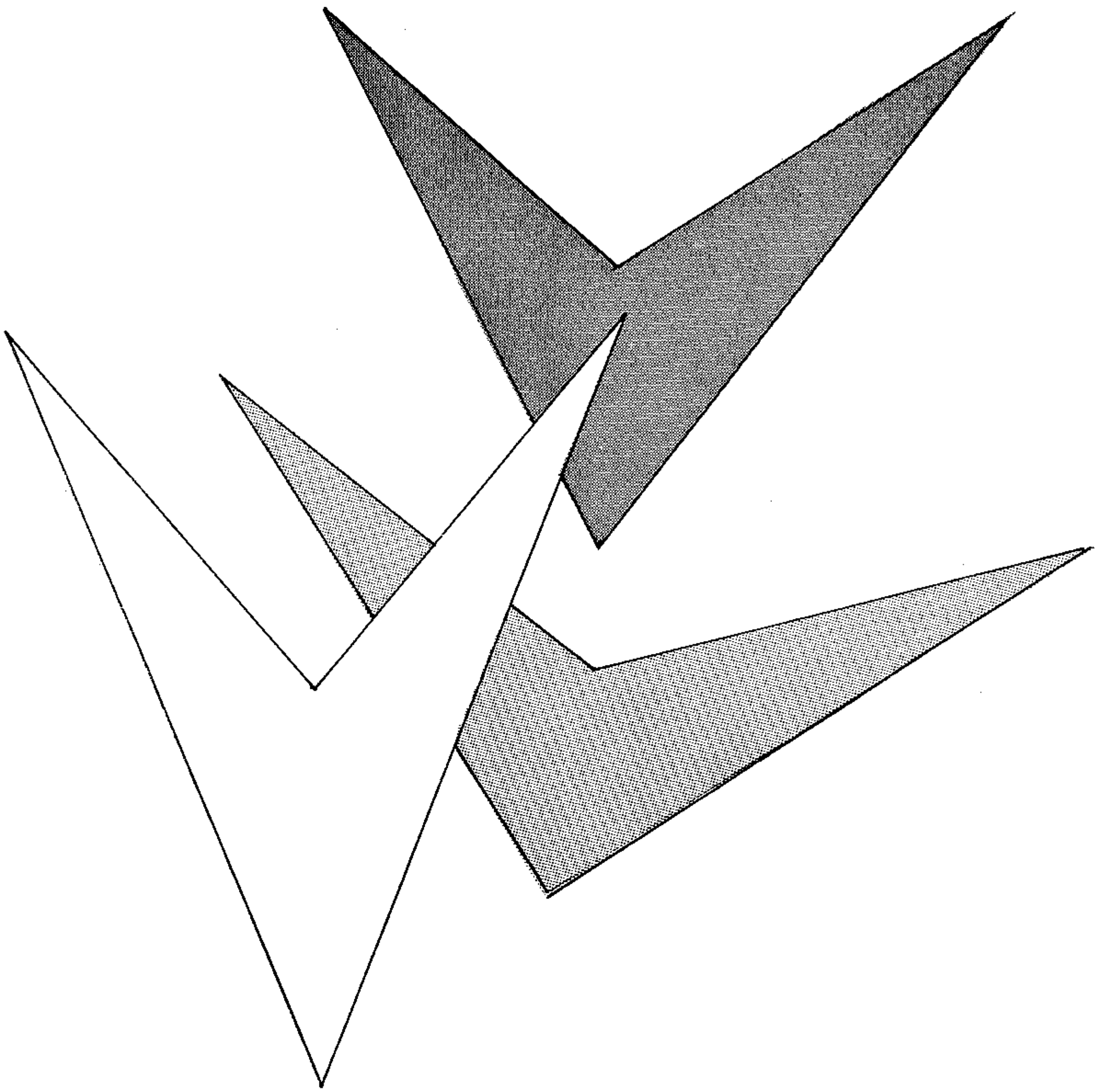
T.C.T.M.

TEXAS MATHEMATICS TEACHER



Texas Council of Teachers of Mathematics

BCH

TEXAS MATHEMATICS TEACHER is a refereed journal and is the official journal of the Texas Council of Teachers of Mathematics. The views expressed are the contributor's own and are not necessarily those of the publisher or the editor. All manuscripts and correspondence about this publication should be addressed to Mr. J. William Brown, *Texas Mathematics Teacher*, 3632 Normandy Avenue, Dallas, Texas 75205.

TEXAS MATHEMATICS TEACHER is published quarterly by the **Texas Council of Teachers of Mathematics.** Payment of membership fee of **$5.00** entitles members to all regular Council Publications.

TEXAS MATHEMATICS TEACHER

Texas Council of Teachers of Mathematics

Volume XXXIII | MAY, 1986 | No. 3

PRESIDENT'S MESSAGE

This has been a hectic and, in some ways, troublesome year for teachers in Texas. The implementation of some of the features of the so-called educational reform legislation has caused problems with morale and for some has negatively affected heir whole attitude toward teaching. The infamous TECAT is over, at least for the first round, but the waiting for results remains. Whether you were insulted by the simplicity of the TECAT or are keeping your fingers crossed while waiting for the results, I hope that you have not let your performance with your students be adversely affected by the anger or the stress that you might have felt. There is still some hope that out of all this there may be some actual improvement in public education in Texas. If so, then maybe the feelings of frustration, or anger, or betrayal, or whatever may be replaced with a new sense of importance and respect; let's hope so. In the meantime let us do the best job we can of showing the citizens of Texas that we are worthy of their trust and respect, that we are competent and caring.

As this school year winds down to its closing I would like to remind you of several things. First, the NCTM Annual Meeting in Washington, D.C., was a successful one. I only wish it would be possible for more of you to attend these meetings, for the teacher in the classroom could profit much from the sessions. Second, make plans now to attend the 33rd Annual Conference for the Advancement of Mathematics Teaching (CAMT) to be held October 9 – 11 in Austin. This year we are planning a breakfast meeting of TCTM with the hope that many more members than usual will attend and take part in our annual meeting. Keep a lookout for additional information on this matter. Last (and maybe least) check your mailing label on this copy of the journal. It shows the date to which your dues are paid up. If your membership has expired, or is due to expire soon, please renew your membership using the form on the back of this journal (or a copy of it). We do solicit your continued membership and encourage your participation in the activities and governance of TCTM.

As a final thought let me say to you that I hope that any bad feelings generated this year can be set aside and that next year will be a happy and productive one for all of us.

– Ralph W. Cain

PROPOSED DATES FOR CAMT

1986: October 9 – 11	**1989: June 22 – 24**
1987: August 3 – 5	**1990: June 20 – 22**
1988: August 2 – 4	**1991: June 19 – 21**

Note your mailing label for renewal date of TCTM membership!

STUFF Strategic Tactics Ultimately For Fun

Dear T.C.T.M. Members:

We have been to the National Council of Teachers of Mathematics annual conference in Washington, D.C. How did you spend April 1st through 4th? You obviously did not spend the week writing material for this column.

We are pleased to announce the winner of free membership for this issue -- David Whipkey of Cypress-Fairbanks I.S.D. David, your activity was interesting and your words on "guilt" were inspiring. Thank you, we needed that!

Summer is ahead, so all of you should clean out your cabinet. Send STUFF all the clever ideas you filed last September and have not had time to use. Tomorrow is a new day. Send your multi-paged contributions to Bettye Hall, 3830 Richmond Avenue, Houston, Texas 77027.

Semi-sincerely,

The STUFF Staff
Judy and Bettye

PRIMARY
HOW LONG IS A MINUTE?

Grade levels: 1,2
Number of students: whole class
Topic: Concept of one minute
Material: Clock with second hand and a recording sheet.

For each activity on the recording sheet, ask several students to guess how many times that the activity can be done in one minute. After the guesses are recorded, have the group actually do the activities while you time them for one minute. Ask each child to record his/her performance on the record sheet. Have the students compare the guesses with the performances.

The one minute interval is difficult for young children to abstract. You may need to provide other activities.

The recording sheet should contain these columns:

GUESS	ACTIVITY	MEASURED

The activities could include:

The number of times you breathe in one minute.
The number of times you can write your name in one minute.
The number of times you can hop in place in one minute.
The number of sit-ups you can do in one minute.
The number of words you can read in one minute.
The number of times you can clap your hands in one minute.
The number of jumping jacks you can do in one minute.
The number of rope skips you can do in one minute.

ADDITION MAZE

Grade levels: 2,3
Number of students: whole class
Materials needed: number chart

5	12	11	3
8	4	15	6
13	10	1	14
2	7	16	9

Make a number chart for each student. To use the chart, the students start in the left hand boundry on any square and add the numbers on a path through the squares to give the required sum. Moves may be made to the right, upward, or downward until a square on the right hand boundary is reached. MOVES CANNOT BE MADE TO THE LEFT OR DIAGONALLY.

Find the path which gives the sum of 37, 49, 61, 41, 33, or 71.

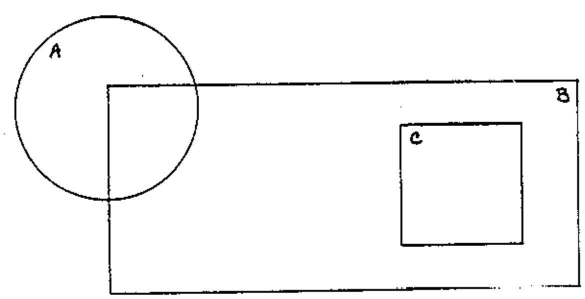
INTERMEDIATE
LOGIC WITH BEANS

Grade levels: 3,4,5
Number of students: small group or whole class
Materials needed: copy of the diagram below and 6 beans, 6 buttons or 6 small pieces of paper.

The students place the six pieces on the diagram in such a manner that the conditions of a problem are met. There are several solutions to some of the problems so students should be encouraged to share the various ones that they have. Be sure that they understand that a piece placed in C is also in B and that there is a section of A that is also in B.

Problems: Place 6 beans in the diagram so that the total number of beans in each set satisfies the given conditions.

1. A is even. B is even. C is even.
2. A is odd. B is odd. C is odd.
3. A is odd. B is odd. C is even.
4. A is even. B is odd. C is even.
5. A is even. B is even. C is odd.
6. A is odd. B is even. C is odd.
7. A is even. B is odd. C is odd.
8. A is odd. B is even. C is even.



JUNIOR HIGH SCHOOL/MIDDLE SCHOOL
SLIDES

A slide means just what the word says. You slide or move the drawing in a certain direction a certain distance. The direction and length of a slide is shown by an arrow. The direction of the arrow is the direction of the slide and the length of the arrow is the length of the slide.

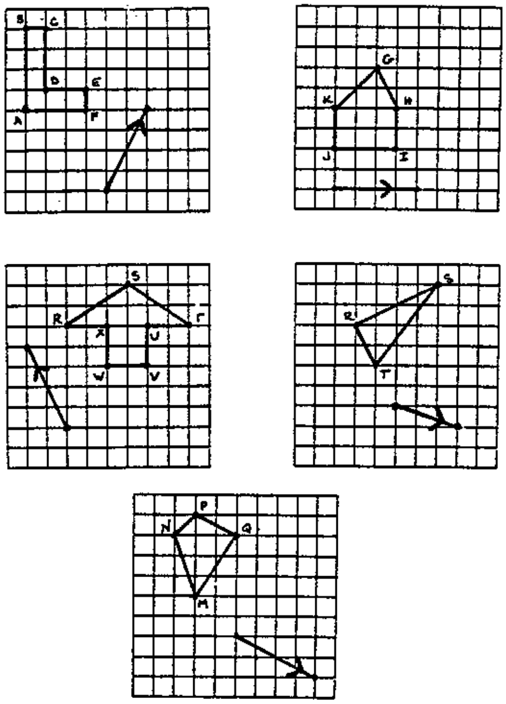
In the figure to the left the arrow indicates a downward movement.

To get from the top dot to the bottom dot you go over 3 squares and down 4 squares.

This motion would be used for all points on the figure. The easiest way to perform the slide is to move the vertices of the figure and then connect the points.

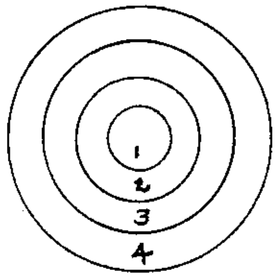
SLIDES

Directions: Draw each figure after the indicated slide.



SENIOR HIGH SCHOOL DART BOARD

This is an extension of the Dart Board game for Junior High in the last issue of TMT



1. A dart board consists of four concentric circles with radii 1, 2, 3 and 4 units. If points are assigned to each ring inversely proportional to its area, how should the points be assigned?

   (Answer: ring 1 = 105 points, ring 2 = 35 points, ring 3 = 21 points, ring 4 = 15 points)

2. What should the radii of the concentric circles be if each region is to have the same area?

   (Answer: region 1 has a radius of 1 unit, region 2: $\sqrt{2}$ units, region 3: $\sqrt{3}$ units, and region 4: 2 units)

3. What should the radii of the concentric circles be if each region is to be twice as large as the previous region (begin in the center)?

   (Answer: region 1 has a radius of 1 unit, region 2: $\sqrt{3}$ units, region 3: $\sqrt{7}$ units, and region 4: $\sqrt{15}$ units)

4. The dart board is constructed of four concentric hexagons. How long should the sides of each hexagon be if each of the 4 regions, moving outward, is to be twice as large as the one that proceeds it?

   (Answer: side 1 is 1 unit long, side 2: $\sqrt{2}$ units, side 3: $\sqrt{3}$ units, and side 4: 2 units)

5. How long should the sides of each concentric hexagon be if each of the four regions, moving outward, is to be twice as large as the one that preceeds it?

   (Answer: side 1 is 1 unit long, side 2: $\sqrt{3}$ units, side 3: $\sqrt{7}$ units, and side 4: $\sqrt{15}$ units)

6. Can the results of problems 2 through 5 be generalized to dart boards of other shapes? Explain your answer.

   (Answer: Yes. The same relationships hold for any dart board made up of regular polygons.)

Contributed by David Whipkey, Cypress-Fairbanks High School
Cypress-Fairbanks I.S.D.

THIS, THAT, AND OTHER THINGS

ACTIVITIES FOR THOSE DOWN TIMES IN CLASS!

GOOD LUCK!!!!

1. How do you write 13 in Roman numerals?
2. How do you write 1313 in Roman numerals?
3. What is a baker's dozen?
4. What does the 13th Amendment to the U.S. Constitution forbid?
5. Whose name is 13th in the alphabetical order of last names in this class?
6. In what year was Super Bowl 13 played?
7. Name the 13 original colonies.
8. How is a Bar Mitzvah connected with the number 13?
9. How do you say 13 in French?
10. How do you say 13 in Spanish?
11. Who was the 13th U.S. President?
12. How much is 13 times 13?
13. Many people believe that the number 13 is unlucky. Give another superstition.

Contributed by: Beth Graham, 5th grade, Rancho Isabella Elementary School, Angeleton, Texas

CALCULATING PUZZLES

Use your calculator to answer these questions. Check the display at the end of the sequence.

Question: What part of your body do you stand on?

1. Start with the number 100.
2. Add the number of elbows on 12 people.
3. Subtract the number of fingers on one hand.
4. Subtract three gumballs from five gumballs and subtract your answer.
5. Add the number of hands on 49 people.
6. Multiply by three because three fingers got caught in the door.
7. Subtract eight and turn the calculator upside down.

Question: What is on the beach?

1. Start with 10,000 grains of sand.
2. Add 77 starfish.
3. Subtract 70 starfish who got caught in a net.
4. Subtract seven more starfish because the octopus ate them.
5. Multiply by seven sunbathing people.
6. Add 7,000 more grains of sand.
7. Add 345 frankfurters to eat and turn your calculator upside down.

ANIMAL ANTICS

Question: A farmer buys 100 live animals for $100. How many of each animal does he buy if chicks are 10 cents each, pigs are $2 each, and sheep are $5 each?

(Continued, Page 8)

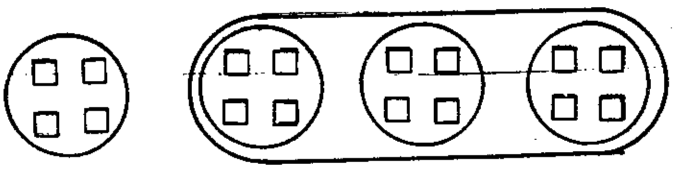
RATIO AND PROPORTION: MANIPULATIVES TO SYMBOLS

John Huber
Sam Houston State University

A ratio can be defined as the comparison of the number of objects in two or more sets. For example, the ratio of the number of boys to the number of girls in a class might be 1 to 2 while the ratio of the number of A's to the number of B's to the number of C's might be 2 to 3 to 4. A proportion is then defined as the equivalence of two ratios. The purpose of this paper is to examine the concept of equivalent ratios beginning at the manipulative level and making a transition to the symbolic level.

Multiplication and Division

Since equivalency of ratios is a multiplicative process, we must examine the concept of multiplication and its inverse operation, division. The concept of multiplication can be interpreted in two quite different ways. First, a x b can be interpreted as 'a' groups of 'b' objects. For example, 3 x 4 can be interpreted as three groups of four objects. (See Figure 1.)

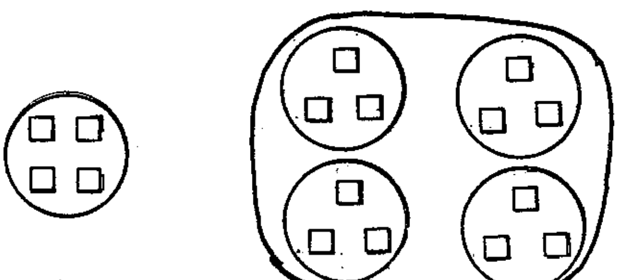


4   3 x 4

Figure 1

This method will be referred to as "repeated addition."

A second interpretation of a x b is that for each unit in b, substitute a units. For example, 3 x 4 can be interpreted as for each of the 4 objects, substitute 3 objects. (See Figure 2.)



4   3 x 4

Figure 2

This method will be referred to as "equal substitution."

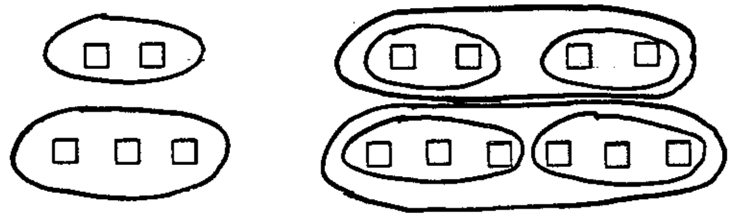
Each of the above interpretations of multiplication has a corresponding inverse operation. Corresponding to the "repeated addition" model of multiplication is the "equal subtraction" model of division. That is, c ÷ a means how many groups of 'a' can be repeatedly subtracted from 'c'. For example, 12 ÷ 4 means "how many groups of 4 can be subtracted from 12?"

Corresponding to the "equal substitution" model of multiplication is the "equal distribution" model of division. For example, 12 ÷ 4 means replace every 4 units in 12 with 1 unit.

Equivalently, "equal subtraction" can be interpreted as: "Given 12 objects, how many groups of 3 objects can be formed?" "Equal distribution" can be interpreted as: "Given 12 objects, how many objects will be in each group if 3 equal sized groups are formed?"

Equivalent Ratios

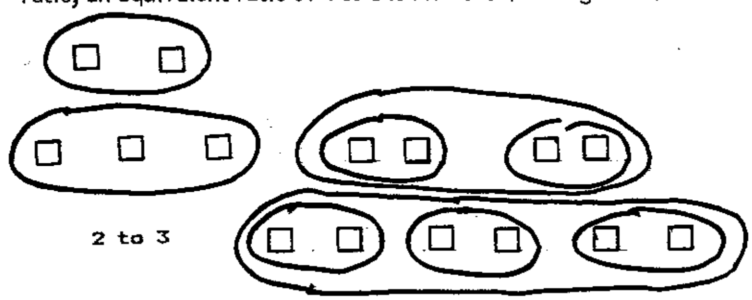
Since we have two different models of multiplication we have two different models of equivalent ratios. Given a ratio of 2 to 3, one interpretation of an equivalent ratio would be an "equal addition" model. Consider a ratio of two objects in one set corresponding to three objects in the second set. Then, if two objects are added to the first set and three objects are added to the second set (or any multiple of these), an equivalent ratio is formed. (See Figure 3.) Thus, the ratio c to d is equivalent to the ration a to b if and only if c is some multiple of a and d is the same multiple of b, i.e., there is a real number k such that $c = k \times a$ and $d = k \times b$.



2 to 3   4 to 6

Figure 3

A second interpretation of equivalent ratios is the "equal substitution" model. If for each object in the sets of the original ratio we substitute equal sized sets, an equivalent ratio is formed. For example, given the ratio of 2 to 3, if we substitute 2 objects for each of the objects in the original ratio, an equivalent ratio of 4 to 6 is formed. (See Figure 4.)



2 to 3   4 to 6

Figure 4

Thus, the ratio of c to d is equivalent to the ratio of a to b if and only if each element of c is formed by replacing each element of a with k elements and d is formed by replacing each element of b with k elements, i.e., there is a real number k such that $c = a \times k$ and $d = b \times k$.

Note that each of the above models can be generalized to a comparison of more than two sets. The ratio a_1 to a_2 to . . . to a_n is equivalent to the ration b_1 to b_2 to . . . to b_n if and only if there is a real number k such that

$$b_i = ka_i \text{ for all } i = 1, \ldots, n.$$

Solving Problems

Suppose we have a ratio of 2 squares to 3 triangles. We want to find an equivalent ratio with 12 triangles. (See Figure 5.)

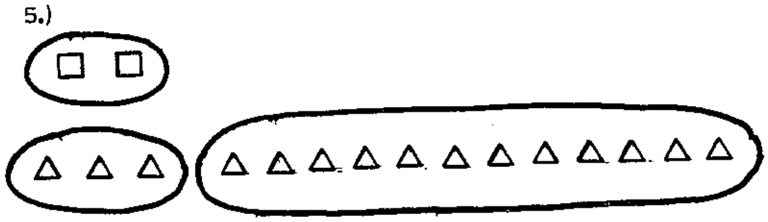


Figure 5

Using the "equal addition" model we will undo the problem with an "equal subtraction" model of division. That is, we will find how many groups of 3 triangles there are in the 12 triangles. (See Figure 6.) Then for each of the 3 triangles there are two

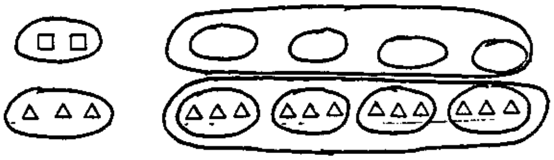


Figure 6

corresponding squarees. (See Figure 7.)

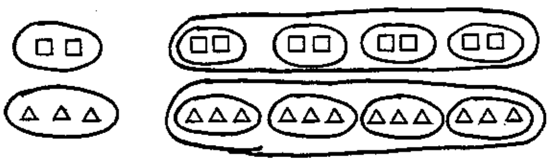


Figure 7

Thus, 2 squares to 3 triangles is equivalent to 8 squares to 12 triangles.

Using the "equal substitution" model we will undo the problem with an "equal distribution" model for division. That is, we will find how many triangles are in each of the 3 groups of 12 triangles. (See Figure 8.) Then for each of the 2

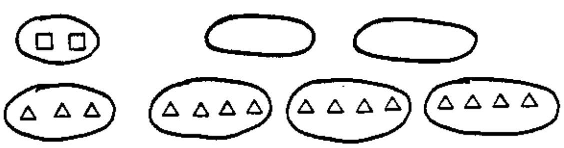


Figure 8

squares we will substitute 4 squares. (See Figure 9.) Then, 2 squares to 3 triangles is equivalent to 8 squares to 12 triangles.

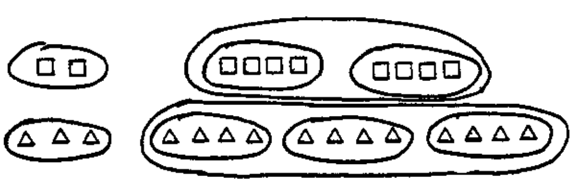


Figure 9

Transition to Symbols

In making a transition to symbols we begin by replacing the objects with numerals. Suppose we want to form a ratio equivalent to the ratio 4 to 5 with 30 corresponding to 5. (See Figure 10.) Using the "equal addition" model we find how many

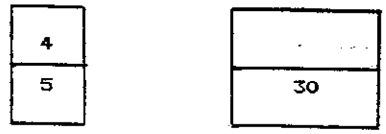


Figure 10

groups of 5 are in 30. (See Figure 11.) Then for each of the 5

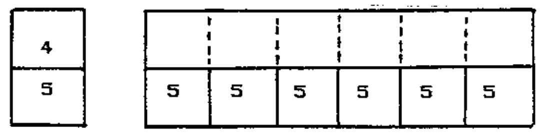


Figure 11

there are 4 corresponding in the first set. (See Figure 12.)

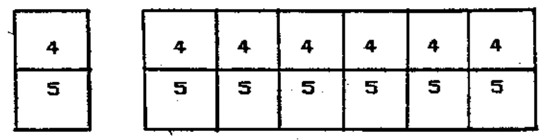
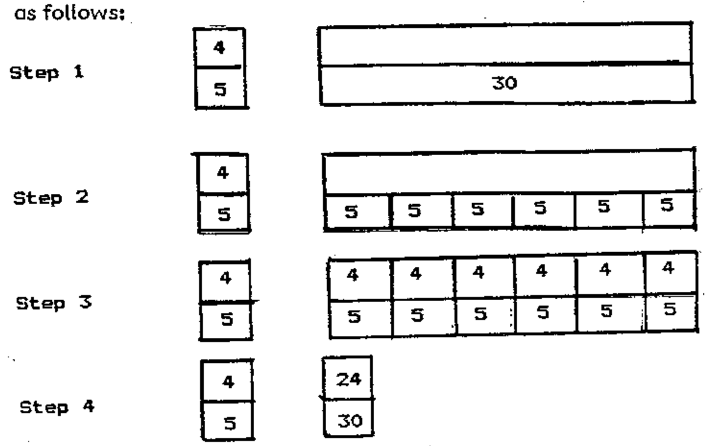


Figure 12

Thus, 4 to 5 is equivalent to 24 to 30. This can be summarized as follows:



Using the "equal substitution" model on the same problem we begin as in Figure 10 but we want to find how many are in each of the five groups in 30. (See Figure 13.) Then for each of the 4 we

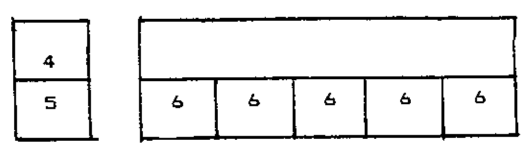


Figure 13

will substitute 6. (See Figure 14.) Thus 4 to 5 is equivalent

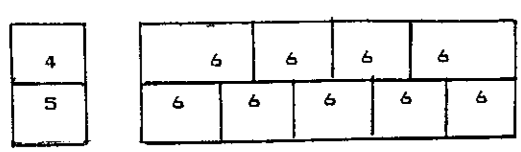
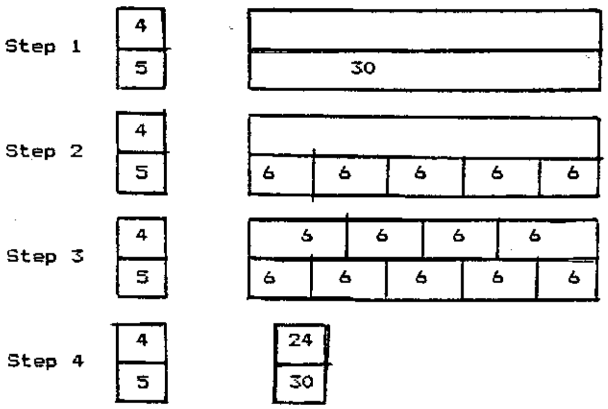


Figure 14

to 24 to 30. Again, this can be summarized as follows:



Next using only symbols for each the two models we have:

	Equal Addition	Equal Substitution
Step 1	$\frac{4}{5} = \frac{}{30}$	$\frac{4}{5} = \frac{}{30}$
Step 2	$\frac{4}{5} = \frac{}{6 \times 5}$	$\frac{4}{5} = \frac{}{5 \times 6}$
Step 3	$\frac{4}{5} = \frac{6 \times 4}{6 \times 5}$	$\frac{4}{5} = \frac{4 \times 6}{5 \times 6}$
Step 4	$\frac{4}{5} = \frac{24}{30}$	$\frac{4}{5} = \frac{24}{30}$

Combining the two models and using only symbols we have:

$$\frac{4}{5} = \frac{}{30}$$

$$\frac{4}{5} = \frac{}{(30 \div 5) \times 5}$$

$$\frac{4}{5} = \frac{(30 \div 5) \times 4}{(30 \div 5) \times 5}$$

$$\frac{4}{5} = \frac{24}{30}$$

Finally, using only symbols we have:

$$\frac{4}{5} = \frac{(30 \div 5) \times 4}{30}$$

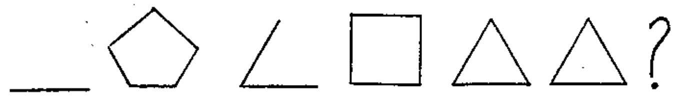
Conclusion

If a student has a conceptual understanding of the two models of multiplication and the two corresponding models of division along with the symbols used to represent these models, a student can develop a conceptual understanding of ratio and proportion beginning at the manipulative level and progressing to a symbolic understanding. To simply say that two ratios are equivalent if their cross products are equal leads to very little understanding much less any chance of applying the concept. Let's teach mathematics in a meaningful way that students can understand and apply.

(CONTINUED FROM PAGE 5)

FRANTIC FIGURES

Question: In logical sequence, what should the next figure be?



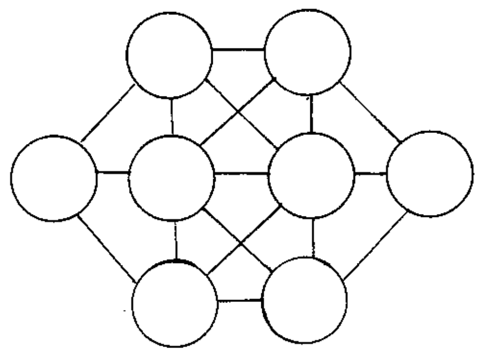
THE ONE HUNDRED PUZZLE

Problem: Reach a total of 100 using as few numbers as possible from those given below. Each number may be used only once.

5 17 19 37 39 46 66

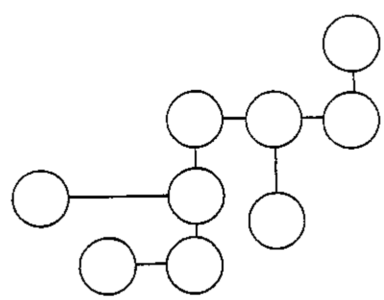
CIRCLE GAME

Problem: Place the consecutive numbers 1 through 8 into the circles -- no lines may connect consecutive numbers.



DIGIT DAZZLER

Problem: Write the digits 1 through 9 in the circles so that each row, across or down, will equal 11.



MAROON VS ORANGE

Question: Twice eight and five Aggies sitting in the rain. One T.U. shot killed a seventh. How many did remain?

(The following article is being reprinted because mathematical symbols were omitted in March, 1986, issue. Our apology!)

MAKING (-x) MEANINGFUL

David R. Johnson, President, National Council of Supervisors of Mathematics
Nicolet High School, Glendale, Wisconsin

How do your algebra students read the symbol "-x"? Common responses are "negative x", "minus x", "the opposite of x" or "the additive inverse of x". The most common response is "negative x". But are all these responses meaningful? Definitely not! In fact the first two responses are very misleading, if not incorrect. We are quite careful in the mathematics classroom to name a real number less than 0 (or to the left of 0 on the real number line) a negative number. Students quite easily grasp the meaning of the phrase "negative number." But all of a sudden we bring out the expression "-x" and read it "negative x"! Trouble begins. Students immediately assume that this symbol stands for a number less than zero simply because its verbal name contained the word negative.

If you don't believe the name ("negative x)" is a misleading name, I suggest that you write the symbol "(-x) on the board and ask your students how it relates to zero on the number line. You will hear a resounding cry "to the left of zero"!

Too many students do not understand that, if x is a real number, "-x" could be a positive, negative, or zero, and that more information is needed before a decision can be made. Students are so overpowered by the use of the word negative and the definition of a negative number, that they do not appreciate the meaning of the expression (-x). Students do appreciate, however, that additive inverses or opposites do not have to be negative. We must encourage our students to read the expression (-x) as the opposite of x.

If we do not read (-x) as "the opposite of x" the problem is complicated even more when we teach the definition of absolute value. Though there are many homespun ways of defining the concept of absolute value, some are confusing and often incorrect. For example: "The absolute value can be found by dropping off the sign." That idea is deadly. If b is less than zero, then b in this case equals -b. No sign was chopped off here. In fact, one was added. When it comes to the definition of words such as absolute value, it is necessary to use a mathematically sound definition:

$a \in R$

If $a = 0$, $|a| = 0$ (a remains unchanged)
If $a > 0$, $|a| = a$ (a remains unchanged)
If $a < 0$, $|a| = -a$ (the result becomes the opposite of a)

This definition, however, demands real understanding. First the student must know the size of the real number in relationship to zero. Secondly, the student must understand that "-x" is simply a symbol for the "inverse of x" and obeys the property of trichotomy. That is, (-x) could be positive, negative, or zero. If, for example, a student is asked to define the absolute value of -b where b is less than zero, it follows that the $|b|$ equal -b. But for students who believe that a negative sign must be dropped to take the absolute value of a number, or for the student that does not appreciate that "-x" is really a positive number in this case, it will be difficult to apply the definition of absolute value to this expression correctly. Again, reading the (-x) as the "opposite of x" will help the student to apply the definition of absolute value correctly.

Students will do well on the examples that follow if they have a good understanding of the definition of absolute value and if they understand that the symbol "-x" represents the inverse of x.

Simplify:

a) $|-b|^3$ if $b < 0$ ans: $-b^3$, because $(-b^3) > 0$
b) $|-3 - x|$, if $x > 0$ ans: $-(-3x)$, because $(-3 - x) < 0$
c) $|-b| + |-b|$, if $b < 0$ ans: $-2b$ because $(-b) > 0$
d) $|3b|$, if $b < 0$ ans: $(-3b)$, because $(3b) < 0$

Expressions with variables should be introduced when teaching the concepts of absolute value in the first year algebra course. Using only constants may lead to poor techniques in simplifying absolute value expressions. That is, students may be able to get the correct answer and yet never realize that they do not understand the definition.

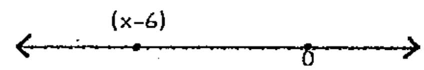
Practice in determining the size of the expression prior to teaching an algebraic definition of absolute value will help make the definition more meaningful to students.

Consider the following expression:

What is the value of the expression $(x - 6)$, if $x < 0$?
a) always less than 0?
b) always greater than 0?
c) zero?
d) sometimes less than/sometimes greater than zero?

Answer:

On a number line place "(x - 6)" to the left of zero.



That is, if $x < 0$, then $(x - 6) < 0$. "(x -6') is a negative number for any value of "x" that is negative.

Determine the sizes of the following expressions given information regarding the values of the variables. Place a check in the appropriate box.

Expression	Variable Information	Less than Zero	Equal to Zero	Greater than
1. x^3	$x < 0$			
2. $x^2 + 6$	$x > 0$			
3. $x^2 + 6$	$x > 0$			
4. $x^2 + 6$	$x = 0$			
5. $-3x$	$x < 0$			
6. $5y$	$y < 0$			
7. $-5x + y$	$x < 0 \wedge y > 0$			
8. $(x - 14)^2$	$x < 0$			

Expression	Variable Information	Less than Zero	Equal to Zero	Greater than
9. $(x-14)^2$	$x > 0$			
10. $(x-14)^2$	$x = 0$			
11. $-f$	$f < 0$			
12. $-(f^2)$	$f > 0$			
13. $-f + -g$	$f, g < 0$			
14. $f^3 + -2g$	$f > 0, g < 0$			
15. $-3x^2$	$x > 0$			
16. $-2(x-1)^2$	$x < 0$			

Given the following information, place the non-zero real numbers, "-f, g, h", on a real number line on the proper side of zero and in the proper order:

Assume the Following:

$f < 0$	$f < g$
$g < 0$	$-h > -f$
$-h > 0$	$h < f$

Using the information in the box above, decide on which side of zero the following numbers are located:

Number	Left	Right
f^3		
$(f - g)$		
$-g^2$		
h^2		
$h + g$		
$(-g) + (-f)$		

Teachers should insist students read the expression $(-x)$ as the opposite of x. This also demands that we as teachers do the same. The correct reading of this expression should begin in the early grades. The incorrect reading of the symbol is not easily changed. "Negative X" sends messages to the student that complicates and confuses concepts an algebra teacher must teach. It's time to tell it like it is! That is, $(-x)$ is the "opposite of x or the inverse of x", not "negative x".

(WISCONSIN TEACHER OF MATHEMATICS, Winter, 1986)

COMPUTER TERMS--Redefined

Complete each sentence--using the COMPUTER WORDS which are written below.

SUBROUTINE	SYNTAX	GO TO STATEMENT
MICROCHIPS	FORMAT	PUNCH CARDS
FLOWCHART	BASIC	SOFTWARE
	LOGO	

1. The tiny crumbs which you find in the bottom of a Pringles can are called__________.
2. The first gear in an automobile transmission is called the __________.
3. Seasickness which occurs before you ever leave the harbor is called__________.
4. The revenue which is collected from the sale of alcoholic beverages is called a__________.
5. When an underwater craft dives and then surfaces it is completing a__________.
6. The fluffy, frilly nightgown which is worn by ladies is called__________.
7. A map of a major river and its tributaries is called a __________.
8. The cards which Bob Hope uses when he writes down his jokes are called__________.
9. The little card which you put on a birthday gift for Matthew reads "__________".
10. When you are "bawled out" by your boss you have received his__________.

— OCTM NEWSLETTER, 1985

How Much Money Does Each Class Member Have?

John Firkins

Lee has $5 less than John.
No one has the same amount.
No one has any change.
Mary has the least amount.
Larry has 10 times as much as Mary and Paul put together.
Dwight has $10 more than Mark.
Mark has $6 less than Lynn.
David has $20 more than Lynn.
John has $17.
Myrna and John together have the same as Larry.
Lee has as much as Mark and Paul together.
Elaine has the most money.
Elaine has twice as much as Larry.
Randy, Bruce & Wayne each have an odd number of dollars.
Myrna has three times as much as Wayne.
Floyd has 5 times as much as Randy.
Jim has three times as much as Bruce.
Caroline has $40 less than Elaine.
Chuck has half as much as Caroline and Elaine together.
Ted has $22 less than Larry.
Ted has the mean amount.
The average is between $20 and $30.

SOLUTION:

John $17, Lee $12, Ted $28, Larry $50, Mary $1, Dwight $18, Mark $8, Paul $4, Lynn $14, David $34, Myrna $33, Elaine $100, Randy $5, Bruce $7, Wayne $11, Floyd $25, Jim $21, Caroline $60, Chuck $80.

Can you find a second solution?

—WASHINGTON MATHEMATICS
WINTER 1985

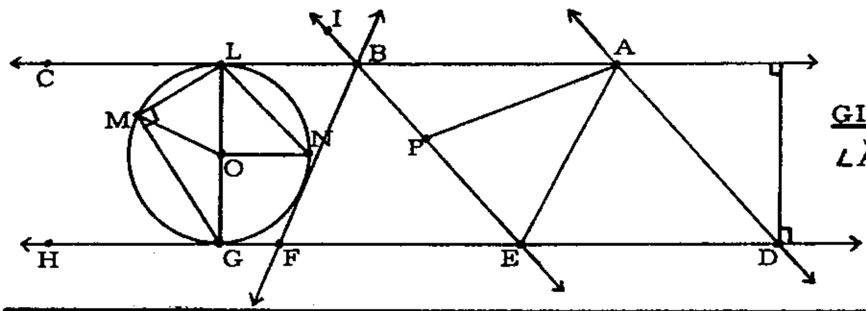
Send manuscripts to

3632 Normandy Avenue

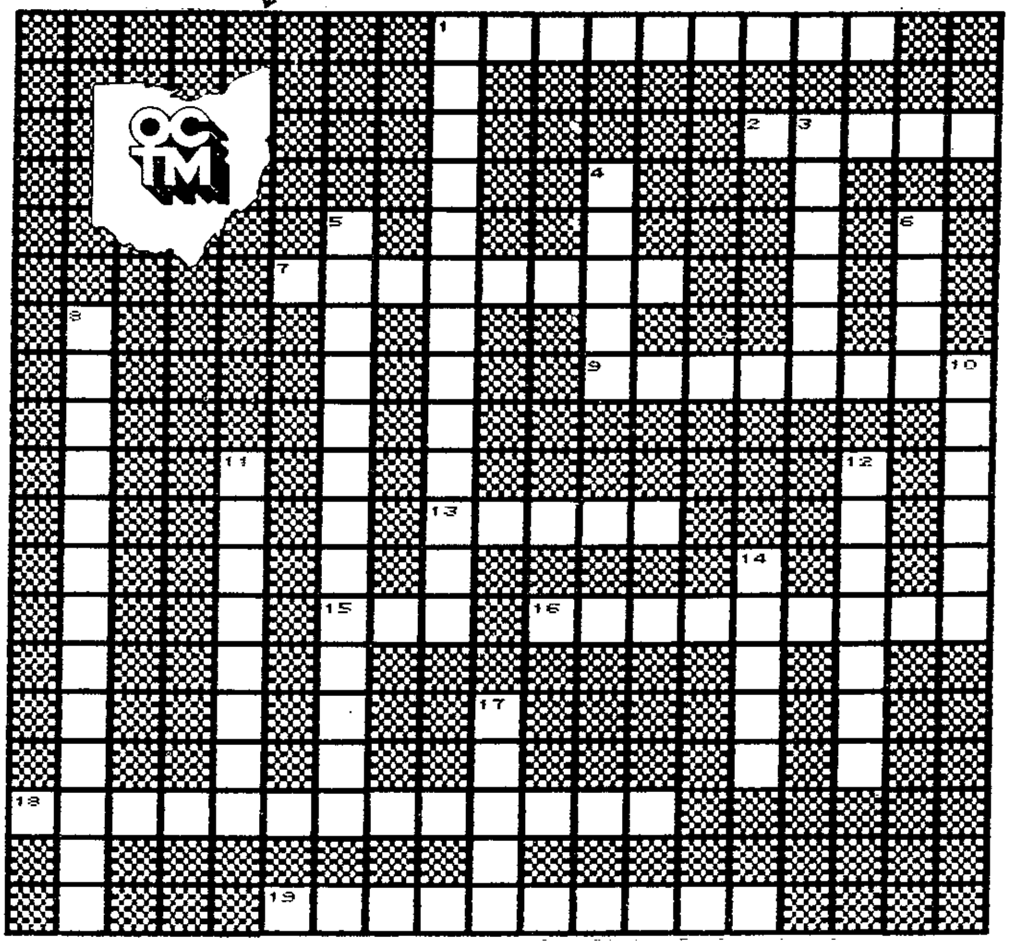
Dallas, Texas 75205

math adds up to a brighter future

GEOMETRY CROSSWORD



GIVEN:
∠ABE = ∠ADE



ACROSS CLUES

1. △ABE & △EDA ARE ___ TRIANGLES.
2. $\overleftrightarrow{AC} \cap \overleftrightarrow{IP}$ IS A ___.
7. $\overline{NO}$ IS A ___ OF $\overline{LG}$.
9. $\overline{LG}$ IS A ___ OF CIRCLE LMG.
13. ∠EBF IS AN ___ ANGLE.
15. ∠ABF ∩ ∠ABI IS A ___.
16. △LON IS AN ___ TRIANGLE.
18. FIGURE ABED IS A_________.
19. $\overline{LG}$ IS THE OF TRIANGLE LMG.

by Maryanne Nevay-Wise

DOWN CLUES

1. ∠LMO & ∠OMG ARE ___ ANGLES.
3. △ABP IS AN ___ TRIANGLE.
4. $\overline{MG}$ IS A ___ OF CIRCLE LMG.
5. POINTS N, L & M LIE ON THE ___ OF CIRCLE LMG.
6. $\overrightarrow{BA} \cup \overrightarrow{AC}$ IS A ___.
8. ∠ABE & ∠BED ARE ___ ANGLES.
10. $\overline{OG}$ IS A ___ OF CIRCLE LMG.
11. $\overleftrightarrow{AC}$ & $\overleftrightarrow{DH}$ ARE ___ LINES.
12. △LMG IS A ___ TRIANGLE.
14. △BEF IS AN ___ TRIANGLE.
17. △LMG IS A ___ TRIANGLE.

PLEASE SOLICIT NEW MEMBERSHIPS!

PROFESSIONAL MEMBERSHIP APPLICATION

Date: ______________ School: ____________________ School Address: ________________________________

Position: ☐ teacher, ☐ department head, ☐ supervisor, ☐ student,* ☐ other (specify) ____________________

Level: ☐ elementary, ☐ junior high school, ☐ high school, ☐ junior college, ☐ college, ☐ other (specify ____________

Other information ____

		Amount Paid
Texas Council of Teachers of Mathematics	☐ New membership ☐ Renewal membership	5.00
Local ORGANIZATION: ______________________	☐ New membership ☐ Renewal membership	
OTHER: ______________________	☐ New membership ☐ Renewal membership	

Name (Please print) ______________________________ Telephone ______________

Street Address ____

City ______________________ State ______________ ZIP Code ______________

National Council of Teachers of Mathematics	Check one: ☐ New membership ☐ Renewal membership	
	$35.00 dues and one journal ☐ Arithmetic Teacher or ☐ Mathematics Teacher	
	$48.00 dues and both journals	
	$15.00 student dues and one journal* ☐ Arithmetic Teacher or ☐ Mathematics Teacher	
	$20.00 student dues and both journals*	*Note New Membership and Subscription Fees*
	12.00 additional for subscription to *Journal for Research in Mathematics Education* (NCTM members only)	
	The membership dues payment includes $13.00 for a subscription to either the *Mathematics Teacher* or the *Arithmetic Teacher* and $2.00 for a subscription to the *Newsletter*. Life membership and institutional subscription information available on request from the Reston office.	

*I certify that I have never taught professionally ______________________ *(Student Signature)* *Enclose One Check for Total Amount Due* →

Fill out, and mail to Mrs. Bettye Hall, 3830 Richmond, Houston, Texas 77027

NOW!

TEXAS MATHEMATICS TEACHER
J. William Brown, Editor
Texas Council of
Teachers Of Mathematics
3632 Normandy Avenue
DALLAS, TEXAS 75205

NON-PROFIT ORGANIZATION
U. S. Postage
Paid
Dallas, Texas
Permit #4899