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IDENTIFIERS	Mini Tests; Project SCIMP; *Single Concept Introductory Mathematics Project; Single Concept Videotapes

ABSTRACT

The Single Concept Introductory Mathematics Project (SCIMP) offered an individualized, self-paced, media-oriented approach to remedial algebra at the community college level. Seventy-one behavioral objectives were identified and videotapes and worksheets prepared for each; mini-tests were given after each lesson and a final exam administered at the conclusion of the course. Students checked the skills required in each lesson and then elected either immediately to "test out" of the objective or to seek instruction before testing; this latter alternative involved the options of studying worksheets, viewing videotapes, or interacting with tutors or the instructor. SCIMP was regarded as successful; completion rates were 50% higher than in traditional courses, learning was 11% to 18% higher. There was more efficient use of teacher time and students enjoyed the course. Since all students had to acquire to criterion each of the same skills and concepts, there was homogeneity of output; the feedback provided by the mini-tests led to early diagnosis and remediation of problems and frequent testing also aided retention. Finally, the modular organization of the course also facilitated both student grasp of specific concepts and easy modification of the instructional program. (PB)

ED 088469

KINGSBOROUGH COMMUNITY COLLEGE
OF
THE CITY UNIVERSITY OF NEW YORK
ORIENTAL BOULEVARD, MANHATTAN BEACH
BROOKLYN, NEW YORK 11235

OUTLINE OF PRESENTATION GIVEN AT GROSSINGERS
FOR NYSECA IN BALSOM ROOM
NOV. 8, 1973 at 3:45 P.M.

SINGLE CONCEPT VIDEOTAPES WHICH STREAMLINE LEARNING WHILE SAVING DOLLARS

JC 030 308

Jack Phillips
Dr. Peter Utz

Administered by the Board of Higher Education
Under the Program of the State University of New York

SCIMP stands for Single Concept Introductory Mathematics Project. It is one of several programs in use at Kingsborough where video tape is the primary instructional mode in concert with worksheets, tutors, teachers, textbook, and a rigorous testing procedure.

Essentially we divided the remedial algebra curriculum into behavioral objectives, made single concept video tapes and worksheets to teach each objective, and made tests for each objective. The student passes the course when he passes the tests. This program is not a supplement to the classroom, but is an independent credit bearing alternate to classroom instruction.

See flow chart on page 2. A student receives instructions on what is expected of him (samples on pages 4-6) and also receive a Concept Book (sample pages 8-11) which he uses to determine in which skills he may already have a competence. For those skills he takes mini tests administered by a clerk in a testing area. The clerk procters and grades the tests telling the student immediately whether he passed or failed. If a student fails he needs a minor review before taking any test, he heads for a booklet of worksheets (sample pages 13-23). If he needs more study he may use video tape. The TV players are in carrels and are manually operated by the students who merely take the tapes from nearby shelves and play them at their own pace. Student tutors roam the area answering questions and working intensively with students having problems. A math instructor is hired full time to oversee the area, guide students, and handle questions which require a professionals' touch.

Sample video tapes were played showing:

1. What our lessons are like.
2. The spirit, humor, and pacing we employ.
3. The simplicity of our equipment and staffing.
4. The fairly good quality available for a mere \$150 -\$200 per lesson.

Advantages of programs:

1. Despite a heterogeneous input of students, a homogeneous output is attained. Traditionally taught classes yield A,B,C, and D students. When these students enter the next course in their sequence the instructor must try to teach a heterogenious group, boring some while baffling others. SCIMP puts out a homogenious group---<u>every</u> student emerges with the same level of competency.

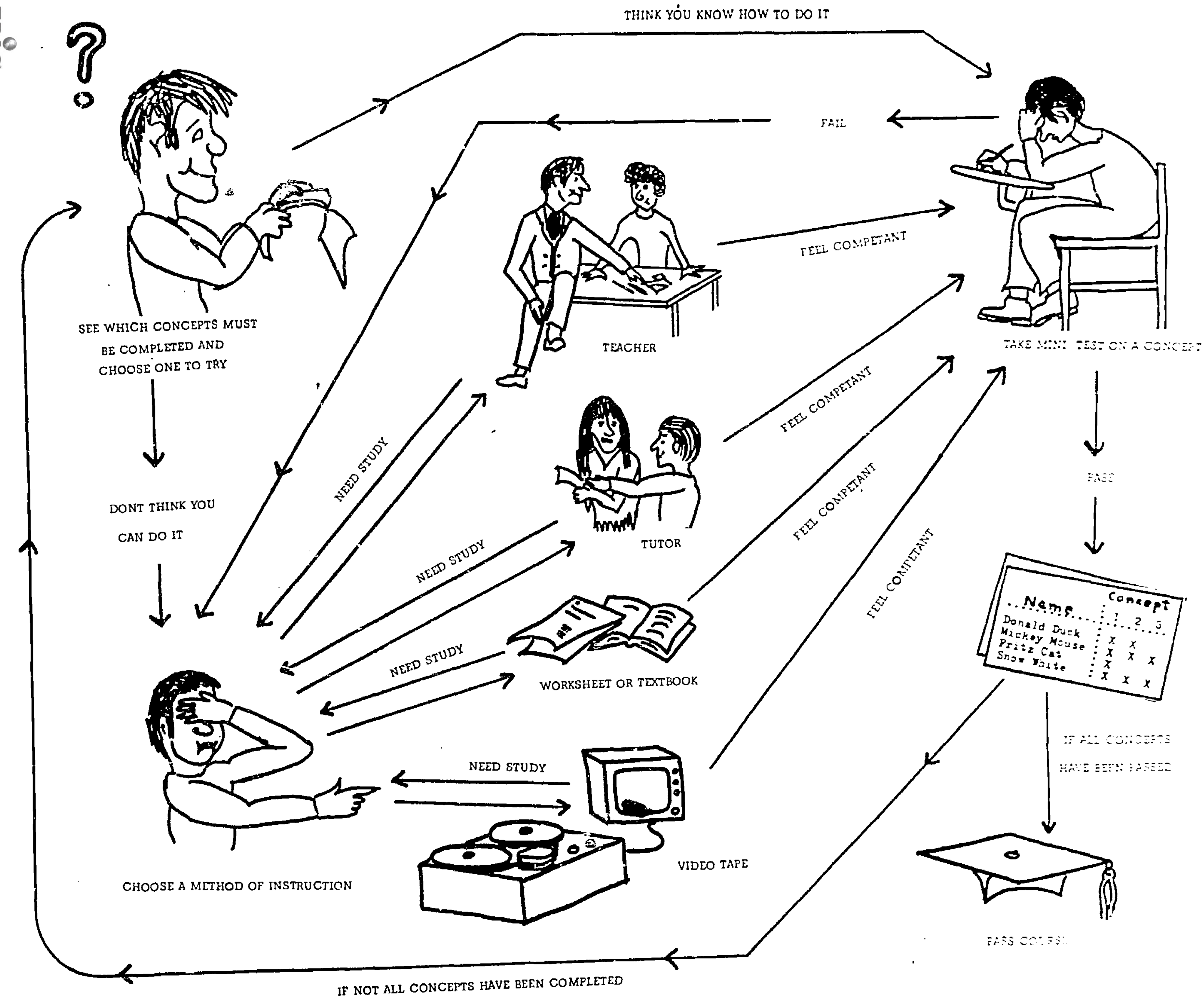
2. Single concepts, like bricks, can be reordered, deleted, augmented, and used in other similar courses without duplication of effort. Concepts are easily adaptable to changing curricula.

3. Good pedagogical techniques are employed:
   a) Instructional Alternatives are chosen by student.
   b) Mini tests do not permit conceptual problems to snowball. Problems are discovered early and corrected.
   c) Mini tests demand practice, thus improving retention.
   d) Mini tests offer extrinsic directed motivation.
   e) Single concepts have diagnostic value. It is easy to determine what concept a student has difficulty grasping.
   f) Single concepts are bite-sized, well within the grasp of most students. Students have the satisfaction of conducting most studies on their own (requiring few human resources on the part of the college).

INDEX TO

SAMPLE PAGES FROM SCIMP MATERIALS

FLOW CHART


THINK YOU KNOW HOW TO DO IT
FAIL
SEE WHICH CONCEPTS MUST BE COMPLETED AND CHOOSE ONE TO TRY
TEACHER
FEEL COMPETANT
TAKE MINI TEST ON A CONCEPT
TUTOR
FEEL COMPETANT
DONT THINK YOU CAN DO IT
NEED STUDY
NEED STUDY
FEEL COMPETANT
PASS
NEED STUDY
WORKSHEET OR TEXTBOOK
FEEL COMPETANT
Name
Concept
1 2 3
Donald Duck X X
Mickey Mouse X X X
Fritz Cat X
Snow White X X X
IF ALL CONCEPTS HAVE BEEN PASSED
NEED STUDY
VIDEO TAPE
CHOOSE A METHOD OF INSTRUCTION
PASS COURSE
IF NOT ALL CONCEPTS HAVE BEEN COMPLETED

GAME PLAN FOR STUDENTS

REQUIREMENTS AND PROCEDURES FOR MATH - 01

Handouts: 1 Booklet listing Math concepts and examples
1 Booklet of Worksheets for Math 01
1 Chart showing course operation

Instructor's Name: ______________________ T.V. Playback Room No. 7206

Instructor's Room No. ______________________ Testing Room No. 7208

Instructor's Office Hours ______________________ Tutoring Room No. 7208

Course Section No. ______________________

1. TWO REQUIREMENTS

To pass this course, you must:

a) Pass 71 mini tests with a grade of 80% or better.
b) Take a final examination.

2. EXAMINATION PROCEDURE

When you feel ready to show you have mastered a skill, a clerk in Room 7208 will hand you a test sheet and an answer sheet for the concept you are doing. Take these to a desk in the "Testing Area" and put all books and papers aside. No talking or visitors permitted in the "Testing Area." Write on the answer sheet only. Take as much time as you wish. When finished, bring both sheets back to the clerk who will score them and tell you your grade (time permitting).

A grade of 80% is a "pass" and will be so indicated on a chart on the bulletin board. A grade of less than 80% is a "fail" and will not be counted against you in your grade, nor will the failing grade be shown on the class chart. After failing a test, it would be wise to get more instruction to find out what you did wrong. Then you may take the test again (a different form of the same test) and try to pass it. If you fail again, SEEK HELP! Remember, you must pass all 71 concepts.

3. FINAL EXAM

When you pass all the exams for the assigned concepts, you may ask to take the final exam. This exam may be taken before, during or after the semester's end. See your instructor or the Math lab coordinator for the times the final will be offered.

4. "TESTING OUT"

If the concept you are on looks easy, and you can do the examples shown in the booklets, you probably can pass the mini test without any instruction at all. Try "testing out."

5. GRADES

When you complete the required concepts, you are guaranteed a "D" for the course. If you make better than a "D" on your final exam, you could receive "A, B, C or D", depending on your final exam grade. If you fail the final, you still get a "D".

6. PACING YOURSELF

The beauty of this program is that you can go at your own speed, studying when you want, taking tests when you are ready. You could finish in a few weeks if you were so inclined. If you wish to complete the course by the end of the semester, try to do 6 concepts a week. Try not to get behind! If you don't finish the concepts by semester's end, you may file for an "Incomplete" and pick up next semester where you left off. You can even study between semesters. If you do continue the course into the next semester, YOU MUST FINISH ALL WORK BY THAT SEMESTER'S END if you wish to pass; in other words, you have a limit of 2 semesters to complete the course.

7. HOURS

The TV room (Learning Lab - Room 7206), is open 8:00 a.m. to 9:00 p.m. Monday through Thursday and 8:00 a.m. to 2:00 p.m. on Friday. The tutoring room (Math Workshop - Room 7206) is open for the same hours, but the clerks are available to give tests only from 9:00 a.m. to 9:00 p.m., Monday through Thursday and 9:00 a.m. to 2:00 p.m., Friday.

8. VIDEO TAPE MACHINES

To watch a tape, just find the one you want on a shelf in room 7206, thread it on a video tape player, get headphones from room 7204, and commence your lesson. Aides are standing nearby to help you find what you need and to show you how the video machines operate. Those video tape players are YOUR SLAVES, so make them serve you. If you already know part of the lesson, switch to FAST FORWARD and skip ahead. If you wish to take notes, you may switch to PAUSE. If you wish to review something a second time, REWIND and "PLAY it again, Sam." When finished, kindly rewind the tape, return it to its box and reshelve it.

9. THE 71 CONCEPTS REQUIRED FOR MATH 01

Series	Concept Number
SCIMP	1-37
SCIMP	39-55
SCIMP	57,60,61
SCIMP	63-69
SCIMP	71,72
SCIMP	75-79

10. OTHER WAYS TO LEARN

Besides tapes, you may use worksheets (in your work books), a textbook (see your teacher for suggestions), tutors on duty in room 7208 who will explain parts on the tape or will help you solve problems, and a math instructor, Mr. Foreman. You may even learn from your friends, if you wish.

11. SCHEDULING YOURSELF

You may wish to avoid the 11:00 a.m. to 2:00 p.m. schedule if you don't like crowds. Your instructor is sure to be in room 7208 at your regularly scheduled class hour, so perhaps that time is best for you. Otherwise, feel free to attend any time the lab is open.

12. ABSENTEEISM

If you get behind, you should be prepared to explain "why" to your instructor. A built-in feature of this program is the individual guidance, attention and encouragement you will receive from your instructor.

YOU CAN NOT FAIL THIS COURSE if you follow the above steps. Each concept is fairly simple by itself. No concept is impossible to master. Your perseverance will guarantee your success.
Good Luck!

Math and Media Departments

CONCEPT BOOKLET

KINGSBOROUGH COMMUNITY COLLEGE

SINGLE CONCEPTS

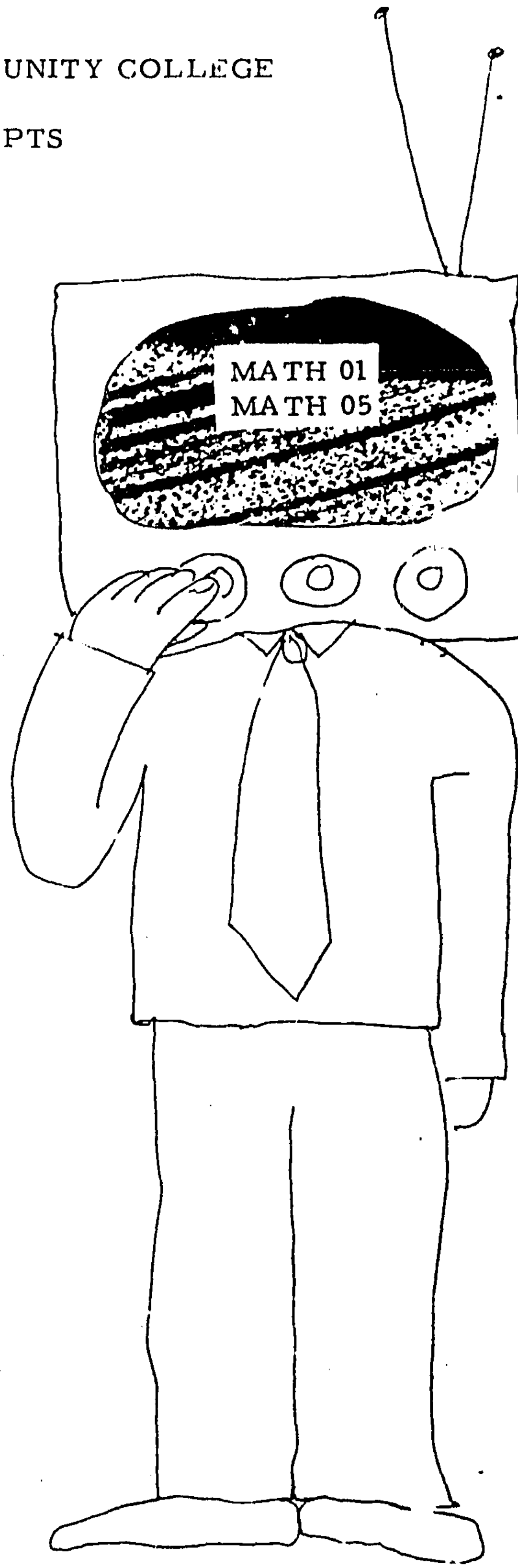
SINGLE

CONCEPT

INTRODUCTORY

MATHEMATICS

PROJECT



BASIC

ARITHMETIC

SKILLS

INVOLVING

COMPUTATION

KINGSBOROUGH COMMUNITY COLLEGE
of
The City University of New York

SINGLE CONCEPT INTRODUCTORY
MATHEMATICS PROJECT

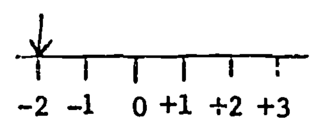
SYLLABUS

Concept
<u>Number</u>

1 SIGNED NUMBERS

Objective: Student will answer correctly 9 out of 10 questions in which he is asked to use signed numbers to represent opposite situations.

Examples:
1. If +\$8 means a profit of \$8, what does − \$8 mean?
   <u>Ans</u>. A loss of \$8.
2. If +90 means 90 miles east, what does −90 mean?
   <u>Ans</u>. 90 mi.west
3. Locate −2 on the number line. <u>Ans</u>.



2 ADDITION OF SIGNED NUMBERS

Objective: Student will answer correctly 9 out of 10 questions involving the addition of signed numbers.

Examples:		<u>Ans</u>.
1.	(+3)+(+4)	1. +7
2.	(−3)+(−4)	2. −7
3.	(−2)+(3)+(−7)+(−1.3)	3. −7.3
4.	During a one day period, the value of a stock rose \$3 dropped \$½ and before closing dropped another \$1½. What was the net change?	4. +\$1

3 MULTIPLICATION OF SIGNED NUMBERS

Objective: Student will answer correctly 9 out of 10 questions involving the multiplication of signed numbers.

Examples:		<u>Ans</u>.
1.	(+2)(+3)	1. +6
2.	(1)(−2)(+3)	2. +6
3.	$\left(-\frac{3}{5}\right)\left(-\frac{5}{3}\right)$	3. +1
4.	(+1.5)(−1.3)	4. −1.95

Concept Number

4 SUBTRACTION OF SIGNED NUMBERS

Objective: Student will answer correctly 9 out of 10 questions involving the subtraction of signed numbers.

Examples:

1. Subtract $\begin{array}{r}-14\\ \underline{+15}\end{array}$ — Ans. 1. -29
2. $(-2)-(-2)$ — 2. 0
3. $6.9-(-3.2)$ — 3. $+10.1$
4. How much is 18 decreased by -8 — 4. $+26$

5 DIVISION OF SIGNED NUMBERS

Objective: Student will answer correctly 9 out of 10 questions involving the division of signed numbers.

Examples:

1. $\frac{+18}{+6}$ — Ans. 1. $+3$
2. $\left(-\frac{1}{2}\right)\div\left(-\frac{1}{3}\right)$ — 2. $+\frac{3}{2}$
3. If we divide a debit of \$ 10 among two people. How much would each person have to pay? — 3. \$5

6 VERBAL PHRASES AND MATHEMATICAL SYMBOLS

Objective: Student will correctly complete 9 cut of 10 questions calling for mathematical symbols or verbal phrases.

Examples:

1. Using mathematical symbols express the following
   a) The sum of 7 and a number x. — Ans. 1. a) $7+x$
   b) Ten less than 5 times the number x. — b) $5x-10$
2. If one suit cost \$60 represent the cost of x suits. — 2. $60x$
3. Express $2x-3$ as a verbal phrase. — 3. Two times a certain number diminished by 3.

Concept Number

117 IDENTIFYING LINEAR AND QUADRATIC EQUATIONS

Objective: Student will correctly answer 4 out of 5 questions requesting that he identify a straight line, parabola, circle, ellipse and hyperbola from a given equation.

Examples: Name the curve that is the graph of the following:

1. $y = 2x+3$ Ans. straight line

2. $x^2+y^2 = 9$ Ans. circle

3. $xy = -7$ Ans. hyperbola

4. $2x^2+y^2 = 10$ Ans. ellipse

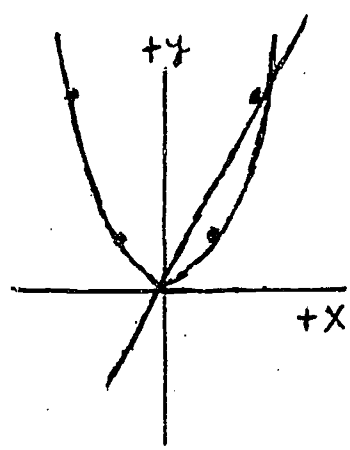
118 SOLVING GRAPHICALLY PAIRS OF EQUATIONS: QUADRATIC OR LINEAR

Objective: Student will correctly solve graphically 2 out of 3 systems of equations consisting of a first-degree and a second-degree equation.

Example: 1. Solve graphically

$$y = x^2$$

$$y = 2x$$



WORKBOOK

KINGSBOROUGH COMMUNITY COLLEGE

WORKSHEETS FOR MATH 01

INTRODUCTORY ALGEBRA BY THE SINGLE CONCEPT APPROACH

WORKSHEET

Algebra

Concept #2

Addition of Signed Numbers

Adding signed numbers means combining them. What we want when we add signed numbers is a single number which represents the total combined effect.

HINT: To add signed numbers think of the positive number as a credit and the negative as a debit or by thinking of these numbers as points won or lost in a game.

Addition

1)	+8 +3 ans. +11	You have 8 and you have 3 you have 11
2)	+ 1 +13 +14	you have 1 and you have 13 you have 14
3)	+6 -4 +2	you have six and you owe 4 Then you have 2
4)	-13 +25 +12	you owe 13 and you have25 you have 12
5)	+8 -9 -1	you have 8 and you owe 9 you owe one
6)	-12 + 5 -7	you owe 12 and you have 5 you owe 7

Answer the following addition problem

1)	+7 +2 ____
2)	+2 +7 ____
3)	+10 -3 ____
4)	-15 +16 ____
5)	-13 +10 ____
6)	-13 + 2 ____

Addition

7) $\begin{array}{r} -3 \\ +0 \\ \hline -3 \end{array}$

you owe 3
and
you have nothing

you owe 3

8) $\begin{array}{r} 0 \\ +5 \\ \hline +5 \end{array}$

you have nothing
and then
you have 5

you have 5

9) $\begin{array}{r} -5 \\ -3 \\ \hline -8 \end{array}$

you owe 5
and
you owe 3

you owe 8

10) $\begin{array}{r} -2 \\ +1 \\ +13 \\ -12 \\ +15 \\ -5 \\ \hline +10 \end{array}$

you owe 2
you have 1
you have 13
you owe 12
you have 15
you owe 5

you have 10

11) (+11) + (-3) + (-5) = (+3)

Note, that the "+" plus sign can have two meanings. It can tell the kind of number (positive or negative) we have. The "plus" can also tell what to do "add"

Answer the following addition problem

7) $\begin{array}{r} -4 \\ 0 \\ \hline \end{array}$

8) $\begin{array}{r} 0 \\ +\ 7 \\ \hline \end{array}$

9) $\begin{array}{r} -\ 7 \\ -\ 10 \\ \hline \end{array}$

10) $\begin{array}{r} -5 \\ +13 \\ -12 \\ +1 \\ -4 \\ +7 \\ -10 \\ \hline \end{array}$

11) (+12) + (-4) + (-3) + (-7)

12) (-1.3) + (-1.2) + (+2.1)

WORKSHEET

Algebra

Concept #3

MULTIPLICATION OF SIGNED NUMBERS

In multiplying signed numbers the only new question is the sign of the product.

Rules for Multiplying Two Signed Numbers

Like Signs ((+)(+) or (-)(-)) result in positive product
Unlike Signs (+)(-) or (-)(+) result in negative product

Multiple:

(1)
(+2)(+3) multiply (2)(3) as if it had not sign. Now remember the rule like signs (both plus) result in positive product. Therefore (+2)(+3) = +6.

(2)
$(+2)(+3\frac{1}{2})$ The rule is as above
$(+2)\left(+3\frac{1}{2}\right) = +7$

(3)
(+5)(-3) Unlike signs the result is a negative product. Therefor (+5)(-3) = -15

(4)
(-3)(+5) Unlike signs → the result is a negative product. Thus our answer (-3)(+5) = -15
Note: (-3)(+5) = (+5)(-3)

(5)
(-2)(-3) Like sign the result is a positive product. Yes indeed, even when both signs are negative! Thus (-2)(-3) = +6

(6)
(-5)(-1.1) = (+5.5)

(7)
(+2)(+3)(-4)
In multiplying more than two signed numbers, we first consider the first two factors (+2)(+3) and the answer to (+2)(+3) is (+6). Now (+6) is multiplied by (-4). Thus, (+6)(-4) = -24. It makes no difference if we multiplied from right to left (-4)(+3) = -12
Now (-12)·(+2) = -24 Same answer

For the Student to Indicate

(1)
(+2)(+4) =

(2)
(+3)(+12) =

(3)
$(+7)\left(2\frac{1}{2}\right) =$

(4)
(+8)(-9)

(5)
(+7)(-3) =

(6)
(-4)(+5)

(7)
(-4)(+1.2) =

(8)
(-1)(-1)

(8)
Note the effect that zero has upon a product.
(+12)(-13)(-5)(+7)(0)(-8)(+1) = 0

(9)
(-10)(-3)(-5)(-2). You might note that if there is an even number of negatives the product will be positive. Ans. <u>+300</u>

(10) If there is an odd number of negatives (-1)(-2)(-3) = -6 The product will be negative.

(9)
(-2)9-13)

(10)
(-25)(-5)

(11)
(+2)(+3)(-1)

(12)
(+7)(-2)$\left(-\frac{1}{2}\right)$

(13)
(+2)(+11)(-2)(-3)

(14)
(-2)(0)$\left(-\frac{1}{2}\right)$(1.2)

(15)
(-2)(-3)(-103)(-1)

Combine Fractions with Unlike Denominators

Things to remember!

1. The numerator and the denominator of a fraction may be multiplied bt the same number without changing the value of the fraction:

Example: $\frac{2}{3} = \frac{2}{3} \cdot \frac{2}{2} = \frac{4}{6}$ or $\frac{2}{3} \cdot \frac{11}{11} = \frac{22}{33}$

$\frac{1}{2} = \frac{1}{2} \cdot \frac{7}{7} = \frac{7}{14}$ or $\frac{1}{2} \cdot \frac{3}{3} = \frac{3}{6}$

$\frac{1}{x} \cdot \frac{y}{y} = \frac{1y}{xy}$ or $\frac{1}{x} \frac{3y}{3y} = \frac{3y}{3xy}$ Get it?

2. Fractions must have the same denominator before they can be added.

Illustrative Examples

Combine:

(1) $\frac{1}{2} + \frac{1}{8}$

Rule (2) tells us we can't combine unless the denominators are the same.

So? So what do we do?
Must get the denominators 2 and 8 to be the same.

Suppose we multiply $\frac{1}{2}$ by $\frac{4}{4}$

To tell the truth multiplying by $\frac{4}{4}$ is on more then multiplying by 1.
Yes, $\frac{4}{4} = 1$ multiplying by 1 is a kosher procedure mainly because we don't change anything.

Thus $\frac{1}{2} + \frac{1}{8}$ is really

$\frac{1}{2} \cdot \frac{4}{4} + \frac{1}{8} = \frac{4}{8} + \frac{1}{8}$

Do we have to do anything to the $\frac{1}{8}$? No!

Now indeed $\frac{4}{8} + \frac{1}{8} = \frac{5}{8}$

Finally we proclaim proudly
$\frac{1}{2} + \frac{1}{8} = \frac{5}{8}$

To be completed by the student

Combine:

(1) $\frac{1}{2} + \frac{1}{4}$

(2) $\frac{1}{3} + \frac{1}{6}$

(3) $\frac{3}{4} + \frac{1}{8}$

(4) $\frac{5}{12} + \frac{17}{36}$

(5) $\frac{3}{4} + \frac{5}{100}$

(6) $\frac{2}{3} + \frac{1}{4}$

(7) $\frac{5}{8} + \frac{1}{3}$

(8) $\frac{4}{5} + \frac{5}{6} + \frac{7}{10}$

(9) $\frac{7}{12} - \frac{1}{3}$

(10) $\frac{k}{4} - \frac{k}{8}$

Illustrative Examples

(2) $\frac{1}{2} + \frac{4}{7}$

$\frac{1}{2}\frac{(7)}{(7)} + \frac{4}{7}\frac{(2)}{(2)}$

$\frac{7}{14} + \frac{8}{14} = \frac{15}{14}$

(3) $\frac{3}{5} + \frac{1}{2}$

$\frac{3}{5} \cdot \frac{2}{2} + \frac{1}{2} \cdot \frac{5}{5}$

$\frac{6}{10} + \frac{5}{10} = \frac{11}{10}$

(4) $\frac{1}{2} + \frac{1}{4} + \frac{5}{8}$

All three must have the same denominator

$\frac{1}{2} \cdot \frac{(4)}{(4)} + \frac{1}{4}\frac{(2)}{(2)} + \frac{5}{8}$

$\frac{4}{8} + \frac{2}{8} + \frac{5}{8} = \frac{11}{8}$

(5) $\frac{1}{2} - \frac{1}{3} = \frac{1}{2}\frac{(3)}{(3)} - \frac{1}{3}\frac{(2)}{(2)}$

$\frac{3}{6} - \frac{2}{6} = \frac{1}{6}$

(6) $\frac{b}{5} - \frac{b}{10}$

$\frac{6}{5}\frac{(2)}{(2)} - \frac{b}{10}$

$\frac{2b}{10} - \frac{b}{10} = \frac{2b-b}{10} = \frac{b}{10}$

(7) $\frac{ab}{6} + \frac{c}{2}$

$\frac{ab}{6} + \frac{c}{2}\frac{(3)}{(3)}$

$\frac{ab}{6} + \frac{3c}{6} = \frac{ab+3c}{6}$

Comcept # 50

To be completed by the student

(11) $\frac{4x}{3} - \frac{2a}{5}$

(12) $a\frac{2}{2} - \frac{5}{b}$

ALGEBRA

Illustrative Examples

(8) $\frac{1}{3} + \frac{2a}{x}$

$\frac{1}{3}\frac{(x)}{(x)} + \frac{2a}{x}\frac{(3)}{(3)}$

$\frac{x}{3} + \frac{6a}{3x} = \frac{x+6a}{3x}$

(9) $\frac{3}{a^3} - \frac{2}{a^2} + \frac{1}{a}$

$\frac{3}{a^3} - \frac{2}{a^2}\frac{(a)}{(a)} + \frac{1}{9}\frac{(a^2)}{(a^2)}$

$\frac{3 - 2a + a^2}{a^3}$

(10) $\frac{7}{8b} - \frac{3}{4b}$

$\frac{7}{8b} - \frac{3}{4b}\frac{(2)}{(2)}$

$\frac{7}{8b} - \frac{6}{8b} = \frac{1}{8b}$

Concept #50

To be completed by the Student

(13) $\frac{3x}{2x} - \frac{1}{x}$

(14) $\frac{c}{a} - \frac{a}{b}$

ALGEBRA

Illustrative Examples

(11) $\frac{1}{a} + \frac{1}{b}$

$\frac{1}{a}\frac{(b)}{(b)} + \frac{1}{b}\frac{(a)}{(a)} =$

$\frac{b + a}{ab}$

(12) $\frac{2}{xy} - \frac{4}{yz}$

$\left(\frac{2}{xy}\right)\left(\frac{z}{z}\right) - \frac{4}{yz}\left(\frac{x}{x}\right)$

$\frac{2z - 4x}{xyz}$

(13) $\frac{2}{y^3} - \frac{3}{y^2} + \frac{7}{y}$

$\frac{2}{y^3} - \frac{3}{y^2} \cdot \frac{(y)}{(y)} + \frac{7}{y} \cdot \frac{(y^2)}{(y^2)}$

$\frac{2 - 3y + 7y^3}{y^3}$

(14) $\frac{1}{ab} + \frac{a-2}{bc}$

$\frac{1}{ab}\frac{(c)}{(c)} + \frac{(a-2)}{(b\ c)}\frac{a}{a}$

$\frac{c + a\ (a-2)}{abc}$

$\frac{c + a^2 - 2a}{abc}$

(15) $\frac{y - 1}{2} - \frac{y - 5}{8}$

$\frac{4}{4}\frac{(y-1)}{(2)} - \frac{(y-5)}{(8)}$

$\frac{4\ (y - 1) - (y - 5)}{8}$

$\frac{4y - 4 - y + 5}{8} = \frac{3y + 1}{8}$

Page 4

Concept # 50

To be completed by the student

(15) $\frac{x}{y} + \frac{y}{x}$

(16) $\frac{2}{y^3} - \frac{3}{y^2}$

(17) $\frac{1}{x^2} + \frac{3}{xy} - \frac{5}{y^2}$

(18) $\frac{a-3}{3} + \frac{a+6}{6}$

(19) $\frac{x+9}{2} + \frac{x-3}{3}$

ALGEBRA

Concept #50

Illustrative Examples

16) $\left(\frac{2a + 3}{12a}\right) - \left(\frac{3a - 6}{8a}\right)$

$\left(\frac{2}{2}\right) \frac{2a + 3}{12a} - \frac{3}{3}\left(\frac{3a - 6}{8a}\right)$

$\frac{2(2a + 3) - 3(3a - 6)}{24a}$

$\frac{4a + 6 - 9a + 18}{24a} = \frac{-5a + 24}{24a}$

17) $\frac{3}{5} + \frac{4m+3}{10} - \frac{8m}{15}$

$\frac{3}{5} \cdot \frac{6}{6} + \frac{3}{3}\left(\frac{4m + 3}{10}\right) - \left(\frac{8m}{15}\right)\frac{2}{2}$

$\frac{18}{30} + \frac{3(4m+3)}{30} - \frac{16m}{30}$

$\frac{18 + 12m + 9 - 16m}{30}$

$\frac{27 - 4m}{30}$

18) $\frac{2}{9} - \frac{2x-3}{6} + \frac{x-1}{2}$

$\frac{2}{9}\frac{(2)}{(2)} - \left(\frac{3}{3}\right)\left(\frac{2x-3}{6}\right) + \frac{9}{9}\left(\frac{x-1}{2}\right)$

$\frac{4 - 3(2x-3) + 9(x-1)}{18}$

$\frac{4 - 6x + 9 + 9x - 9}{18}$

$\frac{4 + 3x}{18}$

19) $\frac{1}{x} + \frac{2}{x+1}$

$\frac{1}{x}\left(\frac{x+1}{x+1}\right) + \left(\frac{2}{x+1}\right)\frac{x}{x}$

$\frac{x+1 + 2x}{x(x+1)} = \frac{3x+1}{x(x+1)}$

to be completed by Student

(20) $\frac{7n - 4}{4} - \frac{3n + 2}{3}$

(21) $\frac{1}{6} + \frac{3x-1}{4} - \frac{x+2}{2}$

(22) $\frac{1}{x+1} + \frac{1}{x}$

(23) $\frac{3}{x+1} + \frac{5}{x+2}$

ALGEBRA

Illustrated Examples

20) $\frac{2}{a+3} + \frac{5}{a+5}$

$\frac{(a+5)}{(a+5)}\frac{(2)}{(a+3)} + \frac{(a+3)}{(a+3)}\frac{(5)}{(a+5)}$

$\frac{2(a+5) + 5(a+3)}{(a+5)(a+3)}$

$\frac{2a + 10 + 5a + 15}{(a+5)(a+3)} = \frac{7a + 25}{(a+5)(a+3)}$

21) $\frac{a}{2a+2b} - \frac{b}{3a+3b}$

First Factor and note

$\frac{a}{2(a+b)} - \frac{b}{3(a+b)}$

$\frac{(3)}{(3)}\frac{a}{2(a+b)} - \frac{2}{2}\frac{b}{3(a+b)}$

$\frac{3a}{6(a+b)} - \frac{2b}{6(a+b)}$

$\frac{3a - 2b}{6(a+b)}$

22) $\frac{x-y}{x+y} + \frac{4xy}{x^2-y^2}$

$\frac{x-y}{x+y} + \frac{4xy}{(x+y)(x-4)}$

$\frac{(x-y)}{x-y}\frac{(x-y)}{(x+y)} + \frac{4xy}{(x+y)(x-y)}$

$\frac{(x-y)(x-y)+4xy}{(x-y)(x+y)}$

multiply $(x-y)(x-y)$

$\frac{x^2 + 2xy + y^2 + 4xy}{(x-y)(x+y)}$

$\frac{x^2 + 2xy + y^2}{(x-y)(x+y)}$

Factor $x^2+2xy + y^2$

$\frac{(x+y)(x+y)}{(x+y)(x-y)} = \frac{(x+y)}{(x-y)}$

To be completed by Student

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

(25) $\frac{9}{x+1} - \frac{3}{4x+4}$

(26) $\frac{x+y}{-y} - \frac{4xy}{x^2 - y^2}$

MINI TESTS

KINGSBOROUGH COMMUNITY COLLEGE
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Test Question Sheet

ALGEBRA | SCIMP Concept #4

Subtraction of signed Numbers | Test A

Do not write on question paper. All work is to be performed on the special answer sheet. Show all work (where applicable) and box your answers.

In examples 1 - 6 subtract the lower number from the upper number.

1) $\begin{array}{r} +50 \\ \underline{+13} \end{array}$ 2) $\begin{array}{r} +27 \\ \underline{-\ 8} \end{array}$ 3) $\begin{array}{r} -6 \\ \underline{+6} \end{array}$ 4) $\begin{array}{r} 0 \\ \underline{-15} \end{array}$

5) $\begin{array}{r} +8.7 \\ \underline{-6.5} \end{array}$ 6) $\begin{array}{r} -3\frac{1}{2} \\ \underline{+2\frac{1}{4}} \end{array}$

Perform the indicated operations

7) (+10) - (+13) 8) (+13) - (-2)

9) (-8.1) - (-9) 10) How much greater than -15 is 12?

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Test Question Sheet

ALGEBRA — SCIMP Concept #4

Subtraction of Signed Numbers — Test B

In examples 1 - 6 subtract the lower number from the upper number.

1) $\begin{array}{r} +40 \\ \underline{+12} \end{array}$ 2) $\begin{array}{r} +27 \\ \underline{-\ 7} \end{array}$ 3) $\begin{array}{r} -10 \\ \underline{+10} \end{array}$ 4) $\begin{array}{r} -0 \\ \underline{-13} \end{array}$

5) $\begin{array}{r} +7.8 \\ \underline{-5.6} \end{array}$ 6) $\begin{array}{r} -3\frac{1}{2} \\ \underline{+1\frac{1}{4}} \end{array}$

Perform the indicated operation

7) (+9) - (+12) 8) (+12) - (-2) 9) (-8.1) - (+.9)

10) How much less than 6 is -3?

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Test Question Sheet

ALGEBRA

SCIMP Concept #4
Test C

In examples 1 - 6 subtract the lower number from the upper number.

1) $\begin{array}{r} +40 \\ \underline{+12} \end{array}$

2) $\begin{array}{r} +27 \\ \underline{-\ 7} \end{array}$

3) $\begin{array}{r} -10 \\ \underline{+10} \end{array}$

4) $\begin{array}{r} 0 \\ \underline{-13} \end{array}$

5) $\begin{array}{r} +7.8 \\ \underline{-5.6} \end{array}$

6) $\begin{array}{r} -3\frac{1}{2} \\ \underline{+1\frac{1}{2}} \end{array}$

Perform the indicated operations

7) $(+9) - (+12)$

8) $(+12) - (-2)$

9) $(-8.1) - (-.9)$

10) How much less than 6 is -3?

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Test Question Sheet

ALGEBRA

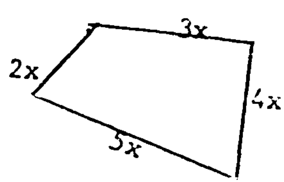
SCIMP Concept #9
Test A

Combining Like Terms

Do not write on this question paper. All work is to be performed on the special answer sheet. Please box your answer.

Combine these like terms:

1. $10y + 2y$
2. $10x + 5x + x$
3. $5c - c$
4. $9yw + 8yw - 3yw$
5. $2\frac{1}{2}a + \frac{1}{2}a$
6. $3.4e + 1.2e$
7. $3.4e - 1.2e$
8. $8.2b + 2.1b - 1.3b$
9. $1x - .7x$
10. Express the perimeter of the following figure



KINGSBOROUGH COMMUNITY COLLEGE
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ORIENTAL BOULEVARD, MANHATTAN BEACH
BROOKLYN, NEW YORK 11235

ABREVIATED COST ANALYSIS FOR USE OF SINGLE CONCEPT VIDEO TAPES

ABBREVIATED COST ANALYSIS

TANGIBLE INPUT

Activity	Input	Remarks
Produce tapes and associated materials	$235/concept	See "Studio Hours and Expense for Typical Recordings" for details.
Operate playback facility	$35,000/yr.	Facility serves SCIMP, BASIC, MAN, and other programs. Handles 500-700 students per week, equivalent to eight 3-credit class sections of 25 students each. See "Operating Playback Facility for One Year" for cost breakdown.

TANGIBLE OUTPUT

Activity	Output	Remarks
Decreased dropout rates, completion rates 50% higher.	About $8000/yr savings	It costs KCC about $200/student each semester to present a 3-credit course. Decreased dropout rate as demonstrated in "Results of SCIMP" study saves recycling 5 students per class, thus saving $1000 per class. The playback facility handles the equivalent of eight 3-credit classes.
Learning rates up 11-18%	No Dollar Figure	See "Results of SCIMP" study for details.
Uniform ability of students emerging from program	No Dollar Figure	

INTANGIBLE OUTPUT

Activity	Output	Remarks
Self-pacing	Saved Time	No wasted ½ semesters for those who know the material presented in the first half of the course.
Liberal use of tutors and release time for teacher	Increased personal attention	Student has no difficulty in getting assistance he needs.
Imaginative TV recordings	Course enjoyable to students	Questionnaires indicate students enjoy watching the tapes. Puppets, skits, music, jokes, special effects, etc., used to "spice up" lessons.
Open scheduling 9 a.m. to 9 p.m.	Course enjoyable to students	Student makes his own study regimen, comes when he pleases, stays as long as he pleases.
Single concepts	Course less threatening to students	Slower students know that by proceeding slowly, they have the chance to complete a course they would have failed otherwise. Also, failure of a mini test is not devastating to a student. Only a student's successes are recorded.

STUDIO HOURS AND EXPENSES

FOR

TYPICAL RECORDINGS

(Data averaged from 150 SCIMP, BASIC, and MAN Productions).

	Talent	Director	Technician	Technician	Assistant	Student Aide Hours
Lesson Plans	1	¼	0	0	0	0
Pre-taping Preparations	3/4	1	½	1	1	¼
Actual Recording	3	3	3	3	3	3
Post-taping Cleanup	0	¼	¼	¼	¼	0
Prepare Worksheets and Tests	1	0	0	0	0	0
Tape Copying and Labeling	0	0	1	½	½	0
Misc.	½	1	½	½	½	0
TOTAL HOURS PER TAPE	6¼	5½	5¼	5¼	5¼	3¼

Pre-taping preparations include:

Determining the order of item presentation
Discussing lesson plans
Preparing visuals, sound effects, gimmics
Partial rehearsal
Camera angle, lighting & "Blocking" of moves
Preparing equipment for recording
Procuring props
Assembling any "extras" or volunteers for taping

By actual Recording we mean:

Recording the tapes
Editing and sound dubbing
Correcting any errors upon reviewing tape
Recording the tape a second time if we find it to be substandard

The total hours mentioned in the table are for a complete, finished product which is:

One master copy, checked and labeled
One student copy, labeled
One student worksheet keyed to the tape, typed and reproduced
One exam answer sheet, typed
Course booklet for each student describing course with examples of each concept, typed and reproduced.
Inclusion of the new tapes in the campus videotape directory

<u>Studio Operation Costs</u>

Software:	1 Master Tape (1 Hr.)	=	\$ 19.47
	1 Copy for student	=	19.47
	Props (averaged)		1.00
	Total software/tape	=	\$ 39.94
Equipment repair (average) @ 10% of total value per year = \$500. Assuming 100 tapes made per year, repair costs per tape		=	5.00
Salary:			
1 Teacher @ \$10/hr x $6\frac{1}{4}$ hr. (assumes \$12,000/yr salary x 30 hr/wk x 40/wk/yr.)		=	62.50
1 Director @ \$10/hr x $5\frac{1}{2}$ hr. (assumes \$15,000/yr salary x 35 hr/wk x 44 wk/yr)		=	55.00
2 Technicians @ \$5.43/hr x $5\frac{1}{4}$ hr. (assumes \$10,000/yr Salary x 40 hr/wk x 46 wk/yr)		=	57.02
1 Assistant @ \$3.05/hr x $3\frac{1}{4}$ hr.		=	10.01
1 Student Aide assistant @ \$1.86/hr x $3\frac{1}{4}$ hr.		=	6.05
	TOTAL SALARY	=	\$ 190.58
	TOTAL COSTS PER TAPE	=	\$ 235.52

COSTS FOR

OPERATING PLAYBACK FACILITY FOR 1 YEAR

Quantity	Position	Hours	Full-Time Yearly Salary	Total
2	Clerks	½ Time	$ 7,000	$ 7,000
6	Student Tutor	1/3 Time	4,000	8,000
1	Math Teacher	Full-Time	14,000	14,000
3	Student Aides	1/3 Time	3,000	3,000
				32,000

NOTE: Playback facility provides other services to school

Amortisement of $15,000 worth of video tape players over a 5-year life: 3,000/yr

TOTAL $ 35,000/yr

RESULTS OF SCIMP

Figures based on following data taken from controlled study comparing SCIMP class with traditional class used on control group.

	SCIMP	REGULAR CLASS
Number of students enrolled	28	28
Number of students passing course by semester's end	11	10
Number of students passing course by 2 months after semester's end	15	10
Average grade of students on final exam	60.5	49.2
Average grade of students who had completed SCIMP before taking final exam	67	--
Final exam grade range	31-94	20-81

NOTE: Any members of the regular class were free to use the tutors, tapes and math workshop personnel on an informal basis if they desired.