL SCIENCE

GROUPING ANIMALS: WHAT IS A MAMMAL? Meade; CORONET INSTRUCTIONAL FILMS one sample page:



3-20 The scientist soon notices that some are covered with hair, some with feathers, some with scales. He knows that animals with feathers are more closely (?) to each other than to the animals with scales.

related



3-21 So he classifies them into a smaller group called a class. Animals with feathers are in one class. Animals with scales are in another class. Animals with hair are in still another (?)

class

3-22 There are more animals in a phylum than there are in a class so a phylum is a larger group than a (?)

class

3-23 Animals with feathers and animals with hair (?) (are/are not) classified in the same class.

are not

GENERAL SCIENCE

Elem.

HOW TO USE THE MICROSCOPE

SETH WOHL

DAVID R. BELASH

LEWIS D. EIGEN

**BERTRAM M. SIEGEL, Programers, The Center for
Programed Instruction, Inc.**

**Published by SCIENCE RESEARCH ASSOCIATES, Inc.,
259 East Erie Street, Chicago 11, Illinois.**

**Programed text, 450 frames, paperback, 169 pp., 8 1/2" x
11", \$2.50.**

**Teacher's Manual available, \$.50 (free with class orders).
Table of Contents.**

Final Test available, \$.10.

**Constructed Responses usually used; some Multiple
Choice; some Branching.**

DEVELOPMENTAL (FIELD TEST) POPULATION(S):

"4th, 5th and 6th grade classes in suburban schools.

I.Q. slightly above average."

Prerequisites: "5th grade reading level."

**Additional material required: "Color-coded microscope
and set of 7 slides. List price: \$45.00."**

Average Time: 8 hours (est.).

Next Revision: June, 1965.

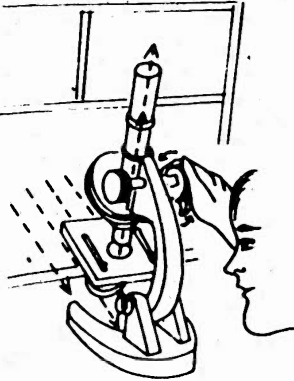
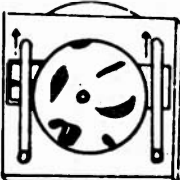
(1 sample page)

GENERAL SCIENCE

HOW TO USE THE MICROSCOPE

Wohl, Belash, Eigen, Siegel; SCIENCE RESEARCH ASSOCIATES

one sample page:

<p>low power lens</p> <p>18-2</p>	<p>STEP 3. Turn the light control ring until the largest hole is clicked into place under the center of the stage.</p> <p>When you have done this, you can see (how many?) <input type="text"/> yellow dots on the edge of the light control ring.</p> <p>18-3</p>
<p>hole</p> <p>18-10</p>	 <p>STEP 11. Put your head down to one side, and turn the <input type="text"/> <input type="text"/> <input type="text"/> so that the low power lens moves (which way?) <input type="text"/>.</p> <p>18-11</p>
<p>C</p> <p>If you chose the wrong answer, go on to the next frame.</p> <p>If you chose the correct answer, skip the next 2 frames and go on to Frame 19-1.</p> <p>18-18</p>	 <p>Slowly move the slide toward the FRONT of the stage.</p> <p>Do this while looking through the microscope.</p> <p>Through the microscope, the diatoms seem to be moving toward the <input type="text"/> of the stage.</p> <p>18-19</p>

GENERAL SCIENCE

Elem.

HOW WE FORECAST THE WEATHER
SHEILA LEVINSKY, Programmer, Learning Incorporated.
Published by CORONET INSTRUCTIONAL FILMS,
65 E. So. Water Street, Chicago 1, Illinois.

Programed text, 300 frames, paperback, 7" x 10", \$1.20.
Teacher's Manual included.

Test Set included.

Constructed Responses usually used; some Multiple
Choice; no Branching.

DEVELOPMENTAL (FIELD TEST) POPULATION(S):

"Data incomplete as of February 8, 1963."

Prerequisites: Grade 5 reading level.

Average Time: "Data incomplete as of February 8, 1963."

Next Revision: "Final revision scheduled for publication
in Summer, 1963."

(1 sample page)

GENERAL SCIENCE

HOW WE FORECAST THE WEATHER Levinsky; CORONET INSTRUCTIONAL FILMS one sample page:

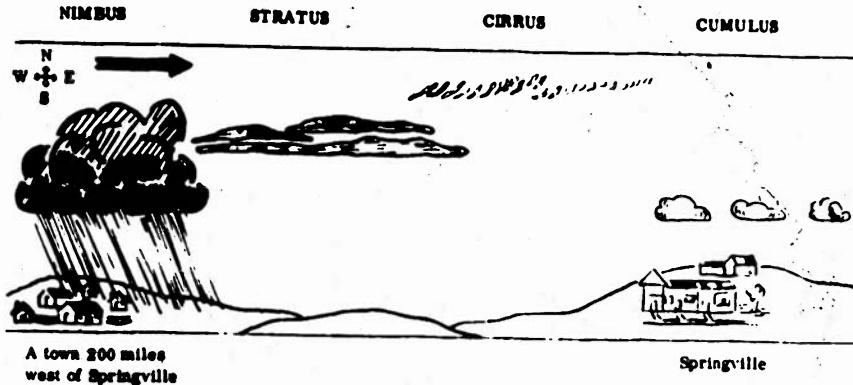


Figure 1

4-16 Figure 1 is a diagram of the sky above two towns. Over Springville, fluffy _____ clouds are floating, but over the other town it is _____ ing.

cumulus;
raining

4-17 Refer to Figure 1 for the next four frames. Clouds move with the wind. The arrow in the diagram shows that the clouds are moving from _____ to _____ (what directions?).

west; east

4-18 After the cumulus clouds pass over Springville, the cirrus clouds will move overhead. After the cirrus clouds, will come the _____ clouds.

stratus

4-19 After the stratus clouds will come the _____ clouds, and then Springville will have rain.

nimbus

4-20 The clouds usually move across the sky in the order shown in the diagram--first cumulus, then _____, then _____, then nimbus.

cirrus; stratus

GENERAL SCIENCE

Jr. H.S.

INTRODUCTION TO NUCLEAR ENERGY

BERTRAM M. SIEGEL

DAVID BELASH

LEWIS D. EIGEN

SETH WOHL, Programers, The Center for Programed Instruction, Inc.

**Published by SCIENCE RESEARCH ASSOCIATES, Inc.,
259 East Erie Street, Chicago 11, Illinois.**

**Programed text, 190 frames, paperback, 48 pp.,
9 1/2" x 6 1/2", \$1.00.**

Answer Sheets available, \$.39.

Teacher's Manual available, \$.50 (free with class orders).

Table of Contents.

Final Test available, \$.10 (free with answer sheets).

**Constructed Responses usually used; some Multiple Choice;
no Branching.**

DEVELOPMENTAL (FIELD TEST) POPULATION(S):

"Slightly above average 5th and 6th grade classes."

**Other using population(s): "4th and 5th grade enrichment
classes."**

**Prerequisites: "5th grade reading level; knowledge of
concepts of matter and atomic structure."**

Average Time: 2 hours (est.).

Next Revision: June, 1965.

(1 sample page)

GENERAL SCIENCE

INTRODUCTION TO NUCLEAR ENERGY

Segel, Belash, Eigen, Wohl; SCIENCE RESEARCH ASSOCIATES

one sample page:

6. All uranium atoms have an atomic number of 92, but may have mass numbers of 234, 235, or 238. In any one element, the atoms may have different but they all have the same
12. The symbols ${}_{38}\text{Sr}^{90}$ and ${}_{38}\text{Sr}^{88}$ stand for different of the element strontium.
99. An isotope that gives off particles of itself is called a radioactive isotope. ${}_{92}\text{U}^{238}$ is a isotope of uranium.
132. The alpha particle has an atomic weight of 4. It is made up of two protons and two (electrons or neutrons)
179. When a uranium atom absorbs a neutron, is released and other are formed.

GENERAL SCIENCE

Elem.-H.S.

INTRODUCTION TO THE UNIVERSE

The Solar System and its Neighbors

WILLIAM L. EARLEY, Consultant Programmer

Published by HONOR PRODUCTS COMPANY,
20 Moulton Street, Cambridge, Mass.

For use in HONOR TEACHING MACHINE, \$20 (approx.);
program reusable, 200 frames, \$2.00-\$2.50. (Machine
may be marketed in retail channels at this \$20 com-
bination price including 3 or 4 programs.)

Constructed Responses usually used; some Multiple Choice;
some Branching.

DEVELOPMENTAL (FIELD TEST) POPULATION(S):

"Public and private schools."

Prerequisites:

Average Time: 1 1/2-2 hours (est.).

Next Revision:

(1 sample page)

GENERAL SCIENCE

INTRODUCTION TO THE UNIVERSE Earley; HONOR PRODUCTS COMPANY one sample page:

<p>Although this completes the list of known planets, which are now _____ in number, it is far from the complete list of heavenly bodies that comprise our solar system. We have, in fact, already discussed three types of heavenly bodies: the sun, the planets, and the moons that are satellites of the planets.</p>	nine
<p>In addition to the nine major solar satellites, or planets, there are thousands of smaller ones that revolve around the sun. These smaller _____ of the sun are like tiny planets and are called <u>planetoids</u>, or <u>asteroids</u>.</p>	satellites
<p>You recall that there was a great distance in space between the orbits of Mars and Jupiter. At one time, astronomers believed there might be another large _____ in this space gap. Instead, they discovered thousands of very small bodies called planetoids, or asteroids.</p>	planet
<p>The asteroids, or planetoids, range in size from 15 miles to 480 miles in diameter. They are very irregular in shape and have extremely rough surfaces. Most of these tiny satellites, or _____, cannot be seen by the unaided eye.</p>	asteroids (planetoids)
<p>Most of the asteroids are held in their particular pattern or orbit because they are attracted in two directions by the magnetic pull of both the sun and Jupiter. This force of attraction is called _____.</p>	gravity
<p>There are two theories that explain the existence of these asteroids. One theory claims that asteroids are the remnants of an old exploded planet. The other theory is that each planet was originally formed when many similar small bodies joined together, but that these have never formed into a single mass.</p> <p>In other words, astronomers cannot agree on whether the asteroids are parts of an old or a new _____.</p>	planet

LATITUDE AND LONGITUDE

DARLENE HARING, Programmer, Learning Incorporated
LLOYD L. HARING, Dept. of Geography, Arizona State
University

Published by CORONET INSTRUCTIONAL FILMS,
65 E. So. Water Street, Chicago 1, Illinois.

Programed text, 380 frames, paperback, 75 pp., 7" x 10",
\$1.20.

Teacher's Manual included.

Test Set included.

Constructed Responses usually used; some Multiple
Choice; no Branching.

DEVELOPMENTAL (FIELD TEST) POPULATION(S):

"...Small representative samplings at appropriate
grade levels tested informally on one-to-one basis
with programmer. Small representative samplings
under controlled conditions (Dukane Redi-tutor using
35 mm. film) for each revision of program. Pro-
gram has been through 5 complete revisions, each
revision based on data obtained from formal machine
testing. Field testing in progress: Classroom test-
ing from 5th through 7th grades, administered by
classroom teachers. Test areas distributed geo-
graphically from Florida to California. All testing
conducted by Learning Incorporated."

Prerequisites: Grade 6 reading level.

Average Time: 3 hours, 38 minutes (based entirely on
data); standard deviation, 31.5 minutes.

Next Revision: "The published program is the final
revision."

(1 sample page)

GENERAL SCIENCE

LATITUDE AND LONGITUDE

D. Haring, L.L. Haring; CORONET INSTRUCTIONAL FILMS

one sample page:

8-21 When we are using degrees to measure latitude, we call them degrees of 1 (?)

latitude

8-22 You probably remember that in time an hour is divided into 60 minutes. A degree of latitude is also divided into (?) minutes.

60

8-24 Sixty minutes of latitude equals one (?) of latitude.

degree

8-25 One degree of latitude equals sixty minutes of latitude. You can write this as 1° of latitude = (?)' of latitude.

60'

Remember to put the sign for minutes on your answer.



8-26 On the map above, the latitude of Point A is between 0°N and 1°N . This means that Point A is more than 0° north of the equator. Point A is 0° and 30' north of the equator. The short way to write this is $0^\circ 30'\text{N}$. The latitude of Point A is 0° (?)' N.

$0^\circ 30'\text{N}$



8-27 On the map above, the latitude at Point B is (?)

$0^\circ 15'\text{N}$

8-28 A point twenty degrees and 60 minutes north of the equator is written as (?) (?) (?)

$20^\circ 60'\text{N}$

Did you get degrees, minutes, and the capital letter right?

GENERAL SCIENCE

Elem.

MEASURING LENGTH IN METRIC UNITS

DAVID BELASH

SETH WOHL

LEWIS D. EIGEN

BERTRAM M. SIEGEL, Programers, The Center for
Programed Instruction, Inc.

Published by **SCIENCE RESEARCH ASSOCIATES, Inc.**,
259 East Erie Street, Chicago 11, Illinois.

Programed text, 475 frames, paperback, 120 pp.,
6 1/2" x 9 1/2", \$2.50.

Teacher's Manual available, \$.50 (free with class orders).

Table of Contents.

Final Test available, \$.10.

Constructed Responses usually used; some Multiple Choice;
no Branching.

DEVELOPMENTAL (FIELD TEST) POPULATION(S):

"3rd-6th grade students selected for their unfamiliar-
ity with the content of the program."

Prerequisites: "Elementary knowledge of addition, and
fractions, 4th grade reading level."

Additional material required: "Kit consisting of 3 metric
rulers and 4 color coded blocks of various sizes and
shapes. List price: \$1.00."

Average Time: 7 hours (est.).

Next Revision: June, 1965.

(1 sample page)

GENERAL SCIENCE

MEASURING LENGTH IN METRIC UNITS

Belash, Wohl, Eigen, Siegel; SCIENCE RESEARCH
ASSOCIATES

one sample page:

	<p>4-1 Fold out Panel 1. Keep Panel 1 out until you are told to put it away. The name of Panel 1 is <input type="text"/>.</p>
<p>2 centimeters</p>	<p>4-9 Find Line N. Measure Line N just the way you measured Line M. The length of line N is <input type="text"/>.</p>
<p>4-8</p>	
<p>1 centimeter</p>	<p>4-17 Look at Line A. Place the 2 of your ruler at the <u>left end</u> of Line A. The right end of Line A stops just above the number <input type="text"/> So the distance from 2 to 3 on your ruler is <input type="text"/>.</p>
<p>4-16</p>	
<p>7, 8 24, 25</p>	<p>4-25 The distance between any number on the metric side of your ruler and the next number is <input type="text"/>.</p>
<p>4-24</p>	

GENERAL SCIENCE

8th Grade+

A PROGRAM ON EARTH-SUN RELATIONS

ROBERT N. SAVELAND, Ginn & Co.

Published by GINN AND COMPANY,

Statler Building, Boston 17, Mass., P.O. 191.

**Programed text, 250 frames, paperback, 5 pages,
8 1/2" x 11", \$1.00.**

Teacher's Manual available, \$.28

Table of Contents

**Constructed Responses always used; no Multiple Choice;
no Branching.**

**"Test(s) and Response Sheets available, \$3.00 per
package (36)."**

DEVELOPMENTAL (FIELD TEST) POPULATION(S):

**The experimental edition was used in regular classes
by over 595 students in Massachusetts, Pennsylvania,
California, Oregon, Illinois, and Mississippi.**

Prerequisites:

Additional material required: Vinyl mask.

Average Time: 10 hours (est.).

Next Revision:

(1 sample page)

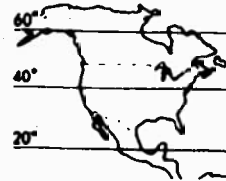
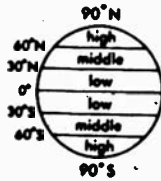
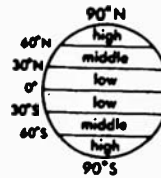
GENERAL SCIENCE

A PROGRAM ON EARTH-SUN RELATIONS
Saveland; GINN AND COMPANY

one sample page:

SET 4

<p>equator</p>	<p>4-16. The latitude of the Tropic of Cancer is $23\frac{1}{2}^{\circ}$ N. Since the Tropic of Capricorn is a similar distance south of the equator, its latitude would be _____$^{\circ}$ _____.</p>
<p>$23\frac{1}{2}^{\circ}$ South</p>	<p>4-17. The Arctic Circle is $66\frac{1}{2}^{\circ}$ north of the equator. What is the latitude of the <u>Antarctic</u> Circle?</p>
<p>$66\frac{1}{2}^{\circ}$ South</p>	<p>4-18. It is sometimes convenient to refer to parts of the world as being in the low, middle, or high latitudes. These broad belts are shown in the accompanying diagram. You can see that the low latitudes extend to _____ degrees on each side of the equator.</p>
<p>thirty or 30</p>	<p>4-19. The high latitudes are those which are more than _____ degrees from the equator.</p>
<p>sixty or 60</p>	<p>4-20. The United States is mainly in the _____ latitudes.</p>



OUR SOLAR SYSTEM

DONNA M. PERSON, Programmer, Learning, Incorporated
THEODORE W. MUNCH, Dept. of Science Education,
Arizona State University

Published by **CORONET INSTRUCTIONAL FILMS**,
65 E. So. Water Street, Chicago 1, Illinois

Programed text, 361 frames, paperback, 66 pp., 7" x 10"
\$1.20.

Teacher's Manual included.

Test Set included.

Constructed Responses usually used; some Multiple
Choice; no Branching.

DEVELOPMENTAL (FIELD TEST) POPULATION(S):

"Small representative samplings at appropriate grade levels tested informally on one-to-one basis with programmer. Small representative samplings under controlled conditions (Dukane Redi-tutor using 35mm. film) for each revision of program. Program has been through 5 complete revisions, each revision based on data obtained from formal machine testing. Field testing in progress: Classroom testing from 6th through 10th grades, administered by classroom teachers. Test areas distributed geographically from Florida to California. All testing conducted by Learning Incorporated."

Prerequisites: Grade 7 reading level.

Average Time: 2 hours, 2 minutes (based entirely on data); standard deviation, 12.7 minutes.

Next Revision: "The published program is the final revision."

(1 sample page)

GENERAL SCIENCE

OUR SOLAR SYSTEM

Person, Munch; CORONET INSTRUCTIONAL FILMS

one sample page:



5-13 Two of the movements of planets are rotation and revolution. A planet in our solar system moves around the sun in the movement called (?).

revolution

5-13 The revolution of a planet is its movement around the (?).

sun

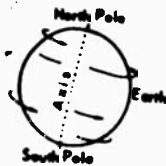


5-14 The farther a planet is from the sun the longer it takes the planet to make one complete trip around the sun. It takes (?) longer to revolve around the sun than (?).

earth;
Venus

5-15 The time that it takes the earth to make one revolution around the sun is called a year. This length of time is about (?) days.

365



5-16 Earth makes a movement called rotation as it turns or spins on its (?) once every 24 hours.

axis

GENERAL SCIENCE

H.S.

SCIENCE I and II

HARVEY POLLACK, High school Science Coordinator,
Queens, N. Y.

ALEXANDER SCHURE, President, N. Y. Institute of
Technology

Published by **CENTRAL SCIENTIFIC Company**,
1700 Irving Park Road, Chicago 13, Ill.

For use in **CENCO PROGRAMED LEARNER**, \$2.95;
program not reusable, 500 frames in I, 500 in II, I or
II included in price of machine.

Constructed Responses usually used; some Multiple Choice
Responses; no Branching.

DEVELOPMENTAL (FIELD TEST) POPULATION(S):
"Over 200."

Prerequisites: None

Average Time: 3 hours (est.)

Next Revision: "Now available."

(1 sample page)

GENERAL SCIENCE

Jr. H.S.

SPACE SCIENCE

RICHARD EDWARDS, Programmer, GPTC

JOHN MORRIS, Programmer, GPTC

MARY UTTON, Editor, General Programmed Teaching Corporation

Published by **ENCYCLOPAEDIA BRITANNICA PRESS,**
425 N. Michigan Avenue, Chicago 11, Illinois

Programed text, 1800 frames, paperback, 300 pp.,
8-1/2" x 11", \$

Teacher's Manual: "Instructions to teacher included in preface."

Table of Contents.

Final tests available.

Constructed Responses usually used; some Multiple Choice; no Branching.

DEVELOPMENTAL (FIELD TEST) POPULATION(S):

"Developmental testing: Junior high students.

Field testing: Junior high students."

Prerequisites: None.

Average Time: 15 hours (based entirely on data).

Next Revision: 1968.






(1 sample page)

GENERAL SCIENCE

SPACE SCIENCE

**Edwards, Morris, Utton; ENCYCLOPAEDIA BRITANNICA
PRESS**

one sample page:

70	At about 50 miles the stratosphere and _____ begin. At about 600 miles the exosphere and _____ begin.
	_____
71	Solar system means a sun and the planets that revolve around it. The Earth is a planet and therefore revolves around our _____. Refer to Panel IV.
	_____
72	The heavenly body that supplies the Earth with heat and light is our _____.
	_____
73	The Sun is not like a planet because a sun gives off its own light. Circle the correct answer in each.
	1. The Sun (gives/does not) off its own light. 2. A planet (gives/does not give) off its own light.
74	A sun is a sphere of superhot gases which gives off its own _____.
	_____

GENERAL SCIENCE

Jr. H.S.

TELLING TIME FROM THE ROCKS

LAURENCE WHISLER, Consultant in Programed Education, Central Scientific Co.

Published by **CENTRAL SCIENTIFIC Company**,
1700 Irving Park Road, Chicago 13, Ill.

For use in **CENCO PROGRAMED LEARNER**, \$2.95; 100 frames, program included in price of machine.

Multiple Choice Responses always used; no Constructed Responses; no Branching.

DEVELOPMENTAL (FIELD TEST) POPULATION(S):

"Planned population of 100."

Prerequisites:

Average Time: 3 hours (est.).

Next Revision: September, 1963.

(1 sample page)

GENERAL SCIENCE

Jr. H.S.

WATER AS A NATURAL RESOURCE

**LAURENCE WHISLER, Consultant in Programed Education,
Central Scientific Co.**

**Published by CENTRAL SCIENTIFIC Company,
1700 Irving Park Road, Chicago 13, Ill.**

**Planned for use in CENCO PROGRAMED LEARNER, \$2.95;
100 problem items, program included in price of
machine.**

**Multiple Choice Responses always used; no Constructed
Responses; no Branching.**

DEVELOPMENTAL (FIELD TEST) POPULATION(S):

"Planned population of 100."

Prerequisites:

Average Time: 3 hours (est.).

Next Revision: September, 1963.

(1 sample page)

GENERAL SCIENCE

WATER AS A NATURAL RESOURCE
Whisler; CENTRAL SCIENTIFIC CO.
one sample page:

WATER AS A NATURAL RESOURCE

12. California has two areas of heavy population concentration: around San Francisco Bay and in Southern California around Los Angeles and _____
a. Sacramento b. San Juan c. San Diego

.....
_____c_____

13. In the California areas of dense population, the precipitation is _____
a. uniform throughout the year b. heaviest in early spring c. heaviest in late summer

.....
_____b_____

SECTION II THE MAP OF USABLE WATER

IN BRIEF: Water users must be compared with usable water. The maps pointed out heavy concentrations of water users. Of course, water is important to all farmers both those near cities and those living in entirely rural areas.

.....
14. The usable water in an area depends mostly on the precipitation. But the amount of usable water is also greatly affected by the _____
a. length of the days b. direction of wind
c. average temperature

.....
_____c_____

GENERAL SCIENCE

Elem.-Jr. H.S.

THE WONDERFUL WORLD OF INSECTS

WILLIAM L. EARLEY, Consultant Programmer

**Published by HONOR PRODUCTS COMPANY,
20 Moulton Street, Cambridge, Mass.**

**For use in HONOR TEACHING MACHINE, \$20 (approx.)
including 3 programs; program reusable, \$2.00-\$2.50.
Constructed Responses usually used; some Multiple Choice;
some Branching.**

**DEVELOPMENTAL (FIELD TEST) POPULATION(S):
"Public and private schools."**

Prerequisites:

Average Time: 1 1/2-2 hours (est.).

Next Revision:

(1 sample page)

GENERAL SCIENCE

THE WONDERFUL WORLD OF INSECTS Earley; HONOR PRODUCTS COMPANY one sample page:

Want to see how sharp you are? Try the following multiple choice and true-false problems. The roll won't advance unless you press the correct button. Score yourself 1 point each time you are right on the first try.

No answer
needed

ALL true insects have the following characteristics:

- a. 8 legs and 2 body parts
- b. 12 legs and 3 body parts
- c. 6 legs and 3 body parts
- d. 6 legs and 2 body parts

c. 6 legs and
3 body parts

Press and hold the button of your choice. The roll will move only when you choose the correct answer.

Insects have an internal skeleton.

- a. True
- b. False

b. False
(They have an
outer, or
exo-skeleton.)

Metamorphosis is the process of laying eggs through the ovipositer.

- c. True
- d. False

d. False
(It is a process
of change.)

Members of the Diptera order have:

- a. lacy wings.
- b. two wings.
- c. sheathed wings.
- d. scaly wings.

b. Diptera
means "two-
wings."

SCIENCE-BIOLOGY

H.S.

CELLS

Their Structure and Function

MARTA ZABORSKA, Programmer, Learning Incorporated.

Published by CORONET INSTRUCTIONAL FILMS,

65 E. So. Water Street, Chicago 1, Illinois

Programed text, 320 frames, paperback, 7" x 10", \$1.20.
Teacher's Manual included.

Test Set included.

**Constructed Responses usually used; some Multiple
Choice; no Branching.**

DEVELOPMENTAL (FIELD TEST) POPULATION(S):

**"...Small representative samplings at appropriate
grade levels tested informally on one-to-one basis
with programmer. Small representative samplings
under controlled conditions (Dukane Redi-tutor using
35 mm. film) for each revision of program. Program
has been through 2 complete revisions based on data
obtained from formal machine testing as of February
8, 1963. Field testing plan: Classroom testing from
9th through 12th grades administered by classroom
teachers. Test areas distributed geographically
from Florida to California. All testing conducted
by Learning Incorporated."**

Prerequisites:

Average Time: "Data incomplete as of Feb. 8, 1963."

**Next Revision: "Final revision scheduled for publication
in Spring, 1963."**

(1 sample page)

SCIENCE-BIOLOGY

CELLS

Zaborska; CORONET INSTRUCTIONAL FILMS

one sample page:

4-6 Mitosis is important to young growing organisms, but it also has a function in adult organisms which have stopped _____.

growing

4-8 A wound in a plant's or animal's body is able to heal mainly because of mitosis. Cell division makes it possible for wounds to _____.

heal

4-7 The damaged cells in a wound are gradually replaced as the healthy cells around it _____ and fill in the gap.

divide

4-9 Mitosis in young organisms makes growth possible. In adults, the healing of wounds is also accomplished by _____.

mitosis



When the cell undergoing mitosis is the unicellular animal amoeba, at the end of the process there are _____ (two many?) amoebas.

two (2)

4-10 When mitosis takes place in a unicellular organism, the result is an increase in the number of whole _____.

organisms



The result of mitosis in multicellular organisms is an increase in the _____ of individual cells.

number

SCIENCE-BIOLOGY

Jr. H.S.

HUMAN ANATOMY & PHYSIOLOGY

ASTRA STAFF

Published by ASTRA

19 Burton Avenue, Norwich, Connecticut

For use in AUTOSCORE machine; program reusable, 850 frames, \$20.00.

Multiple Choice Responses always used; no Constructed Responses; no Branching

DEVELOPMENTAL (FIELD TEST) POPULATION(S):

Other Using Population(s): Schools of nursing.

Prerequisites:

Additional Materials required: AUTOSCORE machine, \$150.00.

Average Time:

Next Revision:

(1 sample page)

SCIENCE-BIOLOGY

HUMAN ANATOMY & PHYSIOLOGY

Astra Staff; ASTRA

one sample page:

ASTROCORP ASTRA CORPORATION 24 BRANCH STREET NEW LONDON CONNECTICUT

245

1. Using the following diagram, trace the path of blood through the body from a capillary in the wrist and back again.

2.

3.

4.

5.

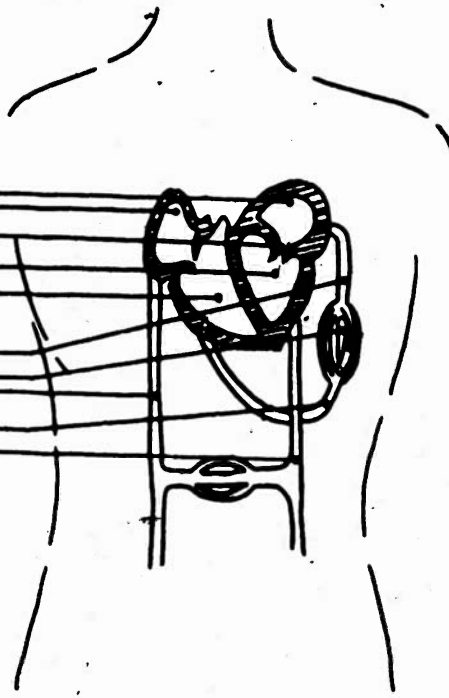
6.

7.

8.

9.

10.



Right Atricle
Aorta
Pulmonary Capillary
Vena Cava
Left Ventricle

Vena Cava
Aorta
Right Atricle
Pulmonary Artery
Pulmonary Vein

Right Ventricle
Left Ventricle
Aorta
Vena Cava
Left Atricle

Pulmonary Vein
Pulmonary Artery
Aorta
Vena Cava
Valve

Vena Cava
Aorta
Pulmonary Vein
Pulmonary Artery
Lung Capillaries

Lung Capillary
Pulmonary Artery
Pulmonary Vein
Aorta
Vena Cava

Left Atricle
Right Atricle
Right Ventricle
Left Ventricle
Aorta

Left Ventricle
Right Ventricle
Right Atricle
Valve
Left Atricle

Aorta
Left Atricle
Right Atricle
Right Ventricle
Left Ventricle

Vena Cava
Aorta
Pulmonary Artery
Pulmonary Vein
Capillaries

Copyright 1961 - ASTRA Corp., New London, Conn. (NY)

SCIENCE-BIOLOGY

MUSCLES, NERVES AND BONES OF THE HEAD
Published by EDUCATION ENGINEERING, Inc.,
381 West 7th Street, San Pedro, California.

Programed text, 5400 frames, paperback, 180 pp.,
5" x 7", available in 5 separate units at \$3.75 each.
For use in SPEED machine, program reusable, \$50.00.
Teacher's Manual available, \$4.00 per unit.
Unit, Final, Diagnostic Test(s) available, \$3.75 each.
Multiple Choice Responses always used; no Constructed
Responses; no Branching.

DEVELOPMENTAL (FIELD TEST) POPULATION(S):

Prerequisites:

**Additional material required: SPEED machine, \$700 &
\$850.**

Average Time: 11 hours (est.).

Next Revision:

(3 sample pages)

SCIENCE-BIOLOGY

MUSCLES, NERVES AND BONES OF THE HEAD EDUCATION ENGINEERING

3 sample pages:

DIRECTION OF PRESSURE IN MASSAGING MUSCLES

As a general rule, when massaging muscles, manipulate from insertion to origin (upward). A few exceptions exist for muscles that have more fixed attachments with sufficient flexibility to permit massaging either towards or towards origins without irritation.

Light massaging, such as sprays, ointments, creams, and powders, can be done without respect to direction.

The reasons for massaging from insertion to origin (upward) are

1. To massage in harmony with muscles and the flow of blood
2. To prevent irritation
3. To facilitate contraction (a muscle responds more readily when exercised from its more movable attachment (insertion) to its less movable attachment (origin))

ABC01 - 811

The _____ is the _____ movable attachment and the _____ is the _____ movable attachment.

- (1) origin, less, insertion, more
- (2) insertion, less, origin, more
- (3) none of these

The _____ of nearly all face muscles extend _____ from their _____

- (7) origins, downward, insertions
- (8) insertions, downward, origins
- (9) insertions, upward, origins
- (10) none of these

As a general rule, when massaging muscles, manipulate from _____ to _____ which is in the _____ direction

- (4) insertion, origin, upward
- (8) origin, insertion, downward
- (9) insertion, origin, downward
- (7) origin, insertion, upward

4. A few exceptions exist for muscles that have more _____ attachment with sufficient _____ to permit massaging in other directions without irritation.

- (7) fixed, flexibility
- (8) fixed, rigidity
- (9) flexible, flexibility
- (10) none of these

5. One of the reasons for establishing a definite direction of massage is:

- (7) To massage in opposition to the flow of blood
- (8) To prevent contraction
- (9) To cause irritation
- (10) To massage in harmony with muscles and the flow of blood

ABC01 - 811

COMPOSITION OF MUSCLES AND THEIR NOURISHMENT

Muscles are composed of reddish fibres which form the red flesh of the body and they are similar to iron meat. They are well supplied with blood vessels, lymphatics, and nerves. In other words muscles are composed of bundles of muscle fibres wrapped together.

Muscles are nourished by food elements delivered to muscle cells by small blood and lymph vessels located in the connective tissue of the muscle.

Each muscle contains blood vessels and lymphatics from which it receives nourishment.

Insertions of nearly all face muscles extend downward from their origins.

ANSWERS

1. Where should light pressure be applied in massaging?
 - (1) d, l, b, m (2) h, i, c, m
 - (3) d, b, i, m (4) none of these
2. Where should firm pressure be applied in massaging?
 - (1) b, f, h, i (2) b, i, h, j
 - (3) b, f, i, j (4) none of these
3. Most muscles of the face should be massaged from _____ to _____.
 - (1) a, c, e (2) m, a, i
 - (3) a, c, e (4) a, m, i
4. Which muscles that have more attachments with sufficient _____ do not have to be massaged in the direction described in question 3?
 - (1) a, p (2) a, j
 - (3) q, r (4) none of these
5. The _____ is the _____ movable and the _____ is the _____ movable attachment.
 - (1) a, c, h, g (2) a, c, e, g
 - (3) h, c, i, g (4) h, c, i, g

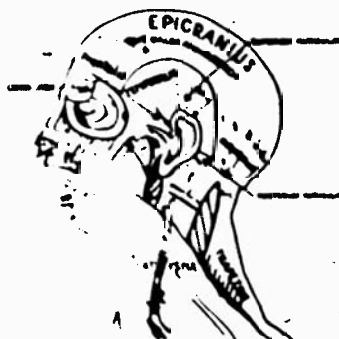
- | | | |
|--------------------------|-------------------|----------------|
| a. origin | g. nose | n. insertion |
| b. scalp | h. cheek | o. fixed |
| c. lips | i. around chin | p. flexibility |
| d. around Adam's apple | j. nose | q. rigid |
| e. upward | k. along mandible | r. rigidity |
| f. sides of back of neck | l. downward | s. flexible |

ORIGINS AND INSERTIONS OF THREE MUSCLES

ZYGOMATICUS - takes its origin from the zygomatic bone and has its insertion at angle of mouth

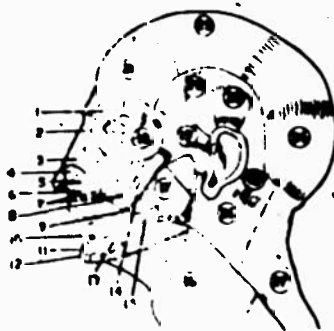
MASSETER - takes its origin from the zygomatic bone and has its insertion in the mandible

TEMPORALIS - takes its origin from the temporal bone and has its insertion in the mandible



ABC01 - Q10

- 1 Identify the zygomaticus muscle
 - (A) 17 (B) 14
 - (C) 20 (D) 7
- 2 Identify the masseter muscle
 - (A) 20 (B) 14
 - (C) 10 (D) 17
- 3 Identify the temporalis muscle
 - (A) 10 (B) 20
 - (C) 20 (D) 17
- 4 Name the muscles that take their origin from the zygomatic bone
 - (1) zygomaticus, temporalis
 - (2) none of these
 - (3) masseter, temporalis
 - (4) masseter, zygomaticus
- 5 Name the muscles that have their insertions in the mandible
 - (1) masseter, temporalis
 - (2) zygomaticus, masseter
 - (3) zygomaticus, temporalis
 - (4) none of these



ABC01 - Q10

SCIENCE-BIOLOGY

Sixth Grade

PHOTOSYNTHESIS

MARTA ZABORSKA, Programmer, Learning, Inc.
Published by LEARNING INCORPORATED,
1317 West Eighth Street, Tempe, Arizona.

Programed text, 25 frames, \$.15.

Constructed Responses always used; no Multiple Choice;
no Branching.

DEVELOPMENTAL (FIELD TEST) POPULATION(S):
Grade 6.

Prerequisites:

Average Time: Under 1/2 hour (est.).

Next Revision: "The program is the final revision."
(1 sample page)

SCIENCE-BIOLOGY

PHOTOSYNTHESIS

Zaborska; LEARNING INCORPORATED

one sample page:

12. Light gives plants energy to make sugar. Sunlight is the most common source of _____ for plants.
energy
13. Plants make sugar by photosynthesis only when there is light to give _____.
energy
14. Energy for making sugar by photosynthesis comes from sun _____.
sunlight
15. Plants have to _____ their own food. Photosynthesis is the special way in which plants make the food _____.
make; sugar
16. Plants need _____ for energy to make sugar in the _____ parts of their cells.
light (or sunlight); green
17. Besides light for energy, plants need water and a special gas called carbon dioxide. The 3 things needed for photosynthesis are:
1. light for _____
2. _____
3. a special ____
energy; water; gas
18. A plant which has plenty of sunlight and water still needs a special ____ for photosynthesis.
gas
19. A plant which has plenty of sunlight for energy and carbon dioxide gas, still needs _____ for photosynthesis.
water
20. Besides light for energy, plants need _____ and a special ____ for photosynthesis.
water; gas
21. Water and carbon dioxide gas are used by plants to make the food _____.
sugar
22. Plants make sugar from water and carbon dioxide gas in the _____ part of their cells.
green
23. To make sugar from water and gas, a plant must have sun _____ to give.
sunlight; energy

SCIENCE-BIOLOGY

H.S.-Coll.

PROGRAMED GENETICS, Vol. I (of three)

The Basic Concepts

CHESTER A. LAWSON,

**MARY ALICE BURMESTER, both of Dept. of Natural
Science, Michigan State University**

**Published by: D. C. HEATH and Co.,
285 Columbus Ave., Boston, Mass.**

- **Programed text, 150 scrambled frames, 320 pp.,
6 1/8" x 9 1/4", soft cover, \$3.50**

Table of Contents

Unit Test(s) available.

All Responses Branched.

DEVELOPMENTAL (FIELD TEST) POPULATION(S):

"361 Students at Michigan State University."

Prerequisites: General Biology.

Average Time:

Next Revision:

(1 sample page)

SCIENCE-BIOLOGY

PROGRAMED GENETICS

Lawson, Burmester; D. C. HEATH and Co.
one sample page:

**THE RELATION OF CONTROLLED
BREEDING DATA TO THE GENE THEORY**

PART I

*Contributions of Plant and Animal Breeders to the Study
of Inheritance*

Science consists of two basic components (1) the data collected by observation and (2) the theories that explain the data. The family pedigree of tasters and nontasters discussed in chapters 1 and 2 represented one kind of data concerning inheritance, and the five assumptions about genes developed thus far represented a theory that explained the inheritance of taste reaction to PTC in this family.

THERE ARE OTHER KINDS OF DATA PERTAINING TO HEREDITY WHICH CAN BE COLLECTED AND WHICH MUST ALSO BE EXPLAINED BY THE THEORY IF THE THEORY IS TO BE ACCEPTED. IF THE THEORY DOES NOT EXPLAIN ALL DATA RELATED TO HEREDITY, THEN THE ASSUMPTIONS OF THE THEORY MUST EITHER BE MODIFIED OR ADDITIONAL ASSUMPTIONS MUST BE INVENTED TO ACCOUNT FOR THE FACTS.

The new data consists of collections of observations of pure lines and of hybrids and of the offspring of hybrids.

A pure line is a family or reproductive line in which a certain characteristic remains constant generation after generation. For example, if a family of several generations consisted only of nontasters this family would represent a pure line for this characteristic. Animal and plant breeders frequently attempt to produce pure lines with particularly favorable characteristics. Such pure lines are of value in investigations in heredity.

A breeder selected three pairs of guinea pigs in which coat color is inherited. One pair was white, the other two pairs were black. He bred the white ones. The offspring produced were all white. He continued breeding the white guinea pigs for five generations making brother and sister matings. In each generation only white guinea pigs were produced.

- 1. Yes page 2b.
- 2. No page 2a.

The new data consists of collections of observations of pure lines and of hybrids and of the offspring of hybrids.

SCIENCE-BIOLOGY

Jr. H.S.+

**SECONDARY SCIENCE SERIES - FUNDAMENTALS
OF HUMAN PHYSIOLOGY**

PÓLO C. DE BACA

JOHN P. FULLILOVE, both of Teaching Materials Corporation.

Published by **TEACHING MATERIALS CORPORATION**,
575 Lexington Avenue, New York 22, N.Y.

Programed text, 1,968 frames, paperback, 371 pp.,
8 1/2" x 11", bound in 2 separate volumes, **\$11.00**.
For use in MIN/MAX II machine, **\$25.00**; program
reusable, **\$10.00**.

Teacher's Manual: General Manual available for all
TMI-Grolier programs.

Table of Contents.

Unit and Final Test(s) included.

Constructed Responses usually used; no Multiple Choice
Responses; no branching.

DEVELOPMENTAL (FIELD TEST) POPULATION(S):
"9th graders, average age 14 years."

Prerequisites:

Average Time: 20-30 hours (based entirely on data);
standard deviation, 4 hours.

Next Revision: December, 1964.
(2 sample pages)

SCIENCE-BIOLOGY

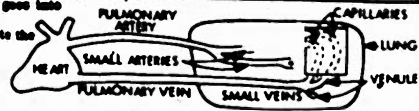
SECONDARY SCIENCE SERIES - FUNDAMENTALS OF HUMAN PHYSIOLOGY

Baca, Fullilove; TEACHING MATERIALS CORPORATION
2 sample pages:

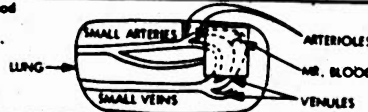
301 A part of your pulmonary circulatory system is the flow of blood from your pulmonary artery into small arteries inside your lung. Which of these shows this flow?
A. Venule → Small Vessel B. Heart → Pulmonary Artery C. Capillaries → Small Arteries
D. Pulmonary artery → Small Arteries

D. Pulmonary artery → Small Arteries

302 From the small arteries inside your lung, your blood goes into very small arteries, or arterioles. Copy and complete the diagram and label the missing part you fill in.



303 From your arterioles, your blood flows into the smallest blood vessels, the capillaries. In the diagram, the little man, Mr. Blood, has just left your arterioles and is just now inside your _____.



capillaries

304 From your capillaries, blood flows into the venules to start its trip back to the heart. Copy the diagram and draw arrows showing this part of your pulmonary circulatory system.

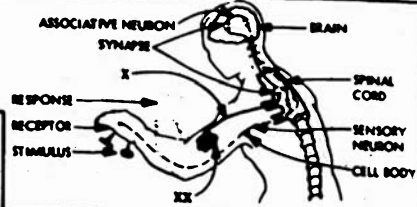


305 In your pulmonary circulatory system, blood has just entered your heart. What part has it just left? _____

pulmonary vein

1-41

186 Name the X and the XX parts of the diagram.



XX Effectors X Motor Neurons

187 Meat and eggs are foods which are high in _____

protein

188 When a sensory impulse leaves a sensory neuron and goes to an associative neuron, there is a _____ between the sensory and associative neurons.

synapse

189 Voluntary muscles are made up of many tiny fibres called _____

fibres

190 What is the function of hyaline cartilage? _____

to protect or cushion movable joints

6-28

SCIENCE-BIOLOGY

Jr. H.S.

SPERMATOPHYTES

ASTRA STAFF

Published by **ASTRA**

19 Burton Avenue, Norwich, Connecticut

For use in AUTOSCORE machine; program reusable, 690 frames, \$20.00.

Multiple Choice Responses always used; no Constructed Responses; no Branching.

DEVELOPMENTAL (FIELD TEST) POPULATION(S):

Prerequisites:

Additional Materials required: AUTOSCORE machine, \$150.00.

Average Time:

Next Revision:

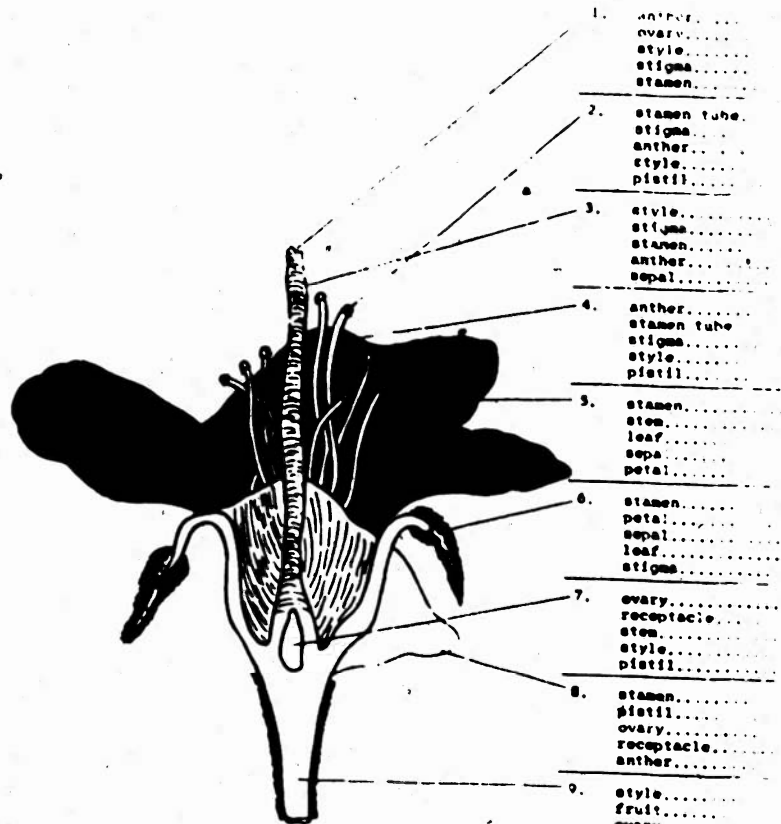
(1 sample page)

SCIENCE-BIOLOGY

SPERMATOPHYTES

Astra Staff; ASTRA

one sample page:



- 1. anther.....
ovary.....
style.....
stigma.....
stamen.....
- 2. stamen tube.....
stigma.....
anther.....
style.....
pistil.....
- 3. style.....
stigma.....
stamen.....
anther.....
sepal.....
- 4. anther.....
stamen tube.....
stigma.....
style.....
pistil.....
- 5. stamen.....
stem.....
leaf.....
sepal.....
petal.....
- 6. stamen.....
petal.....
sepal.....
leaf.....
stigma.....
- 7. ovary.....
receptacle.....
stem.....
style.....
pistil.....
- 8. stamen.....
pistil.....
ovary.....
receptacle.....
anther.....
- 9. style.....
fruit.....
ovary.....
receptacle.....
stem.....
- 10. staminate.....
mixed.....
pistillate.....
crude.....
several.....

The flower pictured above is a _____ flower.

SCIENCE-CHEMISTRY

Jr. H.S.

**ATOMS, ELECTRONS AND THE STRUCTURE OF
MATTER**

**Unit I of "COMPLETE ATOMIC THEORY & ITS
APPLICATIONS"**

**H. YILMAZ, Research-Biology: MIT; Dept. of Nuclear
Physics, Northeastern University; and research
scientist: Arthur D. Little Corp.**

**Published by LEARNING FOUNDATIONS INSTITUTE Inc.,
271 North Avenue, New Rochelle, N.Y.**

**For use in LEARNATRON MARK II, A/Z MARK I & II
machines, \$89-\$495; program reusable, Unit I:
170 frames; complete course: 730 frames, \$25.00
per unit.**

Programed text planned.

Table of Contents.

Unit and Final Test(s) included.

Program available in French, Turkish, Urdu.

**Constructed Responses usually used; some Multiple
Choice; no Branching.**

DEVELOPMENTAL (FIELD TEST) POPULATION(S):

**"International Camp and Children's Colony (Lakeville,
Conn.): advanced students and teachers' training camp."**

Prerequisites:

**Average Time: 5-7 hours, complete program (est.);
1/2 hour, Unit I (est.).**

Next Revision: 1964.

(1 sample page)

SCIENCE-CHEMISTRY

ATOMS, ELECTRONS AND THE STRUCTURE OF MATTER
Yilmaz; LEARNING FOUNDATIONS INSTITUTE
one sample page:

LEARNING
FOUNDATIONS
INSTITUTE, INC.

CLOSE THE FRAME TO SMALL WINDOW

11. This diagram of an atom is also incomplete. Draw a complete atom the way you think it should be.



COULD BE ONE OR MORE



12. Electrons are not exactly like planets. Planets are of different size and weight. Electrons have all the same w-----.



WEIGHT

SCIENCE-CHEMISTRY

H.S.

CHEMICAL BONDING

LINDA LUE DORAN, Programmer, General Programmed Teaching Corporation

SHIRLEY B. BITTERLICH, Editor, General Programmed Teaching Corporation

TAYLOR ABEGG, Subject Matter Expert

**Published by ENCYCLOPAEDIA BRITANNICA PRESS,
425 N. Michigan Avenue, Chicago 11, Illinois**

Programed text, 1800 frames, paperback, 360 pp., 8-1/2" x 11", \$

Teacher's Manual: "Instructions to teacher included in preface."

Table of Contents.

Final test available.

Constructed Responses usually used; some Multiple Choice Responses; no Branching.

DEVELOPMENTAL (FIELD TEST) POPULATION(S):

"Developmental testing: 11th and 12th grade students.

Field testing: High school students."

Prerequisites: None.

Average Time: 17 hours (est.).

Next Revision: 1968.

(1 sample page)

SCIENCE-CHEMISTRY

CHEMICAL BONDING

Doran, Bitterlich, Abegg; ENCYCLOPAEDIA BRITANNICA PRESS

one sample page:

11	a) When the electronegativity difference between two atoms is 1.6 or more a(n) _____ bond may be predicted. b) When the electronegativity difference between two atoms is less than 1.6 a(n) _____ may be predicted.	a) ionic b) covalent	a) b)
12	Electronegativity of H is 2.1 Electronegativity of Cl is 3.0 What type of chemical bond may be predicted to form when H and Cl combine?	<input checked="" type="radio"/> a) ionic bond <input type="radio"/> b) covalent bond	
13	H and Cl will combine to attain a more stable configuration by _____ electrons.	<input type="radio"/> a) sharing <input type="radio"/> b) transferring	
14	How many atoms of H will combine with one atom of Cl? $H^{\circ} \quad \overset{\circ\circ}{\underset{\circ\circ}{Cl}}$	_____ atom(s) of H	
15	How many pairs of electrons are being shared between H and Cl? $H^{\circ} \quad \overset{\circ\circ}{\underset{\circ\circ}{Cl}}$		

SCIENCE-CHEMISTRY

H.S.

CHEMICAL MATHEMATICS

SHIRLEY B. BITTERLICH, Programmer, General Programmed Teaching Corporation

WAYNE T. ALCOCK, Editor, General Programmed Teaching Corporation

TAYLOR ABEGG, Subject Matter Expert

Published by **ENCYCLOPAEDIA BRITANNICA PRESS**,
425 N. Michigan Avenue, Chicago 11, Illinois

Programed text, 1000 frames, paperback, 200 pp.,
8-1/2" x 11", \$ _____.

Teacher's Manual: "Instructions to teacher included in preface."

Table of Contents.

Final test available.

Constructed Responses usually used; some Multiple Choice Responses; no Branching.

DEVELOPMENTAL (FIELD TEST) POPULATION(S):

"Developmental testing: 10th-11th grade students.

Field testing: High school students."

Prerequisites: None.

Average Time: 9 hours (based entirely on data).

Next Revision: Undetermined.

(1 sample page)

SCIENCE-CHEMISTRY

CHEMICAL MATHEMATICS

**Bitterlich, Alcock, Abegg; ENCYCLOPAEDIA BRITANNICA
PRESS**

one sample page:

171

What is the percentage composition of Na_2O_2 (sodium peroxide)?

172

If a compound has a molecular weight of 200, and is 53.9% silver, a) what is the weight of silver in 1 mole, and b) how many atoms of silver are there in 1 molecule?

a)

b)

173

How many atoms of Cu does it take to have a weight of 254.0?

174

A compound that has a molecular weight of 99 and is 64.2% Cu contains what weight of Cu in each mole?

175

If a compound is 25.9% N and has a molecular weight of 108, a) what is the weight of N in each mole of the compound? b) How many atoms of N are there in each molecule?

a)

b)

CHEMISTRY I

Atomic Structure and Bonding

CHARLES R. DAWSON, Dept. of Chemistry, Columbia University

STEPHEN A. RUDOLPH, Basic Systems

STEPHEN DRUGER, Basic Systems

ROBERT J. LEFKOWITZ, Basic Systems

DAVID J. DAWSON, Basic Systems

Published by **APPLETON-CENTURY-CROFTS, LYONS & CARNAHAN**,

34 West 33rd Street, New York 1, N.Y.

Programed text, 804 frames, paperback, 280 pp., 6" x 9",
\$3.24.

Answer Sheets available, **\$.64.**

For use in **KONCEPT-O-GRAPH** machine, program reusable; **GRAFLEX MICRO-AID**, program reusable.

Teacher's Manual available, free upon adoption of 10 or more copies of the program.

Table of Contents.

Unit and Final Test(s) available, free in Teacher's Manual.

Constructed Responses usually used; some Multiple Choice; no Branching.

DEVELOPMENTAL (FIELD TEST) POPULATION(S):

"A total of 26 students were sampled. The validation group consisted of 12 students ranging in school grade from 10th-12th grade, in age from 14-17 years and in I.Q. (Wechsler form) from 102-138."

Prerequisites:

Additional material required: Response book 83 pages, price **\$.64.**

Average Time: 10.9 hours (based entirely on data). Range: 6.5-15.3 hours.

Next Revision:

Literature: "Spectrum," Pfizer Medical Magazine;
The Center for Programed Instruction Bulletin,
December, 1962.

(1 sample page)

SCIENCE-CHEMISTRY

CHEMISTRY I

Dawson, Rudolph, Druger, Lefkowitz, Dawson; APPLETON-CENTURY-CROFTS, LYONS

one sample page:

CHEMISTRY I Atomic structure and bonding

If an atom has 2 protons and 2 neutrons, its nucleus would be symbolized like the diagram to the left. How would you symbolize the nucleus of an atom with 3 protons and 4 neutrons?



46



46

Draw the symbols of the following nuclei.

1. 4 protons, 5 neutrons
2. 9 protons, 10 neutrons



47



47



From what you have learned so far, is the number of protons in the nucleus always the same as the number of neutrons?

no

48

48

The number of protons in an atom is called the *atomic number* of that atom. The atom below has an atomic number of _____



49

two

49

SCIENCE-CHEMISTRY

H.S.

CHEMISTRY CONCEPTS

The Molar Method

THOMAS MAXWELL, Programmer, Learning Incorporated
SHEILA M. LEVINSKY, Programmer, Learning Incorporated
DUANE BROWN, Dept. of Chemistry, Arizona State
University

Published by CORONET INSTRUCTIONAL FILMS
65 E. So. Water Street, Chicago 1, Ill.

Programed text, 310 frames, paperback, 59 pp., 7" x 10",
\$1.20.

Teacher's Manual included.

Test Set included.

Constructed Responses usually used; some Multiple
Choice; no Branching.

DEVELOPMENTAL (FIELD TEST) POPULATION(S):

"...Small representative samplings at appropriate grade levels tested informally on one-to-one basis with programmer. Small representative samplings under controlled conditions (Dukane Redi-tutor using 35 mm. film) for each revision of program. Program has been through 9 complete revisions, each revision based on data obtained from formal machine testing. Field testing in progress: Classroom testing from 9th through 12th grades, administered by classroom teachers. Test areas distributed geographically from Florida to California. All testing conducted by Learning Incorporated."

Prerequisites: "Grade 9 reading level. Ability to perform the four arithmetic operations. Familiarity with these terms: atom, molecule, element, compound."

Average Time: 3 hours, 55 minutes (based entirely on data); standard deviation, 30 minutes.

Next Revision: "The published program is the final revision."

(1 sample page)

SCIENCE-CHEMISTRY

CHEMISTRY CONCEPTS

Maxwell, Levinsky, Brown; CORONET INSTRUCTIONAL FILMS

one sample page:

8-7 We can divide both 1.8 moles S and 3.6 moles O by the smaller of the two numbers, which is 1.8:

$$\frac{1.8}{1.8} = 1 \text{ mole S} \quad \frac{3.6}{1.8} = 2 \text{ moles O}$$

1.8 moles S to 3.6 moles O is the same proportion as 1 mole S to (?) moles O.

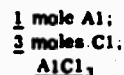
Now we can write the simplest formula, which is (?).



8-8 A sample of a certain compound is found to contain 2.3 moles Al and 6.9 moles Cl. We reduce these to whole numbers in the same proportion by dividing both by the smaller number of moles.

$$\frac{2.3}{2.3} = \text{(?) mole(s) Al} \quad \frac{6.9}{2.3} = \text{(?) mole(s) Cl}$$

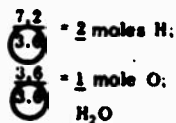
The simplest formula is (?).



8-9 In a sample of an unknown compound 7.2 moles of H combines with 3.6 moles of O. We divide both amounts by the smaller number of moles given.

$$\frac{7.2}{3.6} = \text{(?) mole(s) H} \quad \frac{3.6}{3.6} = \text{(?) mole(s) O}$$

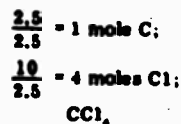
The simplest formula is (?).



8-10 In a sample of a certain compound 2.5 moles of C combines with 10 moles of Cl.

$$\frac{2.5}{2.5} = \text{(?) mole(s) C} \quad \frac{10}{2.5} = \text{(?) mole(s) Cl}$$

The simplest formula is (?).



8-11 The simplest formula of a compound is which 0.4 mole Fe combines with 0.8 mole S is (?).



SCIENCE-CHEMISTRY

H.S.+

GASES: KINETIC-MOLECULAR THEORY OF GASES
RENÉE FORD, Center for Programed Instruction, Inc.
Published by HOLT, RINEHART & WINSTON,
383 Madison Ave., N. Y. 17.

Programed text, 252 frames, paperback, 46 pp.,
8-1/2" x 11", \$.48.

Teacher's Manual available, free with class orders.
Final Test available.

Constructed Responses usually used, some Multiple
choice, some Branching.

DEVELOPMENTAL (FIELD TEST) POPULATION(S):
"2 high school classes, several individuals."

Prerequisites: "One year algebra, 10th grade reading
level, knowledge of gas laws."

Average Time: 2-1/2 - 4 hours (est.).

Next Revision: Uncertain.

(1 sample page)

SCIENCE-CHEMISTRY

GASES: KINETIC-MOLECULAR THEORY OF GASES

Ford; HOLT, RINEHART & WINSTON

one sample page:

Substance	Critical Temperature ($^{\circ}\text{C}$)	Critical Pressure (atm)
Water, H_2O	374	217.7
Carbon dioxide, CO_2	31	73.0
Oxygen, O_2	-119	49.7
Hydrogen, H_2	-240	12.8
Helium, He	-267.9	2.3

Figure 7. Critical temperatures and pressures of various substances.

- 193 (a) liquid
(b) gas
- 194 Water (H_2O) and carbon dioxide (CO_2)
- 195 motion movement energy etc
- 196 greater more energetic etc
- 197 (a) attractive forces (or forces of attraction)
(b) are
(c) increased motion movement greater energy etc.
- 198 higher
- 199 (a) cannot
(b) can
(c) H_2O (water)
(d) CO_2 (carbon dioxide)
- 200 (a) are not
(b) molecular motion, energy of its molecules, etc.
- 194 Refer to Figure 7. Room temperature is about 23°C . Which of the substances listed can be liquefied at room temperature? ()
- 195 For a gas to liquefy, the forces of attraction between its molecules must overcome the _____ of the molecules.
- 196 The motion of the molecules is () at high temperatures than it is at low temperatures.
- 197 When a gas can be liquefied at high temperatures, it is because the (a) () between its molecules (b) [are/are not] strong enough to overcome the (c) () of its molecules.
- 198 The stronger the attractive forces are between its molecules, the _____ the temperature at which a gas can be liquefied.
- 199 Refer to Figure 7. CO_2 (a) [can/cannot] be liquefied at 100°C . H_2O (b) [can/cannot] be liquefied at 100°C . So the forces of attraction between (c) molecules must be greater than they are between (d) molecules.
- 200 CO_2 cannot be liquefied at 100°C , no matter how much the pressure is increased, because the attractive forces between its molecules (a) [are/are not] strong enough to overcome the (b) () at that temperature.
- 201 Refer to Figure 7. The forces of attraction between H_2O molecules are so strong that even at a temperature as high as 374°C , it can be liquefied when the ()

SCIENCE-CHEMISTRY

H.S.+

GASES: GAS LAWS

**RENÉE FORD, Center for Programed Instruction.
Published by HOLT, RINEHART AND WINSTON,
383 Madison Avenue, N. Y. 17, N.Y.**

**Programed text, 398 frames, paperback, 72 pp., 8-1/4"
x 11, \$.48.**

**Teacher's Manual available, free with class orders.
Final Test available.**

**Constructed Responses usually used; some Multiple
choice; some Branching.**

DEVELOPMENTAL (FIELD TEST) POPULATION(S):

"2 High School classes, several individuals."

**Prerequisites: "One year of Algebra, 10th grade reading
level."**

Average Time: 7-10 hours (est.).

Next Revision: Uncertain.

(1 sample page)

SCIENCE-CHEMISTRY

GASES: GAS LAWS

Ford; HOLT, RINEHART AND WINSTON

one sample page:

Problem 12. A sample of gas occupies a volume of 700 cc at 25°C and atmospheric pressure. Calculate the volume occupied by the same sample of gas at atmospheric pressure and 1515°C.

218 (a) $1.2 \text{ liters} \times \frac{4}{3} = 1.6 \text{ liters}$
 (b) 0.4 liter

219 Read Problem 12. Both temperatures are given in (a) _____ (units) and therefore must be converted to the (b) _____ scale before determining the final volume

219 (a) °C
 (b) Kelvin (°K)

220 Refer to Problem 12. Tabulate the data

	Absolute temperature	Volume
original		
final		?

220

	Absolute temperature	Volume
original	298°K	700 cc
final	1788°K	?

Correct your data table before proceeding.

221 Refer to your data table for Problem 12. Write the equation you would use to find the volume

\times = (do not solve)

221 Select the box containing the equation which is most like your answer for #221

A

1. $700 \text{ cc} \times \frac{1}{6} =$
 2. $700 \text{ cc} \times \frac{298}{1788} =$
 3. either of above without units

B

1. $700 \times 6 =$
 2. $700 \times \frac{1788}{298} =$

C

1. $700 \text{ cc} \times 6 =$
 2. $700 \text{ cc} \times \frac{1788}{298} =$

If your equation is in Box A—go to 222.

If your equation is in Box B—go to 228

If your equation is in Box C—go to 229.

SCIENCE-CHEMISTRY

H.S.

GAS LAWS

**JACOB REGER, Programmer, General Programmed
Teaching Corporation**

SHIRLEY B. BITTERLICH, Editor, GPTC

TAYLOR ABEGG, Subject Matter Expert

**Published by ENCYCLOPAEDIA BRITANNICA PRESS,
425 N. Michigan Avenue, Chicago 11, Illinois**

**Programed text, 1800 frames, paperback, 300 pp.,
8-1/2" x 11", \$ _____.**

**Teacher's Manual: "Instructions to teacher included in
preface."**

Table of Contents.

Final test available.

**Constructed Responses usually used; some Multiple
Choice; no Branching.**

DEVELOPMENTAL (FIELD TEST) POPULATION(S):

"Developmental testing: 10th-11th grade students.

Field testing: High school students."

Prerequisites: None.

Average Time: 15 hours (based entirely on data).

Next Revision:






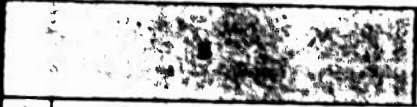









(1 sample page)

SCIENCE-CHEMISTRY

GAS LAWS

Reger, Bitterlich, Abegg; **ENCYCLOPAEDIA BRITANNICA PRESS**

one sample page:

1	If the piston is moved from position A to position B, the gas molecules will hit the walls _____.	A  B 
	Circle.	
		more often less often
2	The pressure in the container will be greater when the piston is in position _____.	A  B 
		
3	When the piston is moved from A to B, the volume is _____.	A  B 
	Circle.	
		increased decreased
4	When the piston is moved from A to B, the pressure is _____.	A  B 
	Circle.	
		increased decreased
5	A  B 	When the pressure exerted on a gas increase, the volume occupied by the gas _____.
	Circle.	
		increases decreases

SCIENCE - CHEMISTRY

Coll.

INTRODUCTION TO CHEMICAL CONCEPTS

JAY A. YOUNG, Professor of Chemistry, King's College

Published by: PRENTICE-HALL, Inc.,

Englewood Cliffs, New Jersey

Programed text, 1000 frames, paperback, 100 pp., 5" x 8",
\$2.95.

Table of Contents.

Constructed Responses usually used; some Multiple
Choice; some Branching.

DEVELOPMENTAL (FIELD TEST) POPULATION(S):

"College chemistry students, freshman year."

Prerequisites: "None, beyond admittance to chemistry
course."

Additional material required: "Slide rule, dictionary, met-
ric ruler, paper clips, small coins, etc."

Average Time: 20 hours (based entirely on data); standard
deviation: 60%.

Next Revision: "Uncertain."

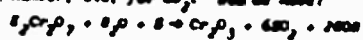
(1 sample page)

SCIENCE-CHEMISTRY

INTRODUCTION TO CHEMICAL CONCEPTS Young; PRENTICE-HALL one sample page:

33 From Statement to Balanced Equation

No matter what we do, to get the oxygen's balanced, something else will be thrown off. In such a case, one must be bold, really bold. We shall really throw off the balance by picking a number which we are sure will not keep things in balance. Off hand, we pick the number, etc. for SO_2 . Now we have:



And our table now reads:

Reactant side	Product side
24	24
2Cr	—
8 O	— 0
20	— 20
18	— 8
	— 2Cr
	— 17
	— 8

34 Actually, our balancing did not seem to help much. But let us take a closer look. Perhaps the trouble is that the number of oxygens on the left is even and on the right the number of oxygens is _____.

35 So long as this happens, things will never be balanced. They must be both even, or both _____ on both sides of the arrow. For no reason at all, but just to pick one or the other, we shall make the oxygens even on both sides. (If this does not work out, we shall begin all over, and make them both odd, on both sides.)

36 Now to make the oxygens even on the right side, we must put an _____ number as a multiplier on the Cr_2O_3 . We were bold last time, now let us be more timid. Pick a small even number, say, _____ the smallest has there is, not counting zero.

37

Now our equation reads:



And the corrected table reads:

SCIENCE - CHEMISTRY

H.S.-Coll.

LIQUIDS AND SOLUTIONS

JAY A. YOUNG, Professor of Chemistry, King's College
Published by JAY A. YOUNG, Kings College, Wilkes-
Barre, Pa.

Programed text, 500 frames, paperback, 101 pp., 5" x 8",
\$1.40.

Table of Contents.

Constructed Responses usually used; some Multiple Choice;
some Branching.

DEVELOPMENTAL (FIELD TEST) POPULATION(S):

"College chemistry students, freshman year."

Prerequisites: "None, beyond admittance to chemistry
course."

Additional materials required: "Slide rule, dictionary,
metric ruler, paper clips, small coins, etc."

Average Time: 15 hours (based entirely on data); standard
deviation: 60%

Next Revision: "Uncertain."

(1 sample frame

SCIENCE-CHEMISTRY

LIQUIDS AND SOLUTIONS

Young; JAY A. YOUNG

one sample frame:

Concentration; Molar and Formal

2



Figure 1

Now let us proceed to the development of the significance of the concept of concentration. In the illustration, figure 1, there is a square 1.0 cm on each side. By counting, we can see that there are 12 dots inside the square. The area of the square is 1.0 cm².

12
1.0

3

That is, in figure 1, the concentration of dots is 12 dots per 1.0 cm².

12
1.0

4

The word, "concentration" is always associated with the word "per". In figure 1, the concentration of dots is 12 dots per 1.0 cm².

per

5

The word, per, has several meanings. We are using it here to mean "for each", or "in each". Thus, if you work 10 hours for an employer and are paid \$250.00, your wage is \$25.00 per hour. Now, refer to figure 1; the concentration of dots in figure 1 is _____.

per
12 dots per
1.0 cm²

6

Mathematically, the word, per, indicates a division, or a fraction, which is the same thing. Thus, we might say, from our example, that your wage is $\frac{25.00 \text{ dollars}}{1 \text{ hour}}$.

Or, in figure 1, writing the concentration of dots as a fraction, the concentration of dots is _____.

$\frac{12 \text{ dots}}{1.0 \text{ cm}^2}$

7

As we know, we need not write a one when it appears in the denominator of a fraction, so, we could say that your wage is 25.00 $\frac{\text{dollars}}{\text{hour}}$. Or, that the concentration of dots in figure 1 is _____.

12 $\frac{\text{dots}}{\text{cm}^2}$

SCIENCE-CHEMISTRY

Elem.

MATTER AND ATOMIC STRUCTURE

BERTRAM M. SIEGEL

DAVID BELASH

LEWIS D. EIGEN

**SETH WOHL, Programers, The Center for Programed
Instruction, Inc.**

**Published by SCIENCE RESEARCH ASSOCIATES, Inc.,
259 East Erie Street, Chicago 11, Illinois.**

**Programed text, 800 frames, paperback, 180 pp.,
8 1/2" x 11", available in 2 separate volumes at
\$1.00 each.**

Answer Sheets available, \$.39.

Teacher's Manual available, \$.50 (free with class orders).

Table of Contents.

Final Test available, \$.10 (free with answer sheets).

**Constructed Responses usually used; some Multiple Choice;
no Branching.**

DEVELOPMENTAL (FIELD TEST) POPULATION(S):

"Slightly above average 4th, 5th and 6th grade students."

Prerequisites: "4th grade reading level."

Average Time: 7 1/2 hours (est.).

Next Revision: June, 1965.

(1 sample page)

SCIENCE-CHEMISTRY

MATTER AND ATOMIC STRUCTURE

Siegel, Belash, Eigen, Wohl; SCIENCE RESEARCH ASSOCIATES

one sample page:

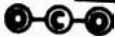
4-31 "So", said Mic, "in an atom of any element, the number of protons (is or is not) the same as the number of electrons. The number of neutrons is (always or sometimes) the same as the number of protons."

5-13 "So", said Mic, "if I wanted to write that iron has an atomic number of 26, I would write ${}^{26}\text{Fe}$."
Show how you would write that Cu has an atomic number of 29.

5-42 "In the symbols for all the other 101 elements, the mass number is always (larger than or smaller than or equal to) the atomic number. But in the symbol for hydrogen, the mass number is (larger than or smaller than or equal to) the atomic number."

6-25 "A molecule that contains two or more atoms is called a compound", said Jumbo. "A compound (can or cannot) contain only one kind of atom."

6-33 "A molecule of H_2S , which is a bad-smelling gas, contains (How many?) atom(s) of hydrogen and (How many?) atom(s) of sulfur," Jumbo continued.

7-27 The picture of a CO_2 molecule in Exhibit 4 is (less or more) complicated than this picture of a CO_2 molecule. 

SCIENCE-CHEMISTRY

H.S. - Coll.

PRINCIPLES OF CHEMISTRY

FRANK E. HARRIS, Dept. of Chemistry, Stanford University, in conjunction with Behavioral Research Laboratories, Palo Alto, California.

Published by **ADDISON-WESLEY Publishing Co., Inc.**
Reading, Mass.

Programed text, 18,000-20,000 frames, paperback, 2000 pp., 8-1/2" x 11", \$23.50 (approx.).

Teacher's Manual available.

Table of Contents.

Unit, Final, Diagnostic Test(s) available. More than one equivalent form of Unit Test available.

Constructed Responses usually used; some Multiple Choice; no Branching.

DEVELOPMENTAL (FIELD TEST) POPULATION(S):

"Student tested with both classroom groups and some control groups. I.Q. range of 94-145."

Prerequisites: "Two years high school math training or any ability to learn it easily."

Average Time: "Designed for full year introductory chemistry course."

Next Revision:

(1 sample page)

SCIENCE-CHEMISTRY

PRINCIPLES OF CHEMISTRY

Harris; ADDISON-WESLEY

one sample page:

SECTION 1 CHEMISTRY

1. The world contains many substances.
Water is a _____ substance
2. Silver and gold are also _____ substances
3. Some substances are solids. Silver is a solid _____; gold is a _____ substance
_____ solid substance
4. Some substances are liquid. Water is a _____ liquid
5. Some substances are gases. Air is a gaseous substance. Steam is another _____ gaseous substance
6. A substance can be a _____, a liquid, or a gas. Not all substances are solids. Not all substances are gases. Not all substances are _____ liquids
7. Everything that has weight is a substance. Wood has _____ weight
and is therefore a _____ substance
8. All substances have weight. Water is a substance. It has _____. Air is a _____. Air has _____ weight
substance weight

SCIENCE-CHEMISTRY

Elem.-H.S.

**A PROGRAMED INTRODUCTION TO THE PERIODIC
CHART OF THE ATOMS**

**ELTON R. LASH, Programed Instruction Dept., Welch
Scientific Co.**

**Published by THE WELCH SCIENTIFIC Co.,
1515 Sedgwick St., Chicago 10, Illinois**

**Programed text, 130 frames, paperback, 16 pp., 8 1/2" x 11",
package of 25, \$6.25.**

Teachers Manual included.

Index.

Final Test included.

**Constructed Responses always used; no Multiple Choice;
no Branching.**

DEVELOPMENTAL (FIELD TEST) POPULATION(S):

**"Three revisions, Field test population - 224 junior and
senior High School students."**

Prerequisites:

**Additional material required: 1 - Periodic Chart of the
Atoms, Welch No. 4854, \$7.50 ea.**

Average Time: 1 hour (est.).

Next Revision:

(1 sample page)

SCIENCE-CHEMISTRY

A PROGRAMED INTRODUCTION TO THE PERIODIC
CHART OF THE ATOMS

Lash; THE WELCH SCIENTIFIC CO.
one sample page:

PLEASE USE THE PERIODIC CHART OF THE
ATOMS TO AID YOU IN THE FOLLOWING
SECTION.

Oxygen has an atomic number (Black Numeral)
of (18).

The (19) number of O (Oxygen) indicates that
one atom of oxygen contains (20) protons in
its nucleus.

Oxygen (O) also contains 8 minus charges called
(21) in its shells.

18

xxxxxxxxxxxxxxxxxxxxx
eight (8)

19

xxxxxxxxxxxxxxxxxxxxx
atomic

20

xxxxxxxxxxxxxxxxxxxxx
eight (8)

21

xxxxxxxxxxxxxxxxxxxxx
electrons

SCIENCE-CHEMISTRY

Jr. H.S.+

**SECONDARY SCIENCE SERIES-CHEMISTRY:
MATTER & CHEMICAL CHANGE**

BARBARA BOWMAN

GAYLA GLASCOCK, both of Teaching Materials Corporation.

Published by **TEACHING MATERIALS CORPORATION**,
575 Lexington Avenue, New York 22, N.Y.

Programed text, 3,181 frames, paperback, 702 pp.,
8 1/2" x 11", bound in 3 separate volumes, \$16.00.
For use in MIN/MAX II machine, \$25.00; program
reusable, \$15.00.

Teacher's Manual: General Manual for all TMI-Grolier
programs available.

Table of Contents.

Final Test included.

Constructed Responses always used; no Multiple Choice
Responses; no Branching.

DEVELOPMENTAL (FIELD TEST) POPULATION(S):
"9th graders, age 14 years."

Prerequisites:












Average Time: 20-40 hours (based entirely on data);
standard deviation, 8.13 hours.

Next Revision: March, 1964.

(3 sample pages)

SCIENCE-CHEMISTRY

SECONDARY SCIENCE SERIES - CHEMISTRY: MATTER & CHEMICAL CHANGE Bowman, Glascock; TEACHING MATERIALS CORPORATION 3 sample pages:

36	There are 92 naturally occurring elements, plus some manmade ones. Copy the number of naturally occurring elements we have now.	
92	93 102 94 92 91	
37	Which two of these atoms are atoms of the same element?	
A. 	B. 	C. 
A. 	B. 	
38	Match the following. A. electron 1. 0 charge B. proton 2. + charge C. neutron 3. - charge	
TEST		A. B. C.
39	In which of these does the number of protons differ from the number of neutrons?	
A. 	B. 	C. 
A. 	B. 	
40	Atoms of the same element do not always have the same number of neutrons. Which is true?	
A. Atoms of the same element always have the same number of protons. B. Atoms of the same element always have the same number of neutrons. C. both D. neither	A. Atoms of the same element always have the same number of protons.	

56

The atomic number of an element is equal to the number of protons in the nuclei of its atoms.

The atomic number of an atom having this nucleus $\begin{matrix} 70+ \\ 100n \end{matrix}$ is 70.

The atomic number of an atom having this nucleus $\begin{matrix} 15+ \\ 16n \end{matrix}$ is ().

15

57

The number of protons in the nuclei of the atoms of an element is equal to the _____ of that element.

atomic number

58

This is the nucleus of an atom of one of the elements.

A. How many protons does it have?

B. What is its atomic number?



A. 60
B. 60

A.
B.

59

Write "metal" or "nonmetal" for each diagram.



A. metal
B. metal
C. nonmetal

A.
B.
C.

60

The nucleus of this atom shows that the element made up of such atoms has an atomic number of ().



3-12

186

Write "metal" or "nonmetal" for each diagram.



- A. metal
- B. metal
- C. nonmetal

- A.
- B.
- C.

187

A certain atom has 34 neutrons and a mass number of 48. How many protons does it have?

21

188

RIDDLE

I am one of three atoms.
We all have the same atomic number.
We have different numbers of neutrons.
What are we called?



We are isotopes.

189

Isotopes have the same number of protons.
Which of these is also true?

- A. Isotopes have the same mass numbers.
- B. Isotopes have the same atomic numbers.
- C. both
- D. neither

190

An atom that has borrowed two electrons has a () () electronegativity.

-2

3-33

SCIENCE - CHEMISTRY

H.S.-Coll.

SELECTED PRINCIPLES OF CHEMISTRY

JAY A. YOUNG, Professor of Chemistry, King's College
Published by **PRENTICE-HALL, Inc.**,
Englewood Cliffs, New Jersey.

Programed text, 1000 frames, paperback, 100 pp., 5" x 8",
\$2.95.

Table of Contents:

Constructed Responses usually used; some Multiple Choice;
some Branching.

DEVELOPMENTAL (FIELD TEST) POPULATION(S):

"College chemistry students, freshman year."

Prerequisites: "None, beyond admittance to chemistry
course."

Additional material required: "Slide rule, dictionary,
metric ruler, paper clips, small coins, etc."

Average Time: 25 hours (based entirely on data); standard
deviation: 55%.

Next Revision: "Uncertain."

(1 sample page)

SCIENCE-CHEMISTRY

SELECTED PRINCIPLES OF CHEMISTRY

Young; PRENTICE-HALL

one sample page:

Dynamic Equilibrium: Applications I

51

We know that the value of $[H_3O^+]$ is _____ mole/l.
(Calculate this value from the given pH, 3.45; use your notebook. If you cannot solve for the answer here, go to step 51A, then 51B, and so on to 51G. If you obtained the correct answer, go to step 52.)

3.55 x 10⁻⁴

51A

Since the pH is 3.45, we know that

$$\log [H_3O^+] = - \underline{\hspace{2cm}} \quad 3.45$$

51B

Also, $- 3.45 = +0.55 - 4.00$

We could have said that $- 3.45 = +0.12 - 4.57$, or some other combination of positive and negative numbers. However, we choose to select a negative integer which is the next smallest integer, less than $- 3.45$. This integer is _____

-4.00

51C

Now we can say that $\log [H_3O^+] = + \underline{\hspace{2cm}} - \underline{\hspace{2cm}}$ 4.00

0.55

51D

The antilog of $+ 0.55$ is _____.
(Find this number by using your slide rule.)

3.55

51E

The antilog of $- 4.00$ is ten to a negative integer power; it is _____.

10⁻⁴

51F

The antilog of $\log [H_3O^+]$ is _____.

$[H_3O^+]$

SCIENCE-PHYSICS

H.S.

ACTION OF FORCES

LAURENCE WHISLER, Consultant in Programed Education, Central Scientific Co.

Published by **CENTRAL SCIENTIFIC Company**,
1700 Irving Park Road, Chicago 13, Ill.

Planned for use in **CENCO PROGRAMED LEARNER**,
\$2.95; 100 frames, program included in price of
machine.

Multiple Choice Responses always used; no Constructed
Responses; no Branching.

DEVELOPMENTAL (FIELD TEST) POPULATION(S):

"Planned population of 100."

Prerequisites:

Average Time: 3 hours (est.).

Next Revision: September, 1963.

(1 sample page)

SCIENCE-PHYSICS

ACTION OF FORCES

Whisler; CENTRAL SCIENTIFIC CO.

one sample page:

ACTION OF FORCES

25. Complete the table of forces and distances:

F_1	D_1	F_2	D_2
120		330	4 Lever system #5
18	$4\frac{1}{2}$	9	9 Lever system #6
44	11		4 Lever system #7

The entries should be _____

- a) 11 and 121 b) 2 and 330 c) 165 and 4

.....
 a

26. In the common problem of unbalanced levers where the clockwise torque, L_1 , is either greater or smaller than the counterclockwise torque, L_2 , one must find a third force which when properly applied balances the system. One must find the difference in torques, select a point of application of a balancing force, and finally determine the amount of the balancing force.

The paragraph indicates that torques may be _____

- a) divided b) squared c) subtracted

.....
 c

26 1/2. The next problem deals with forces and distances expressed in metric units. The torque will, consequently, be expressed in kilogram meters.

SCIENCE-PHYSICS

H.S.

HYDROSTATICS

LAURENCE WHISLER, Consultant in Programed Education, Central Scientific Co.

**Published by CENTRAL SCIENTIFIC Company,
1700 Irving Park Road, Chicago 13, Ill.**

**Planned for use in CENCO PROGRAMED LEARNER,
\$2.95; 98 problem items, 19 pp., included in price of
machine.**

**Multiple Choice Responses always used; no Constructed
Responses; no Branching.**

DEVELOPMENTAL (FIELD TEST) POPULATION(S):

"Planned population of 100."

Prerequisites: General Science.

Average Time: 3 hours (est.).

Next Revision: August, 1963.

(1 sample page)

A PROGRAMED INTRODUCTION TO VECTORS

**ROBERT CARMAN, Dept. of Physics, San Bernardino
Valley College**

**Published by JOHN WILEY & SONS, Inc.,
605 Third Avenue, New York 16, N.Y.**

**Programed text, Paper (Spiral-Bound), 160 pp., 6" x 9",
\$2.75.**

Teacher's Manual available, free.

Table of Contents.

Unit and Final and Diagnostic Test(s) included.

**Branching always used; Multiple Choice Responses usually
used; some Constructed Responses.**

DEVELOPMENTAL (FIELD TEST) POPULATION(S):

**"High School Students (advanced 11th grade math and
physics) tech. Institute, 4 year engineering college,
secondary teachers taking college work to teach
PSSC material."**

**Prerequisites: "Elementary geometric concepts (angle,
parallelism, etc.) are assumed to be understood."
(from Preface)**

Average Time:

Next Revision:

(1 sample page)

SCIENCE-PHYSICS

A PROGRAMED INTRODUCTION TO VECTORS

Carman; JOHN WILEY & SONS

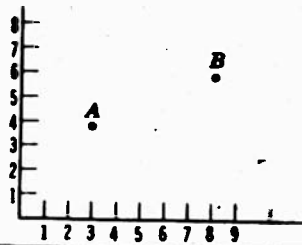
one sample page:

19A

From p. 23A

You are correct. $(4, 1, 7)$ is certainly not a two-dimensional vector. Since it is a group of three ordered numbers it has three components and is a three-dimensional vector.

In the familiar Cartesian coordinate system each point on the plane is labeled with a pair of numbers. In the graph shown point A is $(3, 4)$. We may say that every point on the plane has a vector "associated" with it. The vector $(3, 4)$ is associated with point A . What vector is associated with point B ?



- a. $(8, 6)$ see page 22B
- b. $(6, 8)$ see page 24B
- c. $(7, 6)$ see page 25C

22B

From p. 19A

Right you are.

Let's digress for a little graph-reading practice to sharpen you for the labors ahead.....

24B

From p. 19A

You answered that the vector associated with point B is $(6, 8)$. Perhaps you have forgotten the convention used in specifying the coordinates of a point. The x coordinate value (the abscissa or horizontal axis) is placed first and the y coordinate (ordinate or vertical axis) is placed second in the parenthesis. Apparently you have not followed this convention.

Return to page 19A and try again.

25C

From p. 19A

You answered that the vector associated with point B is $(7, 6)$. Oops! Looks like you misread the graph. Return to page 19A and give it another try.

SCIENCE-PHYSICS

H.S.-Coll.

VECTORS

A Programmed Text for Introductory Physics

PETER FEIBLEMAN

BARBARA STOCKING

DAVID DAWSON

FRANCIS MECHNER, all of Basic Systems, Inc.

**Published by: APPLETON-CENTURY-CROFTS, LYONS
& CARNAHAN,
34 West 33rd Street, New York 1, N.Y.**

**Programed text, 496 frames, paperback, 175 pp., 6" x 9",
\$2.20.**

**For use in KONCEPT-O-GRAPH machine, program re-
usable, \$5.60 and GRAFLEX MICRO-AID, program
reusable.**

**Teacher's Manual available, free upon adoption of 10 or
more of the program.**

Table of Contents.

**Unit and Final Test(s) available, "student final exams free
upon adoption of program."**

**Constructed Responses usually used; some Multiple Choice;
no Branching.**

DEVELOPMENTAL (FIELD TEST) POPULATION(S):

**"Developmental: Fourteen subjects with prerequisite
skills. Field: Various high school and college physics
classes."**

**Prerequisites: "Algebra, elementary concepts of trigonom-
etry and coordinate geometry."**

**Additional material required: "Graph paper, ruler—neces-
sary tables supplied within the program."**

Average Time: 8 hours (est.).

Next Revision: 1965

(1 sample page)

SCIENCE - PHYSICS

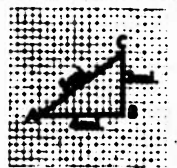
VECTORS

Feibleman, Stocking, Dawson, Mechner; APPLETON-CENTURY-CROFTS, LYONS

one sample page:

VECTORS: BASIC SYSTEMS

A boy walks from A to B to C. What is the magnitude of his displacement? What is the magnitude of the distance he has walked?



five miles
seven miles

24

24

Explain why displacements can be represented by arrows.

Displacements are vectors and therefore can be represented by arrows.

24

24

Suppose that there are three forces on an object,

$$\vec{F}_1 = (7, 0), \vec{F}_2 = (2, 4), \text{ and } \vec{F}_3 = (2, 1).$$

A single force that will have the same effect as

$$\vec{F}_1, \vec{F}_2, \text{ and } \vec{F}_3, \text{ is } (\quad , \quad).$$

(11, 7)

204

204

Take a sheet of graph paper. Draw and label coordinate axes. Draw in a picture of a block.



205

205

Draw a vector representing a force that has the same effect as these forces:

$$\vec{F}_1 = (2, 3), \vec{F}_2 = (0, 1), \text{ and } \vec{F}_3 = (3, 2).$$

$$\vec{F}_4 = (\quad , \quad).$$



$$\vec{F}_4 = (5, 6)$$

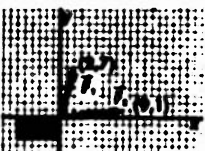
206

206

Again draw and label a coordinate system on a sheet of graph paper. Draw a block in the third quadrant.

Draw vectors representing the forces

$$\vec{F}_1 = (2, 7) \text{ and } \vec{F}_2 = (9, 1).$$



207

207

SCIENCE-PSYCHOLOGY

Coll.

LEARNING AND HUMAN ABILITIES

(An Adjunct Program for the Text.)

RICHARD E. RIPPLE

HERBERT J. KLAUSMEIER, both Dept. of Educational
Psychology.

Published by **HARPER & ROW**,
49 East 33rd St., New York 16, N. Y.

Programed text, 3,000 frames, paperback, 336 pp.,
8-1/2" x 11", \$3.50.

Table of Contents.

Constructed Responses and Multiple Choice usually used;
no Branching.

DEVELOPMENTAL (FIELD TEST) POPULATION(S):

"Students enrolled in educational psychology at the
Univ. of Wisconsin. Second semester, 1961-62."

Prerequisites:

Average time: 50 hours (est.).

Next revision: 1966.

(2 sample pages)

RECOGNITION ITEMS

PART II ACHIEVING LEARNING OUTCOMES EFFICIENTLY

CHAPTER 6 COGNITIVE LEARNING OUTCOMES I: FACTS AND CONCEPTS

A. THE NATURE OF FACTS, CONCEPTS, AND KNOWLEDGE—Facts— Concepts

1. Something that has happened—an event, an actual state of affairs—is a [concept, fact].

fact
2. The meaning that the individual associates with words, other signs, and direct sensory experiences is a [concept, thought].

concept
3. Concepts are not formed in the absence of facts; however, facts may be memorized and recalled without associating [experience, meaning] with them.

meaning
4. The meaningfulness of a concept depends upon previous associations with and [discriminations, integrations] of the events or objects which the concept embodies.

discriminations
5. The calling of a word or number by a certain name is a fact or arbitrary [action, association].

association
6. Rather than trying to explain to a child why "threw" and "through" are spelled the way they are, it is better to accept these as [concepts, facts] to be learned as such.

facts
7. The names given to the parts of speech are likewise [facts, truths] to be accepted.

facts
8. Once we accept the fact that "noun" is a word, we can proceed with acquiring the [concept, fact] of noun as a word used to name a person, place, or thing.

concept
9. The child's giving the correct name of each digit is an example of learning accepted [facts, ideas].

facts

SCIENCE-PSYCHOLOGY

Coll.

PHYSIOLOGICAL PSYCHOLOGY

An Introductory Psychology Unit .

DR. DANIEL P. KIMBLE, Stanford Medical Center

Published by ADDISON-WESLEY Publishing Co.,
Reading Mass.

Programed text, 1500 frames, paperback, 200 pp. 8 1/2" x
11", \$4.50.

Teacher's Manual available.

Table of Contents

Diagnostic, Unit, Final Test(s) available. More than one
equivalent form of each test available.

Constructed and Multiple Choice Responses usually used;
no Branching.

DEVELOPMENTAL (FIELD TEST) POPULATION(S):

"Some control groups and high school seniors."

Prerequisites: Average intelligence.

Average Time: 15-20 hours (est.).

Next Revision: "When needed."

(1 sample page)

SCIENCE-PSYCHOLOGY

PHYSIOLOGICAL PSYCHOLOGY

Kimble; ADDISON-WESLEY

one sample page:

KIMBLE PHYSIOLOGICAL PSYCHOLOGY

430. The intensity of stimuli in the world is translated by the sensory neurons into a _____ code. frequency
431. The frequency of nerve impulses in a sensory neuron will _____ increase/decrease as the intensity of the stimulus increases. increase
432. The reason that a stronger stimulus produces more impulses in a _____ neuron than a weaker one, is because the _____ stimulus can fire the neuron during the relative refractory period. sensory
strong
433. Look at Figure 15. Figure 15 illustrates the changes in the threshold of a neuron before, during, and after the neuron has conducted a _____ impulse. nerve
434. As you can see from Figure 15, the threshold of the neuron is _____ raised/lowered during the relative refractory period. raised

SOCIAL STUDIES

Elem.-Jr. H.S.

AFRICA

The Awakening Giant

B. JEAN ANWYLL, Head Programmer

**Published by HONOR PRODUCTS COMPANY,
20 Moulton Street, Cambridge, Mass.**

**For use in HONOR TEACHING MACHINE, \$20 (approx.)
including 3 programs; program reusable, \$2.00-\$2.50.
Multiple Choice Responses sometimes used; some Branching;
no Constructed Responses.**

DEVELOPMENTAL (FIELD TEST) POPULATION(S):

"Private and public schools,"

Prerequisites:

Average Time: 1 1/2-2 hours (est.).

Next Revision:

(1 sample page)

SOCIAL STUDIES

AFRICA

Anwyll; HONOR PRODUCTS COMPANY

one sample page:

<p>One of the most interesting things about the continent of Africa is that it is one tremendous chunk of rock. Of course, there is now soil on top of the rock, but the base of Africa is probably the biggest in the world. Africa is a whole continent of the big _____.</p>	<p>rock (Remember that whenever I say that Africa is a rock, I mean the <u>base</u> of Africa is rock and there is soil on top.)</p>
<p>The area of Africa is one-fifth of all the land on earth. There is only one continent larger than Africa, and this is Asia. So, the enormous chunk of rock that is Africa is:</p> <p>a. the largest continent. b. the second largest continent.</p> <p>Press and hold the button of your choice. Do not be disturbed if you skip some of the material.</p>	<p>a.</p>
<p>No. Asia is the largest continent on earth. The enormous chunk of rock that is Africa is:</p> <p>a. the largest continent. b. the second largest continent.</p> <p>Press and hold the button of your choice.</p>	<p>b.</p>
<p>Right you are!</p> <p>Africa is the second largest continent and makes up one-fifth of all the land area on the earth.</p>	<p>No answer needed</p>
<p>Our awakening Giant is as big as the United States, Western Europe, China, and India all put together. The Sahara Desert, which is in northern Africa, is as big as the United States. Africa makes _____ of all the land area on earth.</p>	<p>one-fifth</p>

SOCIAL STUDIES

Jr. H.S.

THE BILL OF RIGHTS

**MARIANA ROCA, Programmer, Learning Incorporated
Published by CORONET INSTRUCTIONAL FILMS,
65 E. So. Water Street, Chicago 1, Illinois**

**Programed text, 304 frames, paperback, 7" x 10", \$1.20.
Teacher's Manual included.**

Test Set included.

**Constructed Responses usually used; some Multiple
Choice; no Branching.**

DEVELOPMENTAL (FIELD TEST) POPULATION(S):

"Data incomplete as of February 8, 1963."

Prerequisites: Grade 8 reading level.

Average Time: "Data incomplete as of February 8, 1963."

**Next Revision: "Final revision scheduled for publica-
tion in summer, 1963."**

(1 sample page)

SOCIAL STUDIES

THE BILL OF RIGHTS Roca; CORONET INSTRUCTIONAL FILMS one sample page:

ARTICLE VIII.

Excessive bail shall not be required nor excessive fines imposed, nor cruel and unusual punishments inflicted.

8-1 Article VIII includes some rights that are guaranteed to people who are accused of federal crimes. The first part of Article VIII says:

"Excessive _____ shall not be required..."

bail

8-5 Bail applies only in criminal cases. Bail is an amount of money that is set by a judge. After a person is arrested, he may go home to await trial if he pays the amount of money that the judge sets for b _____.

bail

8-6 Bail is not a punishment. It is to insure that the person will appear for trial. Bail applies only in _____ cases.

criminal

8-7 The judge cannot set the bail at an amount of money that is greater than the person can reasonably afford to pay. Excessive means "too much" and Article VIII forbids _____ bail.

excessive

8-8 Bob Lewis broke into a grocery store to steal some milk and bread because he had no money with which to buy food. He was caught and arrested. The judge set the bail at \$50,000. This amount was much more than Bob could ever afford to pay. This was _____ bail, and is forbidden by Article _____.

excessive

VIII

SOCIAL STUDIES

Jr.H.S.-H.S.

CHINA: A PROGRAMED UNIT IN GEOGRAPHY

Southeast Asia: A Programed Unit in Geography.

T. SOENS,

E. HARR,

H. MAVRINAC,

F. RIFUGIATO,

**P. DREIBELBIS, all social studies teachers, Pittsburgh
Public Schools**

H. KLINE, Geography Dept., University of Pittsburgh.

**Published by HOLT, RINEHART AND WINSTON, Inc.,
383 Madison Avenue, New York 17, N. Y.**

**Programed text, 575 frames, paperback, 112 pp., 8-1/4" x
11", \$.80.**

Teacher's Manual available, free.

Table of Contents.

**Constructed Responses usually used, some Multiple
Choice, no Branching.**

DEVELOPMENTAL (FIELD TEST) POPULATION(S):

**Programs were tested with individual students in
cooperation with the Center for Programed Instruction.
Frames revised and re-revised according to student
responses.**

Prerequisites:

Average Time: 6-7 hours (est.).

Next Revision: 1965.

(1 sample page)

SOCIAL STUDIES

CHINA: A PROGRAMED UNIT IN GEOGRAPHY
 Soens, Harr, Mavrinac, Rifugiato, Dreibelbis, Kline;
 HOLT, RINEHART AND WINSTON
 one sample page:

rainfall, rain, or moisture
 summer



284
 The summer, or wet, monsoon is partially blocked by the Mountains and as a result brings [less / more] rain to North China than it does to South China.

Chin Ling
 less

285
 Rice requires plenty of water. It [is / is not] a suitable crop for most of North China.

is not

286
 In South China there is heavy rainfall in the [winter / summer].

summer

287
 The rainfall from the summer, or [wet / dry], monsoon is greater in [South / North] China.

wet
 South

288
 (Review) The Gobi is one of the two principal deserts in Greater China. The other is the Desert, located on the floor of the Basin in the region of

Takla-Makan
 (TAH-kah-mah-KAHN)
 Tarim
 Sinkiang



289
 In winter, the monsoon winds blow from the (direction), across the [Takla-Makan / Gobi] Desert.

SOCIAL STUDIES

8th Grade +

**THE CONSTITUTION
GINN AND COMPANY**

Published by **GINN AND COMPANY**

Statler Building, Back Bay P.O. 191, Boston 17, Mass.

Programed text, 600 frames, paperback, 122 pp., 8 1/2" x
11", \$ _____.

Constructed Responses always used; no Multiple Choice;
no Branching.

DEVELOPMENTAL (FIELD TEST) POPULATION(S):

Prerequisites:

**Additional Material required: Program Binder with
Sliding mask.**

Average Time: 15 hours (est.).

Next Revision:

(1 sample page)

SOCIAL STUDIES

THE CONSTITUTION
 Ginn and Company; GINN AND COMPANY
 one sample page:

const. g2-1-5

<p>21 Since the Constitution was written in 1787, was it written before or after the Declaration of Independence (1776)?</p> <p>Check the answer.</p>	<table border="1"> <thead> <tr> <th>before 1776</th> <th>after 1776</th> </tr> </thead> <tbody> <tr> <td></td> <td>✓ after 1776</td> </tr> </tbody> </table>	before 1776	after 1776		✓ after 1776				
before 1776	after 1776								
	✓ after 1776								
<p>22 The Constitution was written 11 years after the Declaration of Independence was written in 1776.</p> <p>Circle the year in which the Constitution was written.</p>	<table border="1"> <thead> <tr> <th>1776</th> <th>1787</th> </tr> </thead> <tbody> <tr> <td></td> <td>(1787)</td> </tr> </tbody> </table>	1776	1787		(1787)				
1776	1787								
	(1787)								
<p>23 The Constitution of the United States was written six years after the Revolutionary War ended in 1781. In what year was the Constitution written?</p> <p>Write the year.</p>	<p>1787</p>								
<p>24 Circle the year in which the Constitution of the United States was written.</p>	<table border="1"> <thead> <tr> <th>1776</th> <th>1781</th> <th>1787</th> <th>1812</th> </tr> </thead> <tbody> <tr> <td></td> <td></td> <td>(1787)</td> <td></td> </tr> </tbody> </table>	1776	1781	1787	1812			(1787)	
1776	1781	1787	1812						
		(1787)							
<p>25 The Constitution of the United States divides the power of government between the Federal (national) government and the state governments. Our national government is a _____ government.</p> <p>Circle.</p>	<table border="1"> <thead> <tr> <th>unitary</th> <th>Federal</th> </tr> </thead> <tbody> <tr> <td></td> <td>(Federal)</td> </tr> </tbody> </table>	unitary	Federal		(Federal)				
unitary	Federal								
	(Federal)								

SOCIAL STUDIES

6th Grade

CONSTITUTION OF THE UNITED STATES

LAURENCE WHISLER, Consultant in Programed Education, Central Scientific Co.

**Published by CENTRAL SCIENTIFIC Company,
1700 Irving Park Road, Chicago 13, Ill.**

**Planned for use in CENCO PROGRAMED LEARNER,
\$2.95; 100 frames.**

Multiple Choice Responses always used; no Constructed Responses; no Branching.

DEVELOPMENTAL (FIELD TEST) POPULATION(S):

"Planned population of 100."

Prerequisites:

Average Time: .3 hours (est.).

Next Revision: September, 1963.

(1 sample page)

SOCIAL STUDIES

CONSTITUTION OF THE UNITED STATES

Whisler; CENTRAL SCIENTIFIC CO.

one sample page:

CONSTITUTION OF THE UNITED STATES

157. He shall a give to the Congress information b , and recommend to their consideration such measures as he shall c .

The phrase below, goes in blank _____
OF THE STATE OF THE UNION

.....
 b

158. He may, a , convene both Houses or either of them. And b , he may adjourn them to such time as c .

The phrase below, goes in blank _____
HE SHALL THINK PROPER

.....
 c

158-1/2 He shall receive ambassadors and other public ministers; He shall take care that the laws be faithfully executed. And shall commission all officers of the United States.

.....
159. The judicial power of the United States shall be vested in one Supreme Court, And in such inferior courts as the Congress may from time to time ordain and establish.

An INFERIOR court is a _____ court.
a) temporary b) lower c) military

.....
 b

SOCIAL STUDIES

Jr. H.S.

THE CONSTITUTION OF THE UNITED STATES

A Study Guide for Use with Jensen's Tutor

**GERALD L. JENSEN, Coordinator of Secondary Education,
Imperial County Schools.**

**Published by GERALD L. JENSEN,
1267 Wensely Avenue, El Centro, California**

**For use in JENSEN'S TUTOR, \$3.00; Answer Sheets, \$.07
each; Key Inserts, \$.25 each.**

Teacher's Manual available, \$.50.

Unit and Final Test(s) included.

**Multiple Choice Responses always used; no Constructed
Responses; no Branching.**

DEVELOPMENTAL (FIELD TEST) POPULATION(S):

Junior High School.

Prerequisites: None

Additional material required: Suitable text book.

Average Time;

Next Revision:

(1 sample page)

SOCIAL STUDIES

THE CONSTITUTION OF THE UNITED STATES

Jensen; GERALD L. JENSEN

one sample page:

THE CONSTITUTION OF THE UNITED STATES A STUDY GUIDE FOR USE WITH JENSEN'S TUTOR

DIRECTIONS:

1. Follow the directions for using this study guide with Jensen's Tutor.
2. Do the assignments as indicated in these exercises unless they are modified by your teacher.
3. When the directions say, "do items", indicate your answers on the Envelope-Answer Sheet of Jensen's Tutor. When you are asked to do something requiring paper, provide your own.

OVERVIEW OF THE CONSTITUTION

Study the Preamble of the Constitution, then do items 3 and 4.

3. A. Posterity means succeeding generations or descendants taken collectively or together.
B. Tranquility means disagreement and quarreling.
C. A Constitution is a law passed by a lawmaking body such as Congress or a state legislature.
D. Legal means of or pertaining to law.
4. A. Both of the following are purposes of the government established by the Constitution:
 1. To promote the welfare of all the people.
 2. To keep us and our children and our children's children free.B. According to the preamble of the Constitution the following are three of the purposes for which it was established:
 1. To form a better nation.
 2. To see that the people are treated fairly.
 3. To see that the people have freedom of speech and religion.C. As used in the Preamble of the Constitution, "We, the people of the United States" means, "We, the citizens of the United States."
D. All the following are purposes of the government established by the Constitution:
 1. To be sure that there would be peace within the country.
 2. To provide for defense against enemies outside the country.
 3. To give the people freedom from fear.

List the titles of the eight main parts or articles of the Constitution from the text or reference you use. Leave enough space below each heading to permit you to state the heading in another way.

Do items 5 and 6.

5. A. "Amendments passed before 1800" would be a better primary heading for the Constitution than "Amendments to the Constitution."
B. "The Senate" would be a better primary heading for the Constitution than "The Legislative Department" or "The House of Representatives."

SOCIAL STUDIES

Jr.H.S.

EARTH IN ORBIT

(Geography, Part I)

PATRICK THORNHILL, Director of Methuen & Co.
Published by **METHUEN & CO., LIMITED**, London:
In U.S.A., **FEARON PUBLISHERS, Inc.**,
828 Valencia Street, San Francisco, California

Programed text, 327 frames, soft cover, 56 pp., 5" x 8",
\$1.25.

Planned for use in **THE EMPIRICAL TUTOR** machine,
\$600. 250 pounds; program not reusable.

Table of Contents.

Final Test available.

Constructed Responses usually used; some Multiple
Choice; some Branching.

DEVELOPMENTAL (FIELD TEST) POPULATION(S):

"A class of boys above normal intelligence, aged 12+.
Classes tested by the Automated Teaching Research
Unit of Aberdeen University. Classes both above and
below normal intelligence in London schools."

Prerequisites: "Knowledge of: meaning of 'plane,'
'parallel,' 'perpendicular'; angular measurement in
degrees; position of the continents and oceans; how
to tell the time."

Additional material required: "... a globe is helpful."

Average Time: 4 hours (est.).

Next Revision: 1964.

(1 sample page)

SOCIAL STUDIES

EARTH IN ORBIT

Thornhill; METHUEN & CO., London; FEARON PUBLISHERS, U.S.A.

one sample page:

SPECIMEN PAGES. (Complete first item, 7; check with 7 in list on page 11; if correct, go on.)

MIDNIGHT comes after sunset and before
7 (across opposite page)

As midnight is the middle of the night it must be
about _____ way between sunset and sunrise. 4

MIDDAY comes about half way between sunrise
and _____ 11

We speak of the part of the day that comes directly
after midday as the after _____ 9

Afternoon means after midday; another word for
midday is _____ 12

The Sun is lowest in the sky at sunrise and sunset;
at NOON it is _____ at in the sky. 2

3. THE EARTH'S ROTATION

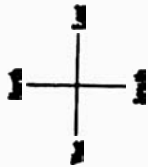


Figure B1 shows the four main points (called the
cardinal points) of the compass. When you face
North, the East is on your _____ hand side. 3

When you face South, the East is on your
_____ hand side. 6

The sun rises in the East. The words 'East',
'Hamer', 'early' all remind you of rising, and they
all begin with the same two letters: _____ at 20

To see the Sun rise you look towards the
_____ s. 11. (across opposite page)

The Sun sets in the West. Sunset reminds you of
'rest', which rhymes with W _____ at 10

In the course of the day, the Sun appears to move
across the sky from _____ at to _____ s. 1

From the window of a train (Fig. B2) that is
moving to the left, a tree would appear to be
moving to the _____ 9

When you are moving to the left, any fixed object
appears to be moving to the _____ 4

When you turn your head to the left, any fixed
object appears to be moving in the
direction. 2

To us on Earth the Sun appears to move; this
could be because the Sun is fixed and the
_____ is turning. 8

The Sun appears to move across the sky from East
to West; this could be because the Sun is fixed and
the Earth is turning in the _____ direction. 6

The Sun, in fact, appears to move across the sky
from East to West because the Earth is turning
in the opposite direction, that is, from _____ at to
_____ s. 7



- 1. right
- 2. higher
- 3. right
- 4. highway (or railway)
- 5. front
- 6. left
- 7. sunrise
- 8. midday
- 9. afternoon
- 10. s
- 11. sunset
- 12. west

[11]

SOCIAL STUDIES

Elem.-H.S.

**GEOGRAPHY OF THE UNITED STATES U-3006
UNIVERSAL ELECTRONICS LABORATORIES
CORPORATION**

**Published by UNIVERSAL TEACHING MACHINE
INSTITUTE,
510 Hudson Street, Hackensack, New Jersey.**

**For Use in UNIVERSAL MODEL U machine, program
reusable, 2160 frames, machine and program,
\$25.00 (school discount).**

Table of Contents.

**Constructed Responses usually used; some Multiple
Choice; no Branching.**

DEVELOPMENTAL (FIELD TEST) POPULATION(S):

"Grade Level - 5-10."

Other using population(s): Adult.

Prerequisites: None.

Average Time: 28 to 32 hours (est.).

Next Revision: August, 1963.

(2 sample pages)

SOCIAL STUDIES

GEOGRAPHY OF THE UNITED STATES U-3006 Universal Electronics Laboratories; UNIVERSAL TEACH- ING MACHINE INSTITUTE

2 sample pages:

GEOGRAPHY U-3006

3 3 3

438 An example of a transparent object is a pane of window glass. Since the bodies of water on the Earth's surface allow the light rays to pass through them, as in the case of the window glass, the bodies of water are also said to be _____.

transparent

439 Opaque bodies, such as land masses, reflect or bend back light rays. Therefore, opaque bodies have two qualities. First, opaque bodies do not allow _____ rays to pass through them.

light

441 Second, opaque bodies bend back light rays. Therefore, the land masses of the Earth bend back or _____ light rays.

reflect

442 Bodies of water also have reflective qualities. The reflective qualities of water, however, are poorer than the reflective qualities of land. Therefore, if we were to choose the best natural reflective surface, we would choose a _____ mass.

land

443 We now have several facts concerning land masses and water bodies. Both of these features are considered part of _____ control.

climatic

444 Since land masses do not allow light rays to pass through them, they are said to be _____ bodies.

opaque

457 Transmission determines the amount of heat an area will receive and hold. Land masses heat more _____ than water bodies.

rapidly
or quickly

458 Bodies of water take longer to heat and longer to lose their heat. Therefore, water will _____ slower than land after the sun goes down.

cool

459 The climates of the United States are affected, in part, by transmission. The central area of the United States, which is a land mass, will heat and cool more rapidly than the area adjoining the Atlantic Ocean, which is known as the _____ Coastal _____.

Atlantic
Plain

460 We may now reach several conclusions about land and water features with regard to climatic control. First, the feature to reach a higher temperature will be the _____.

land

461 In addition, since the land is an opaque body, it will reach its highest temperature much more _____ than will a body of water.

rapidly
or quickly

462 Therefore, the greatest variation in temperature will be found on the feature known as a _____ mass.

land

SOCIAL STUDIES

6th & 7th Grade

GREAT THEMES IN AMERICAN HISTORY

1760-1860 and 1860-1960

DINNERSTEIN, Programmer

ALEXANDER SCHURE, President, N. Y. Institute of
Technology

Published by CENTRAL SCIENTIFIC Company,
1700 Irving Park Road, Chicago 13, Ill.

For use in CENCO PROGRAMED LEARNER, \$2.95;
program not reusable, 500 frames in each section,
one section included in price of machine.

Constructed Responses usually used; some Multiple Choice;
no Branching.

DEVELOPMENTAL (FIELD TEST) POPULATION(S):
"Over 200."

Prerequisites:

Average Time: 3 hours (est.).

Next Revision:

(1 sample page)

SOCIAL STUDIES

GREAT THEMES IN AMERICAN HISTORY
Dinnerstein, Schure; CENTRAL SCIENTIFIC CO.
one sample page:

GREAT THEMES IN AMERICAN HISTORY (1860-1960)

24. According to the Constitution, if the House of Representatives impeaches a President, the Senate must hold a trial to see if the President really has been _____ of committing a very serious crime.

.....
guilty

25. The highest judge in the country must preside over this trial. This is, of course, the Chief Justice of the _____ Court.

.....
Supreme

26. The _____ of President Johnson did not last very long.

.....
trial

27. All of the members of the Senate who were able to vote did so, but they failed by one vote to sustain the _____ of the President.

.....
impeachment

28. Therefore, Johnson continued as President for the _____ of his term of office
remainder, rest

HAWAII—MORE THAN AN ISLAND PARADISE

ALICE WARREN, Programmer

**Published by HONOR PRODUCTS COMPANY,
20 Moulton Street, Cambridge, Mass.**

**For use in HONOR TEACHING MACHINE, \$20 (approx.);
program reusable, 200 frames, \$2.00-\$2.50. (Machine
may be marketed in retail channels at this \$20 com-
bination price including 3 or 4 programs.)**

Constructed Responses:

Multiple Choice Responses:

Branching:

DEVELOPMENTAL (FIELD TEST) POPULATION(S):

"Public and private schools."

Prerequisites:

Average Time:

Next Revision:

(1 sample page)

SOCIAL STUDIES

HAWAII—MORE THAN AN ISLAND PARADISE Warren; HONOR PRODUCTS COMPANY one sample page:

<p>One of the principal factors that has affected Hawaii's history is its _____ halfway across the Pacific. Its mild climate, beautiful scenery, and rich soil are other important factors.</p>	<p>location</p>
<p>Major factors in shaping Hawaii's history are its _____, mild _____, beautiful scenery, and rich soil.</p>	<p>1. location 2. climate</p>
<p>Since most areas close to the equator are very hot, it is surprising to find that Hawaii, only twenty degrees north of the equator, has such a pleasant climate. An ocean current and cool breezes give Hawaii a consistently _____ climate with temperatures between 65 and 75 degrees all year round.</p>	<p>pleasant (cool)</p>
<p>Hawaii's climate is one of its greatest assets. Most visitors to Hawaii go there because its _____ is ideal for vacationing all year round.</p>	<p>climate (temperature)</p>
<p>Beautiful scenery is another of Hawaii's assets. Mountains and valleys, cliffs and canyons, barren areas and jungle-like vegetation, volcanic craters, waterfalls, and beaches are all part of Hawaii's beautiful _____.</p>	<p>scenery</p>
<p>We can easily understand how Hawaii's cool climate and beautiful scenery would attract people to the islands. The stories about the people who were attracted by the islands' cool climate and beautiful _____ are part of Hawaii's fascinating history.</p>	<p>scenery</p>

SOCIAL STUDIES

Elem.-H.S.

**HISTORY OF THE UNITED STATES U-3005
UNIVERSAL ELECTRONICS LABORATORIES
CORPORATION**

**Published by UNIVERSAL TEACHING MACHINE
INSTITUTE,
510 Hudson Street, Hackensack, New Jersey.**

**For use in UNIVERSAL MODEL U machine, program
reusable, 2160 frames, machine and program, \$25.00
(school discount).**

Table of Contents.

**Constructed Responses usually used; some Multiple Choice;
no Branching.**

DEVELOPMENTAL (FIELD TEST) POPULATION(S):

"Grade Level - 5-10."

Other using population(s): Adult.

Prerequisites: None.

Average Time: 28 to 32 hours (est.).

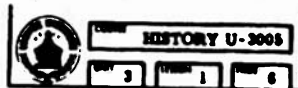
Next Revision: August, 1963.

(2 sample pages)

SOCIAL STUDIES

HISTORY OF THE UNITED STATES U-3005 Universal Electronics Laboratories; UNIVERSAL TEACHING MACHINE INSTITUTE

2 sample pages:



UNIVERSAL ELECTRONICS		
301	The United States had a weak government under the Articles of Confederation. (True or False)	True
302	The first weakness was: each state printed its own _____.	money
303	Second: each state _____ the goods coming into it.	taxed
304	Third: each state had its own _____ and _____.	army (and) navy
305	The one good thing that came out of the Articles of Confederation was the _____.	Northwest Ordinance
306	The Northwest Ordinance set up a plan by which other (colonists/ states) entered the Union.	states

305 We have now learned about two branches of government. The first branch, the _____, writes the laws.		Congress or legislature
306 The second branch of the national government is the executive, or _____ of the United States.		President
307 The third and final branch of the national government is the judicial branch of the government. The national government, therefore, is made up of three parts.	GO TO NEXT FRAME	
308 The first part, or legislative, is Congress. The second part, or executive, is the President. The third part is the _____.		judicial
309 This third branch, the _____, reviews the laws.		judicial
310 The _____ branch reviews the laws to see that they agree with the supreme law of the land, the _____.		judicial Constitution

SOCIAL STUDIES

8th Grade +

HOW A BILL BECOMES LAW.

GINN & COMPANY

Published by **GINN AND COMPANY**

Statler Building, P.O. 191 Back Bay, Boston 17, Mass.

Programed text, 612 frames, paperback, 126 pp., 8 1/2" x
11", \$ _____.

Table of Contents.

Constructed Responses always used; no Multiple Choice;
no Branching.

DEVELOPMENTAL (FIELD TEST) POPULATION(S):

Prerequisites:

Additional material required: Program Binder with sliding
mask.

Average Time: 15 hours (est.).

Next Revision:

(1 sample page)

SOCIAL STUDIES

HOW A BILL BECOMES LAW

Ginn & Company; GINN AND COMPANY

one sample page:

← 4 1/2 →

<p>6 The United States Constitution gives Congress _____</p> <p>Circle the letter in front of the correct answer.</p>	<p>a) lawmaking power b) complete power <input checked="" type="radio"/> c)</p>
<p>7 The United States Constitution is the supreme law of the land.</p> <p>Write the name of the supreme law of the land.</p>	<p>The United States Constitution</p>
<p>8 The United States _____ gives Congress legislative (lawmaking) power.</p> <p>Circle the letter in front of the correct answer.</p>	<p>a) Supreme Court b) Constitution <input checked="" type="radio"/> c)</p>
<p>9 The United States Constitution gives legislative power to _____.</p> <p>Circle the letter in front of the correct answer.</p>	<p>a) the President b) Congress <input checked="" type="radio"/> c)</p>
<p>10 Which one gives Congress its lawmaking power?</p> <p>Circle.</p>	<p>The Declaration of Independence The Gettysburg Address The Constitution <input checked="" type="radio"/> d) The Constitution</p>

SOCIAL STUDIES

H.S.-Coll.+

HOW WE PROSPER

An Introduction to the American Economy
MARSHALL VAN OSTROM, Director of Employee
Development

Published by **EDUCATIONAL METHODS, Inc.**,
612 North Michigan Avenue, Chicago, Illinois.

Programed text, 700 frames, paperback & hardcover,
250 pp., 6" x 9", hardcover, \$7.50; paperback, \$3.50,
may be issued as 16 units at less than \$.50 each.

Teacher's Manual to be available.

Table of Contents, Index.

Constructed Responses always used; no Multiple Choice
Responses; no Branching.

DEVELOPMENTAL (FIELD TEST) POPULATION(S):

"50 supervisory and management personnel."

Other using population(s): "Business executive, Adult
education."

Prerequisites: None

Average time: 7 hours (est.).

Next revision: "1st edition, March, 1963."

(1 sample page)

SOCIAL STUDIES

HOW WE PROSPER

Van Ostrom; EDUCATIONAL METHODS

one sample page:

How We Prosper
An Introduction to the American Economy

9. Much of the seeming difficulty in understanding Economics has stemmed from the terminology Economists use to describe it.
- The basic subject is not too difficult; it's the technical _____ which confuse us.
- terms
(words)
10. Stripped of fancy terminology, Economics can be simply stated and easily understood.
- Breaking through the technical "word barrier" should greatly simplify and aid our understanding of _____.
- Economic
11. For example, Monetisation is an economist's word which simply means "giving a standard value to" as in a national currency.
- At present, our currency has its " _____ " in silver.
- monetisation
12. When silver is "monetised" (as it is in the case of our currency) it is given a standard _____ for exchange purposes.
- value
13. Things other than precious metals (silver, gold) can be monetized also.
- For example, when money is loaned on a borrower's note, (written promise to pay), this note can be _____.
- monetised
14. The note can be monetized by giving it a _____ value.
- standard

Copyright 1963 Educational Methods, Inc.
612 North Michigan Avenue, Chicago, Ill.

SOCIAL STUDIES

Sixth Grade

MAPS: HOW WE READ THEM

WINIFRED NEAL, Programmer, Learning Incorporated
LLOYD L. HARING, Dept. of Geography, Arizona State
University

Published by CORONET INSTRUCTIONAL FILMS,
65 E. So. Water Street, Chicago 1, Illinois

Programed text; 315 frames, paperback, 7" x 10",
\$1.20.

Teacher's Manual included.

Test Set included.

Constructed Responses usually used; some Multiple
Choice; no Branching.

DEVELOPMENTAL (FIELD TEST) POPULATION(S):

"...Small representative samplings at appropriate
grade levels tested informally on one-to-one basis
with programmer. Small representative samplings
under controlled conditions (Dukane Redi-tutor using
35 mm. film) for each revision of program. Pro-
gram has been through 4 complete revisions as of
February 8, 1963, based on data obtained from
formal machine testing. Field testing plan: Class-
room testing from 5th through 7th grades, adminis-
tered by classroom teachers. Test areas distributed
geographically from Florida to California. All test-
ing conducted by Learning Incorporated."

Prerequisites: Grade 6 reading level.

Average Time: "Data incomplete as of Feb. 8, 1963."

Next Revision: "Final revision scheduled for publication
in Spring, 1963."

(1 sample page)

SOCIAL STUDIES

MAPS: HOW WE READ THEM Neal, Haring; CORONET INSTRUCTIONAL FILMS one sample page:

3-22 A landform map tells you whether the land is rough or smooth. An elevation map tells you how far above or below an area is.

3-23

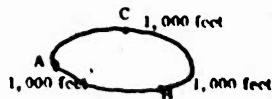
- A. A map which shows distance above or below sea level.
- B. A map which shows mountains, plateaus, plains, and hills.

A describes a(n) _____ map.
B describes a(n) _____ map.

sea level

elevation; landform

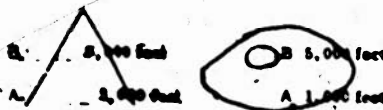
3-24 On an elevation map you see lines called contour lines. A contour line connects all the points that are the same elevation (distance from sea level).



Points A, B and C are connected by a contour line because they are all _____ (how many?) feet above sea level.

1,000

3-25 Elevation means how far above or below sea level a point is.



This mountain is 1,000 feet above sea level at point A near its base, and at point B near its peak, it is _____ feet above sea level.

5,000

3-26



We may find the same type of landform at different elevations, some plains may be at sea level and some may be at 3,500 feet above sea level. These differences would be shown on an _____ map.

elevation

SOCIAL STUDIES

Sixth Grade

THE MEMBERS OF CONGRESS
SHEILA LEVINSKY, Programmer, Learning, Inc.
Published by LEARNING INCORPORATED,
1317 West Eighth Street, Tempe, Arizona.

Programed text, 32 frames, \$.15.
Constructed Responses usually used; some Multiple
Choice; no Branching.

DEVELOPMENTAL POPULATION(S): Grade 6.
Prerequisites: Grade 6 reading level.
Average Time: 26.6 minutes (based entirely on data);
standard deviation, 3.5 minutes.
Next Revision: "The program is the final revision."
(1 sample page)

SOCIAL STUDIES

THE MEMBERS OF CONGRESS Levinsky; LEARNING INCORPORATED one sample page:

11. Each state sends the same number of Senators to Congress. There are 100 Senators in Congress, _____ (how many?) from each of the 50 states.

two

12.

	Number of Senators	Number of Representatives
from New York	2	41
from Illinois	2	24

Every state sends the same number of Senators to Congress, but not the same number of Representatives. New York sends _____ (more/fewer) Representatives to Congress than Illinois.

more

13. The number of Representatives from each state depends on the number of people living in the state. New York has more Representatives than Illinois because there are more _____ living in New York than in Illinois.

people

14. Population of Pennsylvania in 1960 - 11,319,366
Population of Ohio in 1960 - 9,706,397

The population of a state means the number of people living in the state. The figures above show that Pennsylvania has a larger p_____ion than Ohio.

population

15. Population of Iowa in 1960 - 2,757,537
Population of Texas in 1960 - 9,579,677

The number of Representatives from each state depends upon the population of the state. From the figures above, you can tell that Congress has more Representatives from _____ than from _____.

Texas: Iowa

16. The number of Representatives which each state sends to Congress depends upon the _____ of the state.

population

SOCIAL STUDIES

H.S. - Adult

PARLIAMENTARY PROCEDURE

WARREN LEHMAN, U.S.I. Educational Science Division.

Published by DOUBLEDAY & COMPANY, Inc.,
575 Madison Avenue, N.Y.C.

Programed text, 318 frames, hard cover, 344 pp.,
8 1/4" x 5 3/8", \$4.95.

Table of Contents, Index.

Multiple Choice Responses and Branching always used;
no Constructed Responses.

DEVELOPMENTAL (FIELD TEST) POPULATION(S):

Prerequisites: High school education.

Average Time: 6-8 hours (est.).

Next Revision: "Dependent on publisher's requirements."
(1 sample page)

SOCIAL STUDIES

PARLIAMENTARY PROCEDURE Lehman; DOUBLEDAY & COMPANY one sample page:

Sample from Parliamentary Procedure

6
(from page 1)

YOUR ANSWER: Almost every organization follows essentially the same set of parliamentary rules.

This is true. Although many groups change the standard rules in one small way or another, the basic rules are used in almost all groups, from the local fraternal organization to the United Nations, and from the Parent-Teacher Association to the United States House of Representatives. Some vary the names for officers, some the order in which meetings are conducted, some the number of votes necessary to pass certain types of measures, but the differences are small compared to the similarities. Once learned, the rules of procedure should guide you in whatever organizational work you do.

One of the names that varies from organization to organization is that of the person who has the job of running the meeting. Generally, such a person may be called the presiding officer. The presiding officer of the Senate is the Vice-President of the United States. The presiding officer of the House of Representatives is called the Speaker of the House. Sometimes a presiding officer is called a chairman, moderator, or president. Whatever the name, though, the duties are much the same. The presiding officer, sometimes referred to impersonally as the chair, has the job of supervising the meetings of the organization. In one sense, the job of the chair is to see that the rules of procedure are followed.

But what is the purpose of these rules?

To keep order in the meeting. page 9

To ensure that meetings are conducted as quickly as possible. page 13

To ensure that organizations can achieve their purposes democratically. page 16

SOCIAL STUDIES

PARLIAMENTARY PROCEDURE 28

**GEORGE M. SNYDER, Education Engineering, Inc.,
Published by EDUCATION ENGINEERING, Inc.,
381 West 7th Street, San Pedro, California.**

**Programed text, 3240 frames, paperback, 108 pp.,
5" x 7", available in 3 separate units at \$3.75 each.
For use in SPEED machine, \$30.00; program reusable.
Teacher's Manual available, \$4.00 per unit.
Unit, Final, Diagnostic Test(s) available, \$3.75 each.
Multiple Choice Responses always used; no Constructed
Responses; no Branching.**

DEVELOPMENTAL (FIELD TEST) POPULATION(S):

Prerequisites:

**Additional material required: SPEED machine, \$700 &
\$850.**

Average Time: 5 hours (est.).

Next Revision:

(2 sample pages)

SOCIAL STUDIES

PARLIAMENTARY PROCEDURE 29 Snyder; EDUCATION ENGINEERING 2 sample pages:

●● THE "MINUTES"

The "minutes" of meetings, when approved, are the official record of actions taken. The secretary is custodian of the permanent minute book which is available for examination by any member.

The "minutes" should include

1. All motions or resolutions whether carried or lost.
2. The names of the proposers of main motions.
3. Reports of officers and committees

- in brief (the entire report should be submitted in writing and filed).
4. The signature of the secretary, and the date the minutes were approved.
 5. The opening sentence should contain the kind of meeting, name of the organization; the time, date, and place of the meeting, and the name of the chairman.

NOTE: The minutes should not include the personal opinions of the secretary. "Just the facts, Ma'am."

29291 - 00

QUESTIONS

Fill in the blanks.

1. The minutes should include all _____ whether carried or lost.
2. They should include reports in brief of _____.
3. They should include the _____ of the secretary, and the date the minutes were _____.
4. The opening sentence should contain the _____ of meeting, and the _____ of the organization.
5. The minutes should not include the _____ of the secretary.

ANSWERS

1. full discussion
2. club dances
3. telephone number, rejected
4. signature, approved
5. motions or resolutions
6. officers and committees
7. personal opinions
8. purpose, aims
9. names of proposers
10. kind, name

29001 - 00

PRIVILEGED MOTIONS

The motion **TO TAKE A RECESS** allows an assembly to adjourn for a short time. After the recess, business resumes at the point where recess took place.

Second. No debate. Amendable as to time. Majority.

TO RISE TO A QUESTION OF PRIVILEGE relates to the needs of the assembly or a member, which require immediate action (heat, light, dust, noise, announcement, etc.)

Member (not waiting): "Mr. Chairman, I rise to a question of privilege."

Chairman: "State your question of privilege."

No second. No debate. Chairman decides.

TO CALL FOR ORDERS OF THE DAY reminds the chairman of business to be considered at that particular time

No second. No debate. No vote.

39909-17

QUESTIONS

Fill in the blank.

1. The motion to recess allows the assembly _____ for a short time.
2. The motion to recess is _____ as to time.
3. The motion to rise to a question of privilege is decided by _____.
4. It relates to the needs of the assembly which require _____.
5. A call for orders of the day requires _____ vote.

ANSWERS

1. so
2. amendable
3. majority
4. no regular order
5. immediate action
6. to adjourn
7. the chairman
8. the assembly
9. debatable
10. to rest

39909-17

PROGRAMMED INSTRUCTION IN ECONOMICS

(5 Volumes)

Supply and Demand; National Income Accounting;
Theory of Income Determination; The Business Firm;
Theory of Production

LEIGH H. FERGUSON

ALBERT E. HICKEY

SANFORD M. AUTOR, all of Entelek, Inc.

Published by THE MACMILLAN COMPANY,
60 Fifth Avenue, New York, New York

Programed text, 400 frames each volume, paperback, 100
pp., 8-1/2" x 11, program bound in two separate
units, \$2.00.

Table of Contents.

Constructed Responses usually used; some Multiple
Choice; no Branching.

DEVELOPMENTAL (FIELD TEST) POPULATION(S):

"College and high school students."

Prerequisites: "Introductory Economics."

Average Time: 40 hours (est.).

Next Revision: 1965.

(1 sample page)

SOCIAL STUDIES

PROGRAMMED INSTRUCTION IN ECONOMICS

Ferguson, Hickey, Autor; THE MACMILLAN COMPANY
one sample page:

Recall from our discussion of the demand schedule and demand curve that, for each price, consumers are willing and able to purchase a given _____.

1

quantity What would be the result if something happened to change the price? Well, if the price changes, the *quantity demanded* will _____.

2

change Let's examine the effect of a price change on the quantity _____, using Figure 6 on page R5 [see next page].

3

demand In Figure 6, when the price is 35¢, the quantity demanded is _____ pounds per day.

4

40,000 Still on the same graph, construct a *horizontal* line through 55¢. Construct a *vertical* line through 10,000 pounds.

5

In Figure 6, when the price is increased by 20¢, from 35¢ to _____¢, the *quantity demanded* is

6

55
10,000 pounds per day

SOCIAL STUDIES

Elem.

OUR TWO NEWEST STATES

DARLENE HARING, Programmer, Learning, Inc.

Published by **LEARNING INCORPORATED**,
1317 West Eighth Street, Tempe, Arizona

Programed text, 20 frames, \$.15.

Constructed Responses always used; no Multiple Choice;
no Branching.

DEVELOPMENTAL POPULATION(S): Grades 4-6.

Prerequisites: Grade 5 reading level.

Average Time: 10 minutes (est.).

Next Revision: "The program is the final revision."

(1 sample page)

SOCIAL STUDIES

OUR TWO NEWEST STATES Haring; LEARNING INCORPORATED one sample page:



1. When Alaska and Hawaii were admitted to the United States, the number of states increased from 48 to ____ . 50
2. Alaska and Hawaii are the two newest states. Alaska was the 49th state to be added. The 50th state was H ____ . Hawaii
3. Look at the map to find this answer. Both Alaska and Hawaii are farther ____ than our other states. (east or west?) west
4. Neither Alaska nor Hawaii touches another state. Alaska borders on Canada. Hawaii is completely surrounded by the ____ Ocean. Look at the map to get the answer if necessary. Pacific
5. Alaska and Hawaii have some things in common. They are our two newest states, they touch no other states, and they are farther ____ than any other states. (what direction?) west
6. Look at the map to answer this. The state that is farther north than any of the other states is ____ . Alaska
7. Look at the map. While Alaska and Hawaii are both west of the other states, the only state south of all the other states is ____ . Hawaii

STUDY SKILLS

Jr. H.S.

**BETTER STUDY HABITS
UNIVERSAL ELECTRONICS LABORATORIES CORPO-
RATION**

Published by **UNIVERSAL TEACHING MACHINE
INSTITUTE,**
510 Hudson Street, Hackensack, New Jersey.

For use in **UNIVERSAL MODEL U** machine, program
reusable, 552 frames, machine and program, **\$8.95**
(school discount).

Constructed Responses always used; no **Multiple Choice**;
no **Branching**.

DEVELOPMENTAL (FIELD TEST) POPULATION(S):
"Grade level 7-9."

Prerequisites: None.

Average Time: 3 to 5 hours (est.).

Next Revision: August, 1963.

(1 sample page)

STUDY SKILLS

BETTER STUDY HABITS

Universal Electronics Laboratories; UNIVERSAL TEACH-
ING MACHINE INSTITUTE

one sample page:

STUDY SKILLS U-1003

2 3 2

MAKING A STUDY TIME BUDGET SCHEDULE

259 To develop efficient study habits, it is important to make a study-time budget or schedule. Making a study-time budget or schedule enables you to develop more _____ study habits.

efficient

260 Concentration is intensified through the development of a study-time budget. A study-time budget, therefore, develops the habit of _____.

concentration

261 As your ability to concentrate improves, you are less likely to be disturbed by outside _____.

noises

262 There is a great deal of satisfaction and pride from a job well done. Doing a good job allows you to enjoy the feeling of _____ and satisfaction.

pride

263 In this world of ours, you have to be able to plan your time wisely. Having a study-time budget trains you to plan your _____ wisely.

time

264 The first step in preparing a study-time budget is to make an activity record for a week. Making an activity record for the week is the _____ step in preparing a study-time budget.

first

STUDY SKILLS

Jr. H.S.-H.S.

STUDY SKILLS

Guide to Efficient Study

PAUL JOHNSON, Programmer

RENATE LEPEHNE, Programmer

**Published by HONOR PRODUCTS COMPANY,
20 Moulton Street, Cambridge, Mass.**

**For use in HONOR TEACHING MACHINE, \$20 (approx.)
including 3 programs; program reusable, 200 frames,
\$2.00-\$2.50.**

**Constructed Response sometimes used; some Multiple
Choice; some Branching.**

**DEVELOPMENTAL (FIELD TEST) POPULATION(S):
"Public and private schools."**

Prerequisites:

Average Time: 1 1/2-2 hours (est.).

Next Revision:

(1 sample page)

STUDY SKILLS

STUDY SKILLS

Johnson, Lepehne; HONOR PRODUCTS COMPANY
one sample page:

<p>Very good.</p> <p>To learn what the <u>chapter</u> will be about, you read the _____ of the chapter.</p>	<p>first paragraph (Step II is to read the first paragraph or introduction of the chapter.)</p>
<p>Step III is to make a <u>summary</u> of what has been covered in the chapter. To find the <u>summary</u>, you go to the <u>end</u> of the <u>chapter</u> and read the _____ paragraph of the chapter.</p>	<p>last (paragraph)</p>
<p>The third most important step in doing a preview of a chapter is to read about what has been covered in the chapter. Therefore, read the last paragraph, or the _____ of the chapter.</p>	<p><u>summary</u> (Step III is to read the last paragraph, or <u>summary</u> of a chapter.)</p>
<p>Your preview is almost complete. There are four steps in all. Let's review the first three steps before taking up the last.</p> <p>Step I is to read the _____ of the chapter.</p> <p>Step II is to read the _____ of the chapter.</p> <p>Step III is to read the _____ of the chapter.</p>	<ol style="list-style-type: none"> 1. title 2. first paragraph 3. last paragraph
<p>Step IV is to look at the illustrations. Illustrations are: pictures, graphs, charts, and maps.</p> <p>a. correct c. incorrect</p> <p>The roll will move only when you choose the correct answer.</p>	<p>a. correct (Illustrations are: pictures, graphs, charts, and maps.)</p>

STUDY SKILLS

Elem.-H.S.

STUDY SKILLS FOR HOME USE

TECHNICAL STAFF, General Education, Inc.

Published by **GENERAL EDUCATION, Inc.,**
96 Mt. Auburn Street, Cambridge 38, Mass.

For use in TUTOR, program reusable, 2400 frames,
\$30.00 (machine and program).

Table of Contents.

Unit Test(s) available free. "Each unit is a final test for that section of the program."

Constructed Responses usually used, some Multiple Choice, no Branching.

DEVELOPMENTAL (FIELD TEST) POPULATION(S):

Developmental Pre and post tests used on 8-10 students per revision. Several revisions to achieve negligible error rates.

Prerequisites: Fifth grade reading level.

Average Time: 24 hours (est.).

Next Revision: "None planned as yet."

(3 sample pages)

STUDY SKILLS

STUDY SKILLS FOR HOME USE

Technical Staff, General Education; GENERAL EDUCATION
3 sample pages:

Excerpt from

Section 2: LEARNING METHODS I and II

Exhibit 2

The Lion by Ogden Nash

Oh,	weep	for	Mr.	and	Mrs.	Bryan]
He	was	eaten	by	a	lion;	
Following	which,	the	lion's	lieness		
Up	and	swallowed	Bryan's	Bryanness.		

38. Take three of your paper blocks and use them to hide three words in Exhibit 2 that you think you can remember.

(Three words in Exhibit 2 should now be hidden by paper blocks.)

39. Now read the entire verse aloud, recalling the three hidden words when you come to them.

(If you did not remember the hidden words, you may peek under the paper blocks.)

40. Now hide three more words that you think you can remember. Read the poem aloud once again, recalling all six hidden words as you come to them.

(Whenever you forget one of the hidden words, you may peek under the paper blocks.)

Excerpt from
Section 8: HOW TO STUDY FOR AN EXAMINATION I

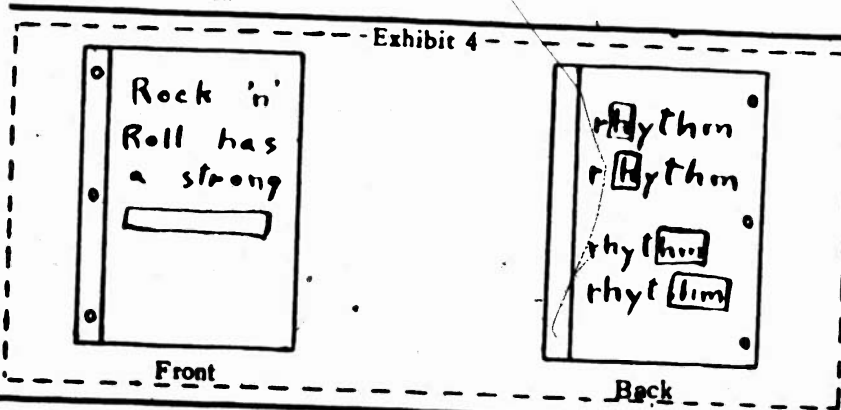
Exhibit 1

1a:	No E W Y O R K	Lion O S A N G E L E S	Can H I C A G O	Push H I L A D E L P H I A	Down E T R O I T	Seven A N F R A N C I S C O	Baboons O S T O N
1b:	Dust Rubbing Acid Perspiration Heat Moisture	Dust Rubbing Heat Moisture Acid Perspiration	D R H M A P	Dr. H. Map			

- | | |
|--|----------------------|
| <p>21. Already you know several good ways to remember lists.
 In Exhibit 1a, the method is to make up a sentence. The _____ (which one?) letter of each word in the sentence is the same as the first _____ of one word in the list.</p> | <p>first; letter</p> |
| <p>22. In Exhibit 1b, you made up a _____ using only the _____ (which one?) letter of each of the words in the list.</p> | <p>name; first</p> |



Excerpt from
Section 20: HOW TO STUDY SPELLING I



<p>13. Exhibit 3 reviews the steps in studying a word. Study the spelling of "rhythm" on a piece of paper the way Exhibit 3 tells you to. Take your time.</p>	<p>Compare your work to Exhibit 4</p>
<p>14. Often you will have to learn many spelling words from a list. Studying one word on the list at a time is easy. However, it is better to study several of the words at a time.</p>	<p>No Answer</p>
<p>15. Although you can learn a single word very quickly, you may also forget it very quickly. It is better to study . . . (one/a few) word(s) at a time.</p>	<p>a few</p>

STUDY SKILLS

Jr. H.S.

YOUR STUDY SKILLS

JANE BOYD LARIMORE, Programmer, Learning Inc.
Published by CORONET INSTRUCTIONAL FILMS,
65 E. So. Water Street, Chicago 1, Illinois.

Programed text, 285 frames, paperback, 57 pp., 7" x 10",
\$1.20.

Teacher's Manual included..

Test Set included.

Constructed Responses usually used; some Multiple
Choice; no Branching.

DEVELOPMENTAL (FIELD TEST) POPULATION(S):

"...Small representative samplings at appropriate grade levels tested informally on one-to-one basis with programmer. Small representative samplings under controlled conditions (Dukane Redi-tutor using 35mm. film) for each revision of program. Program has been through 3 complete revisions, each revision based on data obtained from formal machine testing. Field testing in progress: Classroom testing from 6th through 12th grades, administered by classroom teachers. Test areas distributed geographically from Florida to California. All testing conducted by Learning Incorporated."

Prerequisites: Grade 7 reading level.

Average Time: 2 hours, 41 minutes (based entirely on data); standard deviation, 1 hour, 16 minutes.

Next Revision: "The published program is the final revision."

(1 sample page)

STUDY SKILLS

YOUR STUDY SKILLS.

Larimore; CORONET INSTRUCTIONAL FILMS
one sample page:

9-17 Washington's childhood history will be covered in the first part of Jim's (7).

report

9-18 So now Jim will look for all his notes about Washington's childhood which he has written on small (7).

cards

Outline
I. Washington's childhood history
II. Washington's education
III. Washington's war history.

Washington and his troops spent the winter of 1777 1778 at Valley Forge. (A)

He was born on his father's plantation in Virginia in 1732. (B)

He studied mathematics and later became a surveyor at his plantation named Mount Vernon. (C)

Example 11

9-19 Read Example 11 carefully. Example 11 shows some of Jim's notes. The note on card (7) will be included in section I of his report.

9-20 Example 11. The note on card (7) will be included in section II.

9-21 Example 11. The note on card (7) will be included in section III.

B

•

C

•

A

Set 9

80

APPENDIX A

Covering letter sent to publishers and known suppliers.*

CPI

The Center for Programed Instruction, Inc.
a non-profit, educational organization
365 West End Avenue at 77th Street
New York 24, New York

Apartment 11A
TRafalgar 3-7684

December 26, 1962

Dear Colleague:

As you know, Program 57 *A Guide to Programed Instructional Materials* has been the primary source of information as to the availability of programed materials. In order to keep up with the exciting developments in this field, we are now preparing Program 57 Again, we request your cooperation in this important endeavor.

Please complete one form for each program which can be ordered for delivery by September, 1963. Additional forms will be sent on request.

The form we are using differs somewhat from that used last year. Hopefully, it reflects developments in this rapidly changing field.

Since it is, per se, give each a good idea of program content, we are including a "sample" of each program to enable prospective users to see for themselves the content and methods of approach, as well as the programing techniques. Since you as your authors can best select such a representative sample, we have made provision to reproduce, directly from the copy you submit, sample frames of each program.

For "accredited" programs, we will print a maximum of one (1) page of sample frames for every five hundred (500) frames in the program. For other styles of program, we will print a maximum of one (1) sample page for every one thousand (1000) frames. Regardless of length, we will print at least one (1) page of sample frames per program. No more than ten (10) pages of sample frames will be printed for any one program.

Please prepare pages of sample frames on camera ready copy, 9 1/2" x 9 1/2". Do not leave external margins. We will reproduce your copy as sent in this exact size in a 9 1/2" x 9 1/2" book. We will include page numbers and headings in the additional space. We will not be able to reduce or enlarge copy prepared in other than the requested size. The book will be printed in black and white, therefore do not include color in your copy. (If your sample pages from last year are satisfactory to you, we can arrange to re-run them. However, we will need a new form completed for the program.)

Please include a letter giving the Center permission to reproduce these sample frames for this guide.

We must reserve the right to edit copy of the forms. Also, the final decision as to what constitutes programed material must reside with us. The word "program" has been in education for many years, our limits are not designed to be narrow, only helpful to our readers. Further, we will print data for programs only if such forms and sample frames are submitted to us. If sample frames are not received in time, publisher and program title will be listed only in the Publisher Index as was done in Program 57.

Since the guide is to be used in making plans for the academic year 63-64, we must request the return of both questionnaires and sample frames as soon as practically possible. We cannot guarantee publication of data received in our office after 8 February, 1963, if you can supply either questionnaires or sample frames before this date, it would facilitate our preparation of the guide for press. Please address all returns care of Dr. L. F. Hanson.

Sincerely yours,

Lincoln F. Hanson
Lincoln F. Hanson
Coordinator

* NOTE: In our coverage of possible program suppliers, the Literary Market Place list of book publishers was circulated along with several lists of teaching machine manufacturers and the Center's general correspondence files. If we have inadvertently neglected any publisher, our apologies.

APPENDIX A

Publisher's Questionnaire.

THE CENTER FOR PROGRAMED INSTRUCTION, Inc., 145 West End Ave., NYC 24



SURVEY FOR PROGRAMS AVAILABLE, 1963

1. Title of Program _____
 A. Subtitle (if any) _____
2. Author(s) (List individual names even if authorship is organizational) _____
 NAME _____ POSITION _____
3. Publisher and Address _____
4. Is Program available in languages other than English? _____ If yes, specify: (Languages) _____
5. Number of Frames _____
6. Is the Program available as a Programed Textbook? _____
 - A. Number of Pages _____
 - B. Page Size _____
 - C. Type of Cover (hard, paperback, etc.) _____
 - D. List price of Programed Text _____
 - E. Are separate Answer Sheets (Booklets) available? _____
 - a. List price of Answer Sheets needed for one student _____
 - F. Is how many separate units in the Program bound? _____
 - a. If more than one, list price for each unit _____
7. Is Program available in Teaching Machine format? _____ If yes, complete the following information:

NAME OF MACHINE	LIST PRICE OF MACHINE	LIST PRICE OF PROGRAM FOR THIS MACHINE	DOLLAR PERCENT PERMIT DOLLAR OF PROGRAM
8. Check in the appropriate spaces below. What proportion of frames in the Program utilize:

	All	Half or More	Less Than Half	None
A. Constructed Responses	[]	[]	[]	[]
B. Multiple Choice Responses	[]	[]	[]	[]
C. Branching	[]	[]	[]	[]
9. Is Teacher's Manual available? _____ List Price _____
10. Does Program contain a Table of Contents? _____ An Index? _____
11. Check all appropriate boxes. Objectives of the Program are described by:
 - Table of Contents
 - Behavioral matrix
 - Descriptive paragraphs
 - Other (please specify) _____

(OVER)

APPENDIX A

Test Availability

Unit Test(s)	Check to Availability	Number of items which are					Are They Used for Grading or Other Purposes?	Do They Require Special Equipment or Materials?	Do They Require Special Preparation of Students?	Do They Require Special Preparation of Teachers?
		Free Response	Multiple Choice	True False	Matching	Fill-in the Blank				
Unit Test(s)										
Final Test										
Diagnostic Test(s)										

13. A. Describe intended student population(s)

B. Describe other population(s) which have used Program

C. Describe your developmental and/or field test population(s)

14. List any special student prerequisites

15. Do you provide, or has there been published in the professional literature, any data relevant to the efficacy of the Program? Yes No

16. Estimated date of publication of test revision _____

17. Additional equipment or materials required for this Program (e.g., slide rule, dictionary) (if you supply, please give list price per unit)

18. A. Estimated average time required to complete the entire Program (in hours) _____

B. Above estimate is based on date (check one) entirely partly just a guess

C. If "entirely," give standard deviation _____

19. Respondent information

Name _____
 Position _____
 Mailing Address _____
 Telephone _____ Ext. _____

20. Person to contact if above individual not available

Name _____
 Position _____
 Mailing Address _____
 Telephone _____ Ext. _____

List any additional information you wish, however, we cannot guarantee its publication. Have you prepared and enclosed the sample forms as described in the covering letter?

APPENDIX B

Reprinted from *Audiovisual Instruction*, February, 1963

1962 Interim Report of the Joint Committee on Programed Instruction and Teaching Machines

American Educational
Research Association

American Psychological
Association

Department of
Audiovisual Instruction, NEA

With the cooperation and support of
the Educational Media Branch,
U. S. Office of Education
under NDEA, Title VII

THE members of the AERA-APA-DAVI Joint committee include Harry F. Silber- man, Evan R. Keislar, Robert Glaser, and Arthur A. Lumsdaine, Chairman (American Educational Research Association); Richard S. Crutchfield, James G. Holland, and Lawrence M. Stolurow (American Psychological Association); and Jack V. Edling, Edward B. Fry, Wesley C. Meierhenry, and Paul R. Wendt (Department of Audiovisual In- struction, National Educational Associa- tion). Helpful contributions were made to the preparation and review of the present statement by a cooperating com- mittee of the American Society of Train- ing Directors, whose members are Leon- ard C. Silvern (chairman), Robert L. Craig, Stanley L. Levine, Leonard Nad- ler, and Gerald H. Whitlock. Also con- tributing were several consultants and staff assistants, including Lloyd O. Brooks, Martin V. Covington, H. J. A. Goodman, Bert Y. Kersh, Susan M. Markle, Ernest Z. Rothkopf, and David G. Ryans. Further suggestions from pro- gram writers, publishers, or users are in- vited for the committee's use in the preparation of subsequent reports. This present article, as an interim report, can be interpreted as expressing a consensus of Joint Committee members rather than an official policy statement of AERA, APA, and DAVI.

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This statement by the AERA-APA-DAVI Joint Committee on Programmed Instruction and Teaching Machines is concerned with educational techniques that are variously called "programed instruction," "auto-instructional" methods, and "programmed learning."

The present statement amplifies and extends the previous guidelines published in 1961 by the Joint Committee.¹ This report, like the previous one, is addressed primarily to the non-technical reader interested in the possible purchase of programs. It summarizes some basic aspects of the nature and current status of programed instruction, and also presents some suggestions and cautions concerning the assessment of programs.

A subsequent, more technical report will provide supplementary information and recommendations addressed to the technical specialist who is directly concerned with obtaining or interpreting quantitative data to indicate the effectiveness of programs in contributing to specified instructional goals.

Programed instruction. As used herein, programed instruction refers to the use of materials or procedures which incorporate an "auto-instructional" (or self-instructional) program. Such a program commonly attempts to provide conditions under which a student can learn something efficiently with little or no outside help. Current programs typically employ a pre-arranged sequence of material that is presented to the student one small unit at a time (e.g., a sentence or paragraph). Most programs require the student to respond actively at least once for each unit (or "frame") of material—for example, by composing or selecting an answer to a question. Programs also commonly provide prompt

confirmation or correction, as the case may be, for each response the student makes. In some cases, the program is presented by a mechanism or device called a "teaching machine"; in other cases it is presented by a specially designed form of book.

Some Basic Considerations Concerning Programed Instruction

With or without the use of "teaching machines" for controlled presentation of programs, individual instruction by programed materials offers a very important potential resource for education. Attention to the following guidelines is suggested, however, in order that the potentialities of programed instruction may be effectively developed and utilized.

Experimentation and planning for school use. Programed instruction represents a relatively new and thus far largely experimental resource for education. Experimental tryouts in schools, of both locally and commercially developed programs, is strongly encouraged. Wide-scale adoption of any particular program may well await the evaluation of one or more provisional tryouts of that program.

Curriculum planning. An important potential advantage of individual programed instruction is that abler learners can proceed at an accelerated rate through basic course material and thereby qualify sooner for advanced instruction. On the other hand, suitable programing may enable the slow learner to attain higher levels of proficiency than would otherwise be possible. Planning for adaptation of curricula to accommodate these possibilities needs to be undertaken as programed materials of demonstrated quality become available.

¹This earlier statement by the Joint Committee was published, among other places, as Appendix B in Program '62.

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Perfecting programs through tryout and revision. Programed instruction affords outstanding opportunities for perfecting instructional sequences through successive revision based on detailed records of student response to preliminary forms of a program. The development of high-quality programs will generally entail considerable effort and expense. However, if costs can be prorated over a large number of students, a greater research and development effort can be invested in a program than might otherwise be considered feasible.

Tests of program effectiveness. Although the content which a program is designed to teach may be inferred from careful inspection of the program itself, external evidence based on student performance is needed to demonstrate how well the program actually teaches. However, the value of a method of instruction can not be tested in the abstract. For example, evaluation of a particular textbook is not an assessment of the usefulness of textbooks in general. A properly constructed experimental tryout or field test of a program may provide an assessment of that particular program, but does not afford proof or disproof of the value of a general "method" of programed instruction.

Experimentation conducted thus far supports the expectation that good programs, carefully developed, can significantly improve both the quality and economy of instruction. Whether any particular program will do so is subject to question until established by adequate tests of that program. Unfortunately, programs may be offered for sale that will fall short of the potential value of programed instruction—for example, because they have not been carefully

developed through procedures that include sufficient tryout and revision to assure their effectiveness.

"TEACHING MACHINES"

Some programs require a machine for their presentation, while some are available only in book form. Other programs are available in two separate versions, one in book form and the other for use with a machine. In any case, it should be emphasized that so-called teaching machines, in themselves, do not teach. Rather, the teaching depends on the program of instructional materials that may be presented by a machine. The comparative merits of machine and non-machine presentation of printed programs for use in schools is as yet an unresolved issue. Any advantage for machine over book presentation can not be tested in the abstract but would depend on the characteristics of a particular machine. Some machines have demonstrable advantages for certain uses, including research and suitable machines are required for programs that utilize audio materials.

Machine characteristics. The variety of types of teaching machines continues to proliferate, with little standardization. In evaluating any make or model of teaching machine, a continuing necessity is thus to assess the number and quality of programs available for use in it. For some machines the user who has sufficient time and skill can prepare his own programed materials; for other machines, this may not be feasible. With some machines a program can be re-used indefinitely; for others a new copy of the programed material may be required for each student.

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For many machines, mechanical dependability can not yet be taken for granted. As with any new mechanical device, potential purchasers of teaching machines are well advised to seek reliable information on how extensively the device has been used in schools, what maintenance problems have been encountered, and the extent to which parts and service are locally available at reasonable cost.

Availability of machines. Existing machines differ greatly in complexity and cost; prices for most of them range from a few dollars to several hundred dollars per machine. Any catalog of teaching machines is likely to be obsolete as soon as it is printed because the field is developing so rapidly. New machines appear, and some advertised models fail to get into production. Several dozen different machines are briefly described and illustrated in a 1962 publication by Finn and Perrin.⁴ A number of these are commercially available at present. Others have been withdrawn from the market or were experimental models that have never gotten into production.

PROGRAMS

Availability of Programs

An increasing number of programs is becoming commercially available in a variety of subject-matter areas. Mere

availability is no guarantee of quality, however. In addition, programs (as well as machines) are sometimes announced long before they are actually available; also, as noted above, some programs are in a format that can be presented only with a particular kind of machine.

A useful guide to available programs for school subjects is a 383-page government publication entitled *Programs, '62*.⁵ This publication lists some 120 programs reported to be commercially available by September 1962. These programs span the curriculum from elementary to college levels and cover a variety of subject matter, including language arts, mathematics, music, physical and biological sciences, social studies, and business education. The report cited includes descriptive information and one or more sample sequences from each program. Pertinent data given include the intended student population, the number of "frames" in each program, and its price, but no attempt is made to evaluate the programs.⁶ It is anticipated that this compilation will be updated by similar guides for subsequent years.

Types of Programs

Programs are being produced in a variety of forms. Thus far they have tended to cluster around two or three main types; however, new variants or

⁴Finn, J. D., and D. G. Perrin. *Teaching Machines and Programed Learning, 1962: A Survey of the Industry*. Occasional Paper No. 3, NEA Technological Development Project. Washington, D. C.: U. S. Government Printing Office, 1962 (Publication No. OE-34019; 85 p., 55 cents). See subsequent footnote concerning information presented in this report.

⁵The Center for Programed Instruction, Inc. *Programs, '62: A Guide to Programed Instructional Materials*. Washington, D. C.: U. S. Government Printing Office, 1962 (U. S. Office of Education, Publication No. OE-34015; 383 p., \$1.50). See following footnote concerning information presented in this report.

⁶The reports on devices and programs identified in the two preceding footnotes are cited solely for the convenience of the reader, and statements concerning them are not to be construed as an endorsement by the Joint Committee or its parent organization, either as to completeness or accuracy of the information presented, or of the quality of the devices and programs listed in these publications.

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mixtures of types are also being introduced. The majority of current programs break the subject matter down into a large number of small steps or "frames," requiring the student to make one or more responses to each step. Such a program can be so designed that the student will respond to critical aspects of each frame or will get practice in performing the specific operation that each frame is meant to teach. Careful programming requires the programmer to take great pains to insure that these steps embody a logical, well-sequenced progression of the subject matter. This applies especially to programs that are intended to serve as sole or independent sources of instruction rather than only as supplements to other material. Such programs often provide a number of examples to illustrate each principle, concept, or act that is to be learned.

Programs of the kind described above are designed to adapt to individual differences by allowing each learner to proceed at his own rate. In addition, some types of programs further adapt by providing for "branching" to alternate materials. For this purpose, frames may include questions designed to diagnose the learner's needs, with directions taking him to alternate material suited to these needs.

In most of the current "branching" programs, the program is so constructed that the choice of a particular answer to a diagnostic question determines which frame will be presented next. Incorrect answers may take the student to frames containing information designed to correct the error before allowing him to continue through the sequence, or to frames that provide supplemental information or practice.

There is little empirical basis at present to favor one general type of program over another. It may be anticipated that different types of programs will eventually prove to be especially useful for particular kinds of educational purposes, and that different styles of programming may be combined effectively in a single program. At the present time, however, the general pattern of one type or another of programming may be superficially followed without necessarily capitalizing fully on its potential advantages.

CRITERIA FOR ASSESSING PROGRAMS

"Internal" and "External" Sources Of Information About Programs

A useful distinction can be made between "internal" and "external" characteristics which might serve as possible criteria for program evaluation.

"Internal" characteristics refer to features that can be revealed through visual inspection of the program. These include both the content of the program and the way the program is constructed. Content might be described in terms of relative emphasis given to various topics as well as general organization of the material. Descriptive characteristics of program construction might include information about the length of frames, use of branching sequences, techniques of prompting, patterns of repetition and review, modes and frequency of response called for, procedures and scheduling of reinforcement, and the like.

"External" information about a program refers to features which cannot be observed merely by inspecting the program itself, such as the way it was de-

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veloped and characteristics of its performance as a teaching instrument. External information of interest to a potential purchaser could include such things as the source of program content, qualifications of authors, history of the program's development, tryout and revisions, and test data indicating gains in achievement produced by the use of the program. This information, as indicated more fully below, may be presented in a descriptive manual supplied by the program publisher.

Critical reviews of programs may furnish an additional basis for evaluation. Such reviews are beginning to appear in professional journals along with reviews of textbooks (Some reviews include data on achievement attained by using the program as well as the reviewer's opinion about program content and style.)

Programs as Related to Textbooks and to Tests

The applicability of internal and external kinds of information as possible criteria for evaluating programs may in part be seen by comparing programs with textbooks and also with educational or psychological tests.

Programs as compared with textbooks. Both programs and textbooks may be inspected to determine what topics are covered and the relative amount of attention given to each. Such inspection would also indicate whether the subject matter is factually correct, whether it is current, etc. However, despite their similarities, programs differ from textbooks in several important respects that may affect their evaluation. A program's requirement for frequent student response generates a special source of data

useful for revising the program in detail. The tendency to empirically guided development of programs is coupled with an orientation toward testing the specific effects produced by a program, and toward more sharply focused objectives defined in terms of specified behavioral outcomes. In addition, the program is intended to generate a more predictable pattern of student behavior than does the study of a textbook, which generally has a less specialized purpose in aiming to serve as a reference source as well as a sequence of instruction.

Programs compared with psychological and educational tests. Although programs aim primarily to instruct students rather than to test them, programs and tests share some important attributes. Since both generate student-response data as an inherent feature, both tend to be developed in terms of empirical procedures. The difficulty of each item in a program, as in a test, can be investigated by presenting the program to appropriate samples of students and recording their responses. Both the program and the test have limited ranges of usefulness that can be described to the potential user in terms of empirical evidence; and in both cases it is possible to specify an external criterion to indicate the extent to which some intended outcome is achieved, as evidenced by the kinds of behavior that have been developed or differentiated.

Uses of Internal and External Information For Assessing Programs

Inspecting the subject-matter content of programs. At the present time, the principal recommended use of internal data obtained from inspection of the programmed materials is for determining

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whether program *content* is appropriate to the educator's objectives. As with other educational materials, program titles often are not definitive. Programs labeled with the name of a particular subject matter can vary widely in terms of content and associated instructional objectives. The prospective purchaser of a program should, therefore, inspect the content of the program at least as carefully as he would that of a textbook. Preferably he should go through the entire program to determine what aspects of the subject are treated or omitted, and the extent to which particular sub-topics are developed.

Limitations of program inspection. A risk in relying on inspection for evaluating a program is that one's perception of its value may be inappropriately influenced by his reaction to particular structural features of the program. For example, certain frames or items may seem too difficult or too easy. However, the difficulty and appropriateness of items in a program, like those in a test, generally cannot be judged accurately by inspection alone. External data are needed — data from an actual tryout of the program on students who are representative of the population of intended users.

The need for test data to assess a program's effectiveness. Empirical evidence on what is learned from the program can also be a better basis than mere inspection for answering such questions as whether program sequences have too much or too little repetition, review, prompting, over-

lap of steps, etc. At present, the scientific evidence is not considered sufficient to permit accurate prediction in these respects or to justify recommendation that adherence to specific rules of program construction be used as a basis for program evaluation. External evidence is recommended as the main basis for the evaluation of program effectiveness—in particular, test data obtained from using a program under specified conditions which provide dependable measures of gains produced in student achievement and of the time students require to achieve these gains.*

Uses and assessment of programs. Programs may have a variety of uses. For example, they may be intended to provide the main source from which students are expected to learn facts, principles or skills—or they may be intended only to review or introduce other instruction. In most schools, programs will probably be used in conjunction with other media of instruction. However, no matter what eventual use is contemplated for a program, it will generally help a prospective user to know what the program *itself* actually contributes to the student's knowledge or proficiency—in addition to what is contributed by other elements in the instructional situation.

The kinds of effects that can be revealed through empirical tryout are limited by the content of the achievement tests or other measures used to assess these effects. Inspection of the program by the prospective purchaser, supplemented by independent professional

*This emphasis on external criteria for assessing program effectiveness is consistent with the position earlier advocated in Lumsdane and Glaser's 1960 "Concluding Remarks" (*Teaching Machines and Programmed Learning*, NEA-DAVI, Washington, p. 256), and in Rothkopf's 1961 conference report, "Criteria for the Acceptance of Self Instructional Programs" in *Improving the Efficiency and Quality of Learning*, A. E. Traxler, editor, Washington, D. C.: American Council on Education, 1962, p. 30-31.

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reviews (when available) may sometimes suggest additional uses for which a program might be suitable, or kinds of program effects which are not indicated by field-test data because they were not contemplated in the programmer's original purpose.

Inspection of achievement-test content. Aside from the data obtained in testing a program's use under laboratory or field conditions, inspection of the program itself as a basis for appraisal can be supplemented if the author or publisher has spelled out the program's purpose by describing and exhibiting in full the achievement-test items which purport to exemplify what the program is intended to teach. These criterion-test items, as well as responses called for by the program and test, can be examined to see what the learner is required to be able to do, and whether this reflects the kind of competence which the educator wishes to achieve. Such an analysis of test content as a basis for determining a program's objectives may be particularly helpful for programs which are intended to serve as a primary source of instruction rather than merely as an adjunct to other instructional material.

REPORTING DESCRIPTIVE INFORMATION ABOUT PROGRAMS

Manuals for Providing External Data

"Manuals" for tests and programs. Because some of the characteristics needed to appraise educational and psychological tests are revealed only through data obtained by using them, it has become accepted practice to furnish information about test characteristics in a manual supplied by the test producer. It appears both desirable and feasible to provide a

similar manual for programs as a vehicle for presenting relevant external information about properties which are not apparent on inspection.

Questions that might be answered about a program. Information presented in a manual can help program producers or distributors to answer questions which the prospective purchaser may wish to ask as a basis for selection. Several areas of such questions concerning external information about a program may be identified. These questions might deal with (1) the program's purpose and intended use, (2) the source of program content, (3) the way the program was developed, including tryout and revision, and (4) the conduct and results of testing to determine empirically the effectiveness, or "performance characteristics," of the published program. The last of these kinds of information will generally be considered the most important; however, it also involves the kind of data which may be hardest to evaluate as to adequacy without specialized technical advice.

Purpose and Scope of a Program Manual

The kind of manual here suggested could apply to all types of programmed materials. However, some of the details appropriate for some programs probably would not apply to others. For example, less test data would probably be needed in the case of very short programs.

It is expected that the main user of such a manual would be the school district or other large-scale purchaser interested in buying programs in considerable quantity. To evaluate fully some of the data that could appropriately be included would generally require advice from a technical consultant who has pro-

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professional training and competence in testing and measurement techniques as well as in statistics and experimental design. However, the manual also could well supply general interpretive information to help the non-technical purchaser determine the program's relevance to his educational purposes. Such information could precede and refer to, when appropriate, the presentation of the technical detail needed for the specialist to appraise a program's effectiveness.

Program "labels." In addition, a digest of the information in the manual might be presented as a brief preface or "label" attached to individual copies of the program. Such a label could, at a minimum, indicate the purpose and intended use of the program, who was primarily responsible for its content and preparation, and the source of publications in which further data on its development and effectiveness might be found. This information should include the age- or grade-level(s) of the learners for whom the program is designed, and the prerequisite skills and abilities these learners are assumed to have. The publisher could then characterize and briefly illustrate the kind of competences the program has been demonstrated to produce when used in the manner suggested.

Further Information on Source and Development of Program Content

A more detailed manual which could be supplied by the program publisher to prospective users on request might elaborate this minimum information in relation to further questions, such as the following, which concern the source and development of program content.

Sources of content. What textual or curriculum sources were used in the

selection and development of the content? How current were these sources? Who were the programmer(s) and the collaborating curriculum specialists or subject-matter consultants (if any), that prepared, edited and reviewed the program materials? What are their academic and experience qualifications with respect to competence in the subject matter and techniques of programing? To what kind of review was the program material subjected during its development?

Development, tryout, and revision. As previously noted, records of learners' responses to preliminary versions of a program can provide a basis for its progressive revision and improvement prior to publication. Accordingly, the prospective purchaser might wish information about the extent to which such tryout and revision has been conducted, the kind and amount of student-response data obtained, and the way in which the data were used in revising the program. The manual might also indicate the criteria used to determine when the program was ready for final release and printing prior to the effectiveness testing on which the performance characteristics of the published program are based. As supplementary information, the producer might also wish to indicate the assumptions made and principles used in constructing the program.

Information About the Demonstrated Effectiveness of a Program

It is to be hoped that the manual for a program, at least for major programs of considerable scope, will furnish evidence on the program's effectiveness based on measurement of student performance on pre- and post-program criterion tests.

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These tests should be exhibited either in the manual or in an available supplement, so as to exemplify what the producers expect the student to learn as a result of program use.

Program producers are strongly encouraged to support any claims for the effectiveness of the program in terms of gains in student performance produced by the final, published version of the program, as revealed by appropriate criterion tests. A clear distinction should be made between this effectiveness-test data for the final program and any test data obtained in earlier tryouts of preliminary versions used as a basis for revision. (Changes made in the program after the later effectiveness-test data are obtained could throw doubt on the validity of these data for a demonstration of the program's effectiveness.)

The manual should present whatever further information would seem helpful in evaluating the reported effects of the program or the adequacy of the evidence on which they are based. It should in all cases present evidence to document for the technical reader that the gains in achievement reported can rightly be attributed to the effect of the program's use rather than to extraneous causes. In addition, it should describe the physical and social conditions of the program's use and effectiveness-testing procedures in sufficient detail so that their essential features could be reproduced by another investigator if desired. This information would include details of supervision and incentives used, other instruction given, size of student groups, and physical arrangement of rooms during program use and testing. Any material discrepancies between recommended conditions of use and those that were employed in obtain-

ing the effectiveness-test data should be noted. Students' prior experience with programs and teaching machines, if any, should be noted in view of spuriously large temporary gains that can sometimes result as a novelty effect when a new device or procedure is first introduced.

The manual should indicate how many of the students started and completed the program, the average length of time they required to finish it, the average level of performance on the specified pre- and post-program tests of achievement, and the range or variability with respect to these measures. Relevant further temporal data would include the amount of time learners of different ability spent on various portions of the program, how this time was distributed (especially for long programs), and the time lapse between the completion of the program and the criterion test.

Effectiveness tests could of course be conducted so as to include post-program measures other than the test that specifies the programmer's objectives. The program's effect on secondary objectives not originally aimed at could thus also be revealed. However, whether or not such tests are conducted by the producer or by others (e.g., by a prospective user or by an independent research agency), it is to the programmer's interest to specify what he intended as the program's principal objectives. Finding a program to be ineffective or of only limited effectiveness for contributing to a secondary or unintended objective might be helpful to the user in making a decision about the use of the program for that purpose, but cannot properly be held as a criticism of the programmer's effort.

It is anticipated that a school district

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contemplating the use of a program will be interested in its effect on performances other than those tested by the program producer. Particularly in this case, it is recommended that, when possible, potential users assess a program by their own field tests, guided by suitable technical consultation, before deciding on adoption of a program for wide-scale use. Performance characteristics of a program could specify its effectiveness in affecting behavior of students describable as changes in knowledge, understanding, skill or other outcomes, including beliefs, interests, and motivations.

Learner characteristics. Specification of prior knowledge and ability of learners can serve both to identify the pre-program base line from which gains may be measured, and also to indicate what prerequisites are needed in order to learn effectively from the program. Learner characteristics may be specified as an aspect of the program's purpose and intended use. The corresponding characteristics for the samples of students used in preliminary tryouts or, particularly, in the effectiveness-testing of the program, should be separately specified so as to indicate the degree to which these learners were typical or atypical of the learners for whom the program is in-

tended. The producer should also indicate the limits (particularly the lower limits) of the population for whom the program is intended, and of the samples used in testing its effectiveness.

Technical information concerning the conduct of effectiveness-testing. Valid assessment of what is taught by the use of a program generally involves special technical problems. Evaluation should, whenever possible, utilize the assistance of technical specialists having recognized competence in educational measurement and experimental design. The analogy of programs with standardized educational and psychological tests also suggests a precedent for preparation of technical recommendations by members of relevant professional organizations. These recommendations can serve both to help insure the technical soundness of effectiveness-testing procedures, and to promote comparability and interpretability of data by fostering consistently high standards of practice in reporting the results of tests. The further interim report to be published at a later date by this Committee will discuss in more detail some of the technical problems of assessing what the use of a program, in and of itself, contributes to definable instructional goals.

APPENDIX C

Reprinted from THE BULLETIN
of The National Association of Secondary School Principals
Vol. 44, No. 170 December, 1968

Programmed Learning—20 Questions

JOHN R. BELTON

Dear Programmed Learning Materials Salesman:

OUR programmed learning committee will be pleased to meet with you next Thursday at 1:30 P.M. Because we have scheduled appointments with several sales representatives this same afternoon, it will be necessary for us to limit our discussion with you to thirty minutes. We are now familiar with the history of programmed learning and the basic educational and psychological theories underlying programmed instruction. We would appreciate it if you would answer the following questions as part of your presentation:

1. What is the scope and sequence of programs which you have available for distribution at present and what other programs are you preparing?
2. What is the intended student population and what prerequisite courses (if any) are required for each of your programs?
3. Approximately how much time is required by the *average* student in a given grade to complete each different program?
4. Where will we find information about the qualifications of the authors of each of your programs?
5. Are the general aims and specific objectives of each program indicated in the unit or course description?
6. What is the reading ability level required for each program and how has this been determined?
7. How and where was each program tested?
8. Where in our geographical region have your programs been used and where in this vicinity are they being used at present?
9. Are your programs available in both "machine" and "programmed text" formats?
10. What is the form of response required for each of your programs?
11. Are your programs designed to be used with separate answer sheets and are these supplied?

John R. Belton is a Psychometrist with the Joint School District No. 1, 9333 West Lincoln Avenue, West Allis 14, Wisconsin.

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12. Is there a teacher's manual or guidebook for each program containing references, supplementary information, and suggestions for the use of other enrichment materials?

13. Do pre-tests, progress tests, and final tests accompany each program?

14. Are the tests provided diagnostic tests or achievement tests?

15. Are test-results norms tables available?

16. Which standardized tests may be used effectively with your programs?

17. Are your programs in mathematics and science based on "modern" mathematics and science concepts or are they traditional in nature?

18. Do you provide forms for recording student progress, achievement, and reactions?

19. What is the cost per frame and/or the cost per instructional hour for each of your programs?

20. And, finally, do you supply programs at discount prices for schools interested in pilot-study projects and research?

I am certain that, if you will answer these questions about the programmed learning materials you distribute, we will be in a better position to determine if we will be able to use them effectively in our school system.

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