EVERYDAY MATHEMATICS

MILLBURN SCHOOL DISTRICT #24
WADSWORTH, IL

INTRODUCTION

Imagine a math classroom where children groan when it is time to move on to a different subject. Imagine a class where every hand shoots up when the teacher asks for a solution to the problem or a child says, "I have a better way to solve the problem." These are the experiences of our teachers with the math program *Everyday Mathematics,* which is the elementary curriculum of the University of Chicago School Mathematics Project. UCSMP began in 1983 with the goal of developing a program for children that takes advantage of the mathematics that they already know and builds on their innate interest in solving problems. In part, the Project was also undertaken to address the problem of poor performance of United State's students on the international math tests by creating a more challenging curriculum similar to those in the other industrialized nations. This curriculum is based on the goals that were established by the National Council of the Teachers of Mathematics (the organization that sets national curriculum standards), which is also committed to raising standards for the mathematics programs in this country. School District 24 is committed to excellence for our math program.

TABLE OF CONTENTS

MATHEMATICS CONTENT

Everyday Mathematics covers a broad range of mathematic content areas, or strands. Here is a chart of the strands which are emphasized throughout the program.

Kindergarten	numeration ~ counting ~ operations ~ problem solving ~ graphing ~ geometry ~ measure ~ time ~ money ~ functions ~ relations ~ attributes ~ patterns
First Grade	numeration and counting ~ operations and relations ~ problem solving ~ exploring data ~ geometry ~ measures ~ reference frames ~ money ~ patterns and rules
Second grade	numeration and counting ~ operations and relations ~ problem solving ~ data collection and analysis ~ geometry ~ measures ~ reference frames ~ money ~ patterns and rules
Third grade	numeration ~ operations and relations ~ problem solving ~ data collection and analysis ~ geometry ~ measures ~ reference frames ~ rules, patterns, and functions ~ beginnings of algebra
Fourth grade	numbers, numeration, and order relations ~ measures and measurement ~ coordinate systems and reference frames ~ operations, number facts, and number systems ~ algorithms and procedures ~ problem solving and mathematical modeling ~ exploring data ~ geometry and spatial sense ~ functions, patterns, and sequences ~ algebra and uses of variables
Fifth grade	numbers, numeration, and order relations ~ measures and measurement ~ coordinate systems and other reference frames ~ operations, number facts, and number systems ~ algorithms and procedures ~ problem solving and mathematical modeling ~ exploring data ~ geometry and spatial sense ~ functions, patterns, and sequences ~ algebra and uses of variables

Definitions of Content Areas:

Numeration and Counting:	saying, reading, and writing numbers; counting patterns; place value; whole numbers, fractions and decimals
Operations and Relations:	number facts; operation families; informal work with properties
Problem Solving and Number Models:	mental and written arithmetic along with puzzles, brain teasers and real-life problems
Measures and Reference Frames:	measures of length, width, area, weight, capacity, temperature and time; clocks; calendars; timelines; thermometers; ordinal numbers
Exploring Data:	collecting and ordering data; tables, charts and graphs; exploring uncertainty; fairness; making predictions
Geometry:	exploring two and three-dimensional shapes
Rules and Patterns:	functions, relations, attributes, patterns and sequences
Algebra & Uses of Variables:	generalizing patterns, exploring variables, solving equations

ORGANIZATION and MATERIALS

The materials that you see and hear about vary somewhat by grade level and may be a bit different than those that you remember from elementary school.

The *Math Journal* (first-fifth) contains the problem materials and pages on which the children record the results of their activities. It provides a record of their mathematical growth over time and is used in place of student worksheets, workbook, and textbook.

Math Boxes are 4-6 short problems for review and practice. In the upper grades, these are included as a part of the student journals.

Explorations are independent or small group activities that allow children to investigate and develop math concepts. These are a key part of the math program in the early grades and often involve manipulative materials.

Yearlong projects, such as the *World Tour* in fourth grade or the *American Tour* in fifth grade, link mathematics to social studies. Third grade children trace sunrise, sunset, and length of day, exploring and using the connections between math and science. Kindergarten through second grade track the first 100 days of school.

Home Links and Study Links provide important connections between home and school. Most are activities that require interaction with parents, other adults, or another child. They are designed to provide follow-up and review of skills and concepts, and an extension of the material covered in the daily lessons.

Students use a variety of math tools throughout the year. Rulers, tape measures, geometry templates, counters, and money are among the items kept in the *Math Tool Kit.* Children learn to be responsible for their learning tools and to have them available when needed.

Activity Books (first-third) are a collection of perforated pages that are used for hands-on activities.

ROUTINES

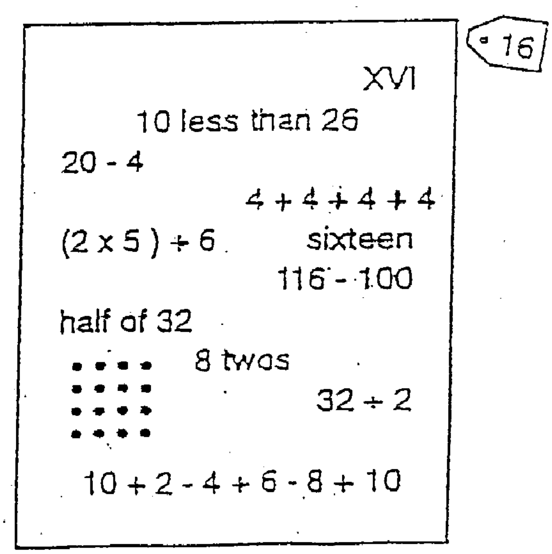
Everyday Mathematics activities help children develop concepts of order and pattern in our base-10 system. The following pages contain routines found in the *Everyday Mathematics* program.

Name-Collection Boxes

This is a device that students use to collect equivalent names for a number. Names include sums, differences, products, quotients, tally marks, arrays, Roman numerals, and so on.

Below are examples of Name-Collection Boxes for 12 and 16.

12
6 + 6
4 x 3
36 ÷ 3
$3^2 + 3$
2 * (5 + 1)
1 dozen
inches in 1 foot



Number Grids

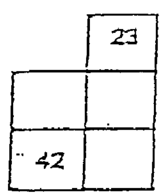
A number grid consists of ten rows of boxes containing a set of consecutive whole numbers. Your child is introduced to the number grid in first grade and will see it many times in future grades.

									0
1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100
101	102	103	104	105	106	107	108	109	110

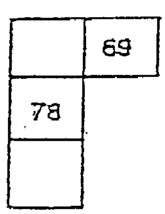
The number grid is used to develop place value concepts. By exploring the patterns in numbers on the grid, your child will discover that as you move from left to right, the ones digit increases by 1; while the tens digit remains unchanged. (See sample number grid at right.)

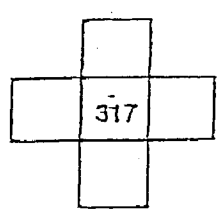
Your child will practice these place value concepts by solving number grid puzzles. These are pieces of the number grid in which some of the numbers are missing.

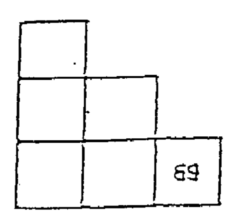
For example, in this puzzle the numbers 32, 33, and 43 are missing.

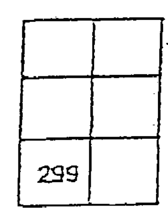


Fill in the missing numbers:







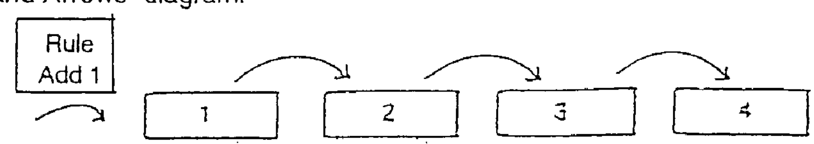


Number grids can also be used to explore other number patterns. For example, children can color the appropriate boxes as they count by 2. If they start with 0, they will color the even numbers; if they start with one, they color the odd numbers. Similar activities will be done with counting by 3's, 5's, and 10's, etc.

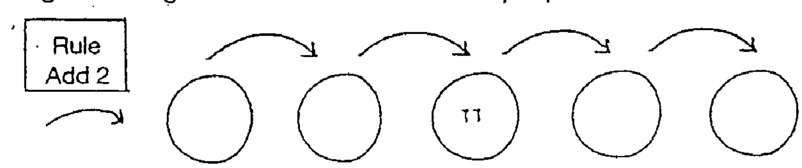
Your child will also use the number grid as a tool for finding the difference (distance) between two numbers, using it often in problem solving. Number grids may also extend to negative numbers.

Frames and Arrows Diagrams

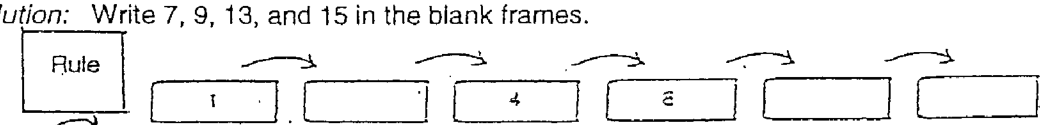
In the *Everyday Mathematics* program, "Frames and Arrows" are used to represent number sequences-- sets of numbers that are ordered according to a rule. These diagrams consist of frames connected by arrows to show the path for moving from one frame to another. Each frame contains a number in the sequence; each arrow represents a rule that determines what number goes in the next frame. Here is an example of a "Frames and Arrows" diagram.



In "Frames and Arrows" problems, some of the information has been left out of the diagram. Children solve the problem by supplying the missing information. "Frames and Arrows" problems become increasingly difficult throughout the grades. Here are a few sample problems.

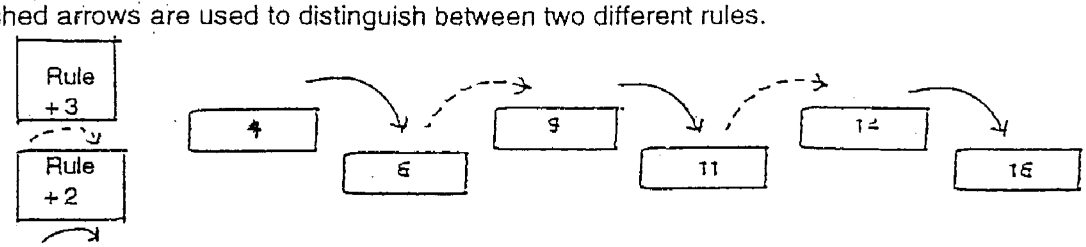


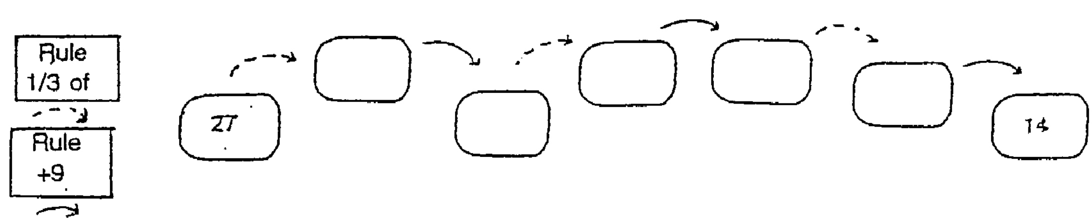
Solution: Write 7, 9, 13, and 15 in the blank frames.



Solution: The rule is double the number. Write 2, 16, and 32 in the empty frames.

A chain can have more than one arrow rule. If it does, the arrow for each rule must look different. For example, you can use different colors to distinguish between arrow rules. In the following example, solid and dashed arrows are used to distinguish between two different rules.





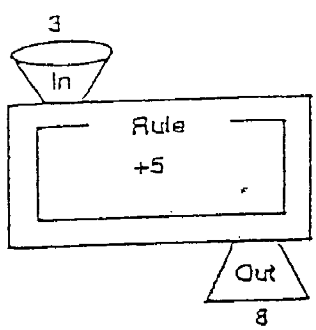
Different frame shapes are used to help children realize that it is the number sequence and its rule that are important, not the shape of the frame. Sequences and other relationships involve applying a rule repeatedly to different numbers. (The rule "count by 3" produces the 3, 6, 9, 12, ...). "Frames and Arrows" activities expose children to an important math concept as well as give them an opportunity to enhance their mental calculation skills.

"What's My Rule?" Activities

"What's My Rule?" games begin in kindergarten with practicing attributes. This idea is extended to numbers and rules for determining which numbers belong to specific sets of numbers. This same concept evolves further to sets of number pairs in which sets of numbers are related to each other according to the same rule. The "What's My Rule?" routines that we teach your child in kindergarten are built upon and extended each year.

To help you understand "What's My Rule?" problems, imagine a machine with a funnel at the top and a tube at the bottom. We call this the function machine. This machine can be programmed so that if you drop a number in the funnel at the top, the machine does something to the number to make a new number come out the tube at the bottom. For example, you could program the machine to add 5 to any number that is dropped in the funnel. If you put in 3, out comes 8; if you put in 7, out comes 12.

We also show this with a table, such as:



in	out
3	8
7	12
15	20 and so on

In "What's My Rule?" problems, some information is always missing. Students must find the missing information. The missing information could be the numbers that come out, the numbers that are dropped in, the rule for programming the machine, or a combination. The tables below illustrate each of these:

Rule: + 6

in	out
3	___
5	___
8	___
9	___

Missing: "out" numbers

Rule: ?

in	out
6	3
10	5
16	8
8	4

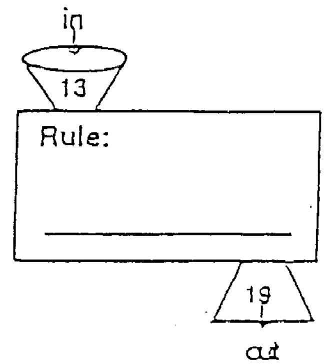
Missing: rule

Rule: + 4

in	out
___	6
___	16
___	11
___	10

Missing: "in" numbers

A combination of more than one type of problem can be given. Children are given enough input and output clues so that they can fill in the blanks as well as figure out the rule.



In	out
13.	19
43	___
___	59
153	159
___	___

Missing: combination:

In the *Everyday Math* program, students begin the informal study of functions using "What's My Rule?" tables. Students learn about patterns and numerical cause and effect relationships, where the value of the second number depends on what we choose as the first number. For example, at the grocery store, if apples cost $.89 per pound, then the amount we pay is determined by the number of pounds we buy. These first steps lead to algebra and beyond, for we deal with functions constantly in our daily lives.

BASIC FACTS

Though we are believers in quick recall with regard to the basic facts, we do not suggest that students be drilled to the point of anxiety and frustration. Rather, the *Everyday Mathematics* program uses a variety of games to give students practice in developing efficiency. It also introduces the facts as "fact families" (3+5=8, 5+3=8, 8-3=5, and 8-5=3) so that students can relate addition to subtraction and later multiplication to division, which reduces some of the demands on their memories.

Parents can support their child's mastery of facts by practicing at home.

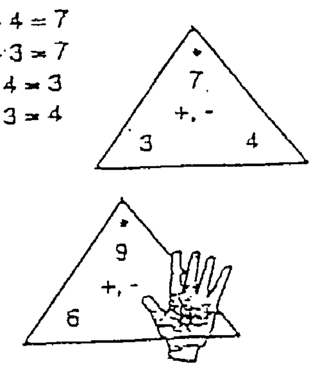
The *Everyday Mathematics* curriculum recommends that by the end of second grade the majority of students should know the basic addition and subtraction facts. By the end of fourth grade, the same should be true of the basic multiplication and division facts. These facts are the building blocks for all arithmetic calculation: addition, subtraction, multiplication, and division.

In addition to the numerous and varied number games that your children play daily in their classroom, we also instill fact recall through fact triangles, fact families, and dominoes.

Fact Triangles

Your child will also practice fact mastery through the use of triangle fact cards. A triangle fact is pictured here. Fact triangles are a more effective device for memorizing the facts than ordinary flashcards because of their emphasis on fact families. Three numbers involved in an addition fact are placed on the corners of the fact triangle. The sum (answer) is at the top, under the asterisk (*). You cover one of the corners of the triangle. Your child gives an addition or subtraction fact that has the number you are concealing as its answer.

3 + 4 = 7
4 + 3 = 7
7 - 4 = 3
7 - 3 = 4



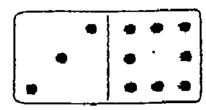
For example, in the fact triangle pictured, your child would say either "6 + 3 = 9" or "9 - 6 = 3".

Similar fact triangle cards are used for multiplication and division.

Dominoes

Double-nine dominoes, which extend the range of numbers children use in working with dice, are a wonderful concrete model of the addition/subtraction facts through 9 + 9. Dominoes help children visualize facts and develop an understanding of the meaning of addition and subtraction and the relationship between the two operations. The domino below shows one side with three dots and the other with eight. Your child thinks of the three numbers associated with the domino (three and eight are the addends, and eleven is the sum). Your child can then use dominoes to learn and practice a variety of concepts and skills.

The three numbers on most dominoes can be used to write two addition facts and two subtraction facts. Such a collection of related facts is called a **Fact Family.**



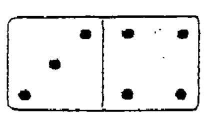
The set of number sentences that reflects these numbers can be written:

$3 + 8 = 11$ $11 - 8 = 3$

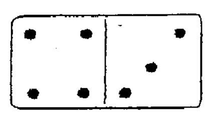
$8 + 3 = 11$ $11 - 3 = 8$

Dominoes can be used in a variety of ways to build early number concepts such as:

- the turn-around rule (commutative property) of addition

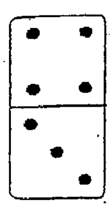


$3 + 4 = 7$

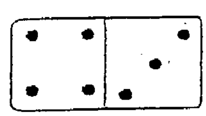


$4 + 3 = 7$

- horizontal and vertical forms of number models

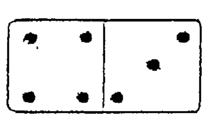
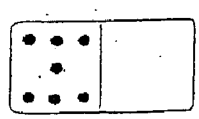
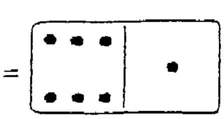
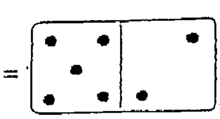


$$\begin{array}{r} 4 \\ \underline{+3} \\ 7 \end{array}$$

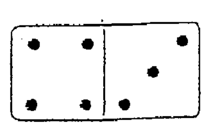


$4 + 3 = 7$

- equivalent names of numbers

7 =  =  =  = 

- the inverse relationship between addition and subtraction as represented by **fact families**

such as: 

$4 + 3 = 7$ $7 - 4 = 3$

$3 + 4 = 7$ $7 - 3 = 4$

ALGORITHMS and COMPUTATION**

An algorithm is a set of rules for solving a math problem which, if done properly, will give a correct answer each time. Algorithms generally involve repeating a series of steps over and over as in the borrowing and carrying algorithms and in the long multiplication and division algorithms. The *Everyday Mathematics* program includes a variety of suggested algorithms for addition, subtraction, multiplication, and division. Current research indicates a number of good reasons for this -- primarily, that students learn more about numbers, operations, and place value when they explore math using different methods.

Arithmetic computations are generally performed in one of three ways: (1) mentally, (2) with paper and pencil, or (3) with a machine, i.e., calculator or abacus. The method chosen depends on the purpose of the calculation. If we need rapid, precise calculations, we would choose a machine. If we need a quick, ballpark estimate or if the numbers are "easy", we would do a mental computation.

The learning of the algorithms of arithmetic has been, until recently, the core of mathematics programs in elementary schools. There were good reasons for this. It was necessary that students have reliable, accurate methods to do arithmetic by hand for everyday life and for business. Today's society demands more from its citizens than knowledge of basic arithmetic skills. Our students are confronted with a world in which mathematical proficiency is essential for success. There is general agreement among mathematics educators that drill on paper/pencil algorithms should receive less emphasis and that more emphasis be placed on areas like geometry, measurement, data analysis, probability, and problem solving. Students should be introduced to these subjects using realistic problem contexts. The use of technology, including calculators, provides children with opportunities to explore and expand their problem solving capabilities, and does not diminish the need for basic knowledge.

****Note: The traditional method is an acceptable alternative. This program is designed to show children other computational alternatives.**

Addition Algorithms

I. Left-to-Right Algorithm

A. Starting at the left, add column by column and adjust the result.

	2	6	8
	+4	8	3
1. Add	6	14	11
2. Adjust 10's and 100's	7	4	11
3. Adjust 1's and 10's	7	5	1

B. *Alternate procedure:* For some children the above process becomes so automatic that they start at the left and write the answer column by column, adjusting as they go without writing any in-between steps. If asked to explain, they say something like this:

> "200 plus 400 is 600, but (looking at the next column) I need to adjust that, so write 7. 60 and 80 is 140, but that needs adjusting, so write 5. 8 and 3 is 11, no more to do, write 1."

$$\begin{array}{r} 268 \\ +\underline{483} \\ 751 \end{array}$$

II. Partial Sums Algorithm

In this algorithm, addition is performed from left to right, column by column, and the sum for each column is recorded on a separate line. The partial sums can be added at each step or at the end.

Here is another method for adding numbers. You add them from left to right, one column at a time. When adding in this way, always keep in mind what number each digit stands for. In the example below, think --

"700 + 400 = 1100"

not --

"7 + 4 = 11"

Partial Sums Method:

		7	6	8
	+	4	8	3
Add the hundreds: 700 + 400 =	1	1	0	0
Add the tens: 60 + 80 =		1	4	0
Add the ones: 8 + 3 =			1	1
Find the total: 1100 + 140 + 11 =	1	2	5	1

(1100 + 140 = 1240)

(1240 + 11 = 1251)

III. The Opposite-Change Method

Most students will probably use pencil and paper when using this method. With practice, some may use it as a mental calculation technique to add relatively small numbers.

Opposite-Change Rule

In an addition problem, if you add a number to one addend and subtract the same number from the other addend, the sum in the new problem is the same as the sum in the problem you started with. For example:

Add and subtract 1:

$$\begin{array}{rcr} 79 & \rightarrow & 80 \\ \underline{+\ 47} & \rightarrow & \underline{+46} \\ & & 126 \end{array}$$

Subtract and add 3:

$$\begin{array}{rcr} 79 & \rightarrow & 76 \\ \underline{+47} & \rightarrow & \underline{+50} \\ & & 126 \end{array}$$

Add and subtract 5:

$$\begin{array}{rcr} 185 & \rightarrow & 190 \\ \underline{+76} & \rightarrow & \underline{+71} \\ & & 261 \end{array}$$

Subtraction Algorithms

I. Add-Up Algorithm

Add up from the subtrahend to the minuend.

932	
- 356	
576	

356	
	+ 4
360	
	+ 40
400	
	+500
900	
	+ 32
932	
Add.	576

II. Left-to-Right Algorithm

Starting at the left, subtract column by column.

932		932
- 356	1. Subtract the 100's	- 300
		632
	2. Subtract the 10's	- 50
		582
	3. Subtract the 1's	- 6
		576

III. Same Change Rule (Same as Rename Subtrahend)

If the same number is added to or subtracted from both the minuend or subtrahend, the result remains the same. The aim is to rename both the minuend and the subtrahend so that the subtrahend is a number ending in zero.

A. Add the same number

932	(+4)	936	(+40)	976
- 356	(+4)	- 360	(+40)	- 400
		subtract		576

B. Subtract the same number

932	(-6)	926	(-50)	876
- 356	(-6)	- 350	(-50)	- 300
		subtract		576

One Way: Add 2.

93	95
- 58	- 60
subtract	35

Another Way: Subtract 8

93	85
- 58	- 50
subtract	35

IV. A Partial Differences Algorithm

Subtraction is performed from left to right, column by column. The smaller number is always subtracted from the larger number, and the difference is recorded on a separate line. If the larger number is part of the number being subtracted (the second number), the difference is indicated by a minus (or negative) sign. This eliminates the need for renaming, which is the major pitfall for students using the standard subtraction algorithm. When all partial differences have been found, they are either added or subtracted, according to the following rule:

~ A partial difference is added, if the second number in the problem (the subtrahend) is less than the first number (the minuend). It is subtracted if the first number is less than the second number.

Always subtract the smaller number from the larger number.

~ If the smaller number is on the bottom, the difference is **added** to the answer.

~ If the smaller number is on top, the difference is **subtracted** from the answer.

<u>Partial Sums Method:</u>

		5	2	8
	+	2	6	3
Subtract the hundreds: 500 - 200 =		3	0	0
Subtract the tens: 60 - 20 = (Smaller number on top)		-	4	0
Subtract the ones: 8 - 3 =			+	5
Find the total: 300 - 40 - 5 =		2	6	5

(300 - 40 = 260)

(260 + 5 = 265)

Multiplication Algorithms

I. Modified Standard U.S. Algorithms

The Standard U.S. algorithm is shown on the lower left (**a**). There are probably few people who could explain why one keeps stepping over by one place in successive lines, but it works.

Example **b** at least solves that mystery by putting zeros in for the blanks, which makes clear for the second partial product, we are multiplying by 50 (5[10's]) and not just by 5.

Example **c** works from left to right, as we would prefer, but is otherwise the same as the standard algorithm with zeros in place of blanks.

a.	b.	c.
67	67	67
x 53	x 53	x 53
201	201	3350
335	3350	201
3551	3551	3551

II. Modified Repeated Addition

Contrary to what is often taught, multiplication is not merely repeated addition, even for whole numbers and certainly not for decimals and fractions. For example, it would be unbearably tedious to add 67 fifty-three times in order to solve 53 x 67. But if we think of 10 [67's] as 670, then we can first add the 10 [67's]. (There are five of them, or 5 [670's]. Then add the 3 [67's], as indicated in the problem. This would reduce the tedium considerably. This procedure is a good "broken calculator" exercise -- find a product without using the [x] key.

67	
x 53	
670	
670	
670	5 [670's]
670	
670	
67	3 [67's]
67	
67	
3551	

III. Partial-Product Algorithm -- Left to Right

This is the suggested procedure in third grade.

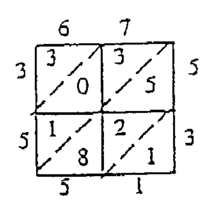
35	351	67
x 7	x 4	x53
210	1200	3000
35	200	350
245	4	21
	1404	3551

IV. The Lattice Method

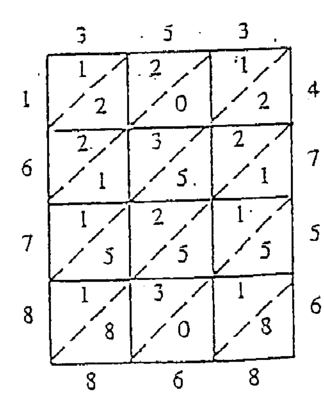
We include this algorithm mainly for its recreational value, historical interest, and the fact that it provides fine practice with the multiplication facts and adding single-digit numbers. It isn't easy to explain exactly why it works, but it does have the reliability that all algorithms must have. It is also very efficient, no matter how many digits are in the factors, as indicated by the second example below.

The lattice method was included in what is said to be the first printed arithmetic book, printed in Treviso, Italy, in 1478. It was in use long before that, with some historians tracing its invention to Hindu origins before 1100.

67 x 53 = 3551



353 x 4756 = 1,678,868



A Division Algorithm

This algorithm resembles the traditional U.S. long-division algorithm, but it is simpler for students to carry out because they build up the quotient by estimating with "easy" numbers. It is another example of a "low-stress" algorithm.

1. Write the problem in this form: 7) 127
   Suggest one way to solve this problem is to use a series of "at least/not more than" estimates.

2. A good strategy is to start with multiples of 10. Ask, "Are there at least 10 [7's] in 127?" (*Yes, because 10 * 7 equals 70.*) "Are there more than 20 [7's]?" *(No, because 20 * 7 = 140.)* So there are at least 10 but less than 20. Try 10.

7) 127	10
70	

3. The next step is to improve the estimate. First, find the difference between 127 and 70.

7) 127	10
70	
57	Subtract

4. Now estimate the number of 7's in 57. Two ways to do this are:
   a. Use a fact family to find the number of 7's in 57. There are 8, since 8*7 = 56. Record as follows:

7) 127	10
70	
57	8 Write your estimate.
56	Write 8 * 7.
1	Subtract

b. Or continue to use "at least/not more than" estimates with numbers that are easy to multiply. Ask, "Are there at least 10 [7's] in 57?" *(No, because 10 * 7 = 70).* "Are there at least 5 [7's]?" *(Yes, because 5 * 7 = 35.)* Next, either subtract 35 from 57 and continue by asking "How many 7's in 22?" or you could improve the estimate by adding on 7's until it is close to 57: 6 [7's] are 42, 7 [7's] are 49, 8 [7's] are 56.

```
7)127 | 10
  70  |
  57  |  5 Write your estimate.
 -35  |    Write 5 * 7.
  22  |  3 Subtract. Estimate again.
  21  |    Write 3 * 7.
   1  |    Subtract.
```

5. In both cases, the division is complete when the subtraction leaves a number less than 7 (the **divisor**, or number you ae dividing by). Any number less than the divisor will be your remainder. The final step is to add the estimates:

```
7)127  |  10
  70   |
  57   |   8
  56   |____
   1   |  18

     -or-

7)127  |  10
  70   |
  57   |   5
  35   |
  22   |   3
  21   |____
   1      18
```

MATH AT HOME:

LEARNING THROUGH GAMES

Games are an integral part of the *Everyday Mathematics* program because they provide enjoyable ways of practicing certain number skills. They reinforce the power of mental arithmetic and are an alternative to drill and practice sheets. The games can be played over and over without repeating the same problems because the numbers in most games are randomly generated.

On the following pages are games that you may enjoy playing with your child. Directions and recommended grade levels are on the following pages:

The following items are needed to use with your child at home to enhance his/her math skills.

Dice

Egg carton

Calculator (inexpensive - under $4 at many stores)

Coins (loose change)

Counters (small items such as: beans, toothpicks, buttons, M & M's, pretzel sticks)

Double-nine dominoes

Rulers (both inch and centimeter)

Playing cards

Index cards

To convert a regular deck of cards to a Math Deck:

- For numbers 2 through 10, use the 2 through 10 cards.
- For the number 1, use Aces.

Use a broad tip marker to:

- Write the number 0 on the Queen's face cards.
- Write the numbers 11 through 18 on the remaining face cards (Kings & Jacks).
- Jokers can be numbers 19 and 20.

Recommended Grade Level 3rd - 5th

Baseball Multiplication

Beginners' Game

Materials: 2 regular dice (or 10-sided or 12-sided)
4 pennies
a Multiplication table or a calculator

Number of Players: 2

Directions: Take turns being the "pitcher" and the "batter."

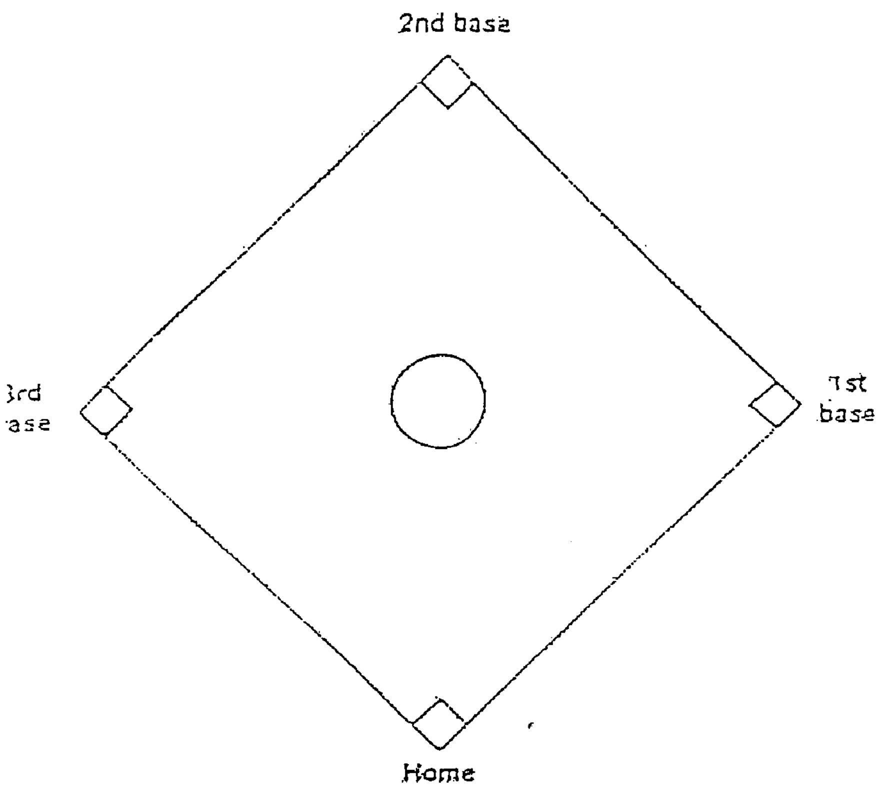
1. At the start of the inning, the batter puts a penny on home plate.
2. The pitcher rolls the 2 dice. The batter multiplies the 2 numbers that come and tells the answer. The pitcher checks the answer in a multiplication table or on a calculator.
3. The batter looks up the product in the **Hitting Table**. If it is a hit, the batter moves all pennies on base as follows:

Single	1 base
Double	2 bases
Triple	3 bases
Home Run	4 bases or across home plate

4. A run is scored each time a penny crosses home plate. If a play is not a hit, it is an out.
5. A player remains the batter for 3 outs. Then players switch roles. The inning is over when both players have made 3 outs.
6. After making the third out, a batter records the number of runs scored in that inning on the scoreboard.
7. The player who has more runs at the end of 4 innings wins the game. If the game is tied at the end of 4 innings, play continues into extra innings until one player wins.
8. If, at the end of the first half of the last inning, the second player is ahead, there is no need to play the second half of the inning. The player who is ahead wins.

Recommended Grade Level 3rd - 5th

Baseball Multiplication (Continued)



Runs and Outs Table

Team 1		Team 2	
Runs	Outs	Runs	Outs

Scoreboard

Inning	1	2	3	4	5	6	7
Team 1							
Team 2							

HITTING TABLES

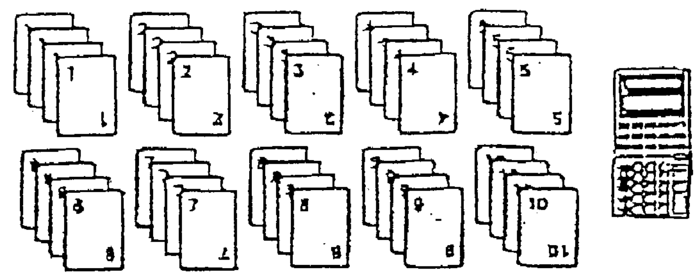
1 to 6 Facts		1 to 10 Facts		1 to 12 Facts	
1 to 9	Out	1 to 21	Out	1 to 24	Out
10 to 19	Single (1 base)	22 to 45	Single	25 to 49	Single
20 to 29	Double (2 bases)	46 to 70	Double	50 to 64	Double
30 to 35	Triple (3 bases)	71 to 89	Triple	65 to 79	Triple
36	Home Run (4 bases)	90 to 100	Home Run	80 to 144	Home Run

Recommended Grade Level 1st - 5th

Beat the Calculator (Addition Facts)

Materials: 1 deck of number cards 1-10 (4 of each for a total of 40 cards)
Calculator

Number of Players: 3



Directions: One player is the "caller," a second player is the "calculator," and the third player is the "brain."

Shuffle the deck of cards and place it face down on the playing surface.

The caller turns over the top two cards from the deck. These are the numbers to be added. The "calculator" finds the sum with a calculator, while the "brain" solves it without a calculator. The "caller" decides who got the answer first. Players trade roles every 10 turns or so.

Beat the Calculator (Multiplication Facts)

Players multiply the numbers on the two cards.

Beat the Calculator (Extended Multiplication Facts)

The caller attaches a 0 to either one of the factors or both factors.

For example, if the caller turns over a 4 and a 6, he or she may make up one of the following problems:

4 x 40   40 x 6   40 x 60   60 x 4

Recommended Grade Level 1st - 5th

Broken Calculator: Number Keys

Material: Calculators

Number of Players: 2

Directions: Partners pretend that one of the number keys is broken. One partner says a number, and the other tries to display it on the calculator without using the "broken" key.

Example:

If the 8 key is "broken," the player can display the number 18 by pressing 9 (+) 7 (+) 2 or 9 (x) 2 or 72 (÷) 4.

Scoring: A player's score is the number of keys entered to obtain the goal. Scores for five rounds are totaled, and the player with the lowest total wins.

Recommended Grade Level 4th - 5th

Division Dash

Materials: Calculator for each player and scoreboard

Number of Players: 1 or 2

Directions:

1. Each player chooses a number and enters it on the calculator.
2. Each player presses the square root (√) key. If the number on a player's calculator display has fewer than 3 digits, the player should repeat steps 1 and 2.
3. Each player:
   - Uses the final digit on the calculator screen as a 1-digit number
   - Uses the two digits before the final digit as a 2-digit number.
4. Each player finds out **how many** of the 1-digit numbers are in the 2-digit number and records the results. (This result is the quotient. Remainders are ignored.) Players calculate mentally or on paper, not on the calculator.
5. The players press √ and repeat steps 3 and 4 until the sum of a player's quotients is 100 or more. The winner is the first player to reach at least 100.

Example: Enter 5678

	Quotient
Press √ and get 75.352<u>504</u> The problem is 50 divided by 4. Find the number of 4's in 50. Record the result. (12, ignoring the remainder)	12
Press √ and get 8.680<u>582</u> The problem is 58 divided by 2. Find the number of 2's in 58. Record the result. (29)	29
Press √ and get 2.9462<u>827</u> The problem is 82 divided by 7. Find the number of 7's in 82. Record the result. (11, ignoring the remainder)	<u>11</u> 52

Repeat

If there is only one player, the object of the game is to reach 100 or more by solving the fewest number of division problems.

Division Dash Scoreboard

Game 1		Game 2		Game 3	
Player 1	Player 2	Player 1	Player 2	Player 1	Player 2

Game 4		Game 5		Game 6	
Player 1	Player 2	Player 1	Player 2	Player 1	Player 2

Game 7		Game 8		Game 9	
Player 1	Player 2	Player 1	Player 2	Player 1	Player 2

Recommended Grade Level - Kindergarten

Egg Carton Mathematics

Materials: Egg carton
Beans

Directions: Using an egg carton, label each cup with the numbers from 0 - 11 in any order. Each child places that many beans in each cup. Check accuracy, or have a partner check.

Note: This is a good game for developing fine motor skills.

Recommended Grade Level 1st - 5th

Egg-Carton Digits Game

Materials: Egg Carton with numbers 0-11 written, in any order, on each cup 2 or more counters

Number of Players: 2 or more

Directions: Players take turns shaking the objects in the closed carton. They open the carton and record the digits where the objects land. Next, they use these digits to make the smallest number possible and the largest number possible.

For example, with a 5, 0, and 1, the smallest number is 105 (some children may wish to write 015, which can also be considered correct but not frequently used); the largest is 510.

Option: Have children successfully read 2 and 3 digit numbers, add a fourth object for a 4-digit number.

Variations: Using 2 or more counters, children can add, subtract, or multiply the numbers after shaking the carton.

Recommended Grade Level 5th

Factor Captor

Materials 48 counters, each the size of a coin
Scratch paper
Calculator

Number of players 2

Directions In the first round:

Player 1 chooses a 2-digit number on the number grid on page 34, covers it with a counter, and records the number on the scratch paper. This is Player 1's score for the round.

Player 2 covers all factors of Player 1's number that are not already covered, finds the sum of those factors, and records the sum on the scratch paper. This is Player 2's score for the round. **A factor may be covered only once during a round.**

If Player 2 missed any factors, Player 1 can cover them with counters and add them to his or her score.

In the next round, players switch roles: Player 2 chooses a number that is not covered by a counter; Player 1 covers all factors of that number.

Any number that is covered by a counter is no longer available and may not be used again.

The first player in a round may **not** cover a number less than 10, unless no other numbers are available.

Play continues with players trading roles in each round until all 48 numbers on the grid have been covered. Players then use their calculators to find their total scores. The player with the higher total score wins the game.

Example: Round 1:
Player 1 cover 27. Player 1's score: 27 points.
Player 2 covers 1,3,and 9. Player 2's score: 1 + 3 + 9 = 13 points.

Round 2:
Player 2 covers 18. Player 2's score: 18 points.
Player 1 covers 2, 3, and 6. Player 1's score: 2 + 3 + 6 = 11 points.
Player 2 covers 9 with a counter because 9 is also a factor of 18.
Player 2 adds 9 points to her or his score.

Date Time

Factor Captor Grid 1 (Beginning Level)

1	2	2	2	2	2
2	3	3	3	3	3
3	4	4	4	4	5
5	5	5	6	6	7
7	8	8	9	9	10
10	11	12	13	14	15
16	18	20	21	22	24
25	26	27	28	30	32

Date Time

Factor Captor Grid 2 (Advanced Level)

1	2	2	2	2	2	3
3	3	3	3	4	4	4
4	5	5	5	5	6	6
6	7	7	8	8	9	9
10	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	30
32	33	34	35	36	38	39
40	42	44	45	46	48	49
50	51	52	54	55	56	60

Recommended Grade Level 4th - 5th

Getting to One

Materials: Calculator

Number of Players: 2

Object of Game: One player chooses a mystery number. The other player tries to guess the number in as few tries as possible. Players then trade roles. The player who guesses the mystery number in fewer tries wins the round.

Directions:

1. **Player A** chooses a mystery number less than 100.
2. **Player A** follows one of these examples depending on the calculator being used to hide the number:
   Example 1: Enter 65 [÷] 65 [=].
   Example 2: If calculator has [K] key, player enters 65 [÷] 65 [K] [=].
   Example 3: If calculator has [OP_1] key, player enters 65 [÷] [OP_1] [OP_1].
3. **Player B** then tries to guess the mystery number **without clearing the calculator.** For example 1 and 2, a guess is made by entering it into the calculator followed by the [=] key. For example 3, a guess is also entered but is followed by the [OP_1] key and the [=] key is never used.
   - If the calculator shows a number less than 1, then the guess was too low.
   - If it shows a number greater than 1, then the guess was too large.
   - If it shows a 1 then **Player B** guessed the mystery number.

Player B enters guesses until the result is 1. **Player A** keeps track of the number of guesses. **Do not clear the calculator until the number has been guessed.**

Example: Mystery number = 65

Player B enters:	Calculator shows:	
55 [=]	0.8461538	too small
70 [=]	1.076923	too big
67 [=]	1.0307692	too big, but closer
65 [=]	1	<u>Just right !</u>

It took **Player B** four tries to guess the mystery number.

Scoring:

One way is to play 5 rounds in which there are no ties. The player who wins more rounds wins the game.

Another way is to play 5 rounds and to keep track of the number of guesses for each round. The player with the fewer guesses in all wins the game.

For a harder version of the game, allow mystery numbers up to 1000.

Recommended Grade Level - Kindergarten - Grade 1

Largest Numbers Dice Game

Materials: 2 dice with numbers written on them: 0, 1, 2, 3, 4, 9, on one die, and 5, 6, 7, 8, 9, 0 on the other.

Directions: This game can be played in a small group or with partners.

A child rolls the dice and then arranges them to make the biggest number possible. For example, a roll of 2 and 7 should be arranged as 72 rather than 27.

Variation: Make the smallest number possible. Encourage "07" when 0 comes up.

Variation: Each child writes down and says both of the numbers made with each roll of the dice.

Recommended Grade Level 2nd - 5th

Making Change Game

Materials: 2 dice
one $1 bill, 6 quarters, 2 dimes, and 2 nickels for each player

Number of Players: 2 or 3

Directions: There is no money in the bank at the beginning of the game. Players take turns depositing money into the bank. To determine the amount to deposit, roll the dice and multiply the total number of dots on the dice by 5 cents.

At the beginning of the game, you will be able to count out the exact amount. Later, you will need to make change from the money in the bank if you don't have the exact amount. The first player without enough money to put in the bank wins.

Variations:

1. Use two different-colored dice to represent nickels and dimes. Each player starts with three $1 bills in addition to the coins.

2. Use three different-colored dice to represent nickels, dimes, and quarters. Each player starts with six $1 bills and one $10 bill in addition to the coins.

Making Change Game Chart

Dots on dice	2	3	4	5	6	7	8	9	10	11	12
Money in bank	10¢	15¢	20¢	25¢	30¢	35¢	40¢	45¢	50¢	55¢	60¢

Recommended Grade Level - Grades 2 - 4

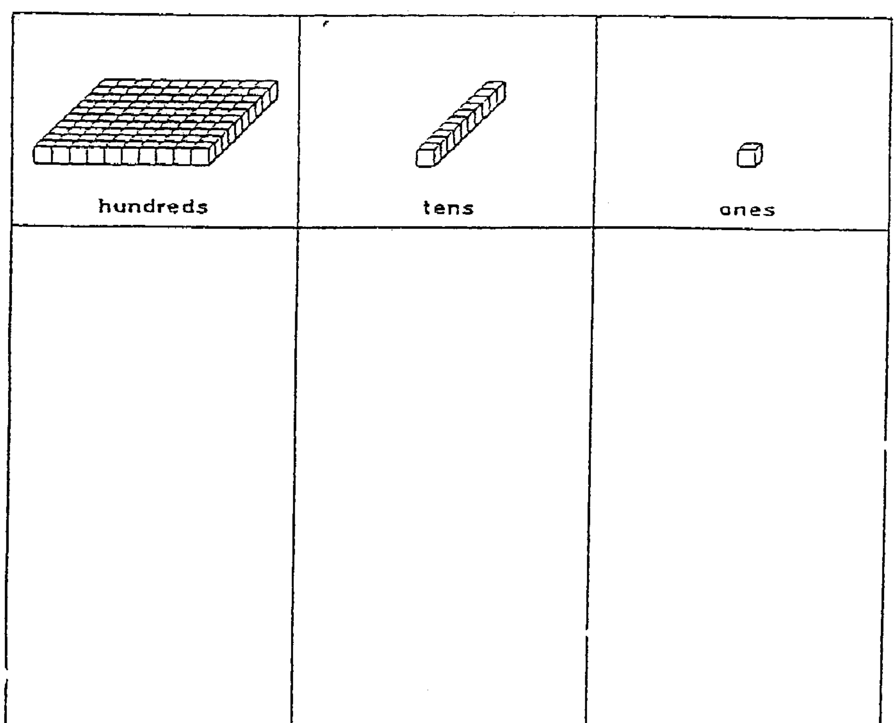
<u>Money Exchange Game</u>

Materials: Twelve $1 bills, twelve $10 bills, and one $100 bill for each player (You can use dollar bills, dimes, and pennies instead of $100, $10, and $1 bills.)

Place - Value Mat (see sample)

Number of Players: 2 or 3

Directions: Players put all their money in the bank. At each turn, they roll the dice, take from the bank the amount they roll, and place the money on the game mat. Whenever possible, they trade ten $1 bills for a $10 bill or ten $10 bills for a $100 bill. The first player to trade for a $100 bill wins. Most games last 12 - 18 rounds.



Place-Value Mat

Recommended Grade Level 2nd - 5th

Name That Number

Materials: 1 Math Deck (using modified regular deck of cards).

Number of Players: 3 or 4

Basic Game

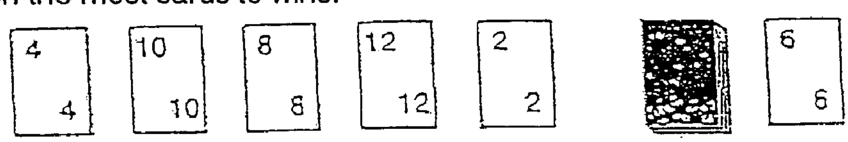
Directions: The cards are shuffled and five cards are placed face up on the playing surface. The rest of the deck remains face down, and the top card from the deck is turned over. This is the number to be named. In turn, players try to name the number by adding or subtracting the numbers on two of the five face-up cards.

Successful players take the two cards and the number named. The three cards taken are replaced by the top three cards from the face down deck.

Unsuccessful players lose their turns. The top card from the face down deck is turned over and becomes the new number to be named.

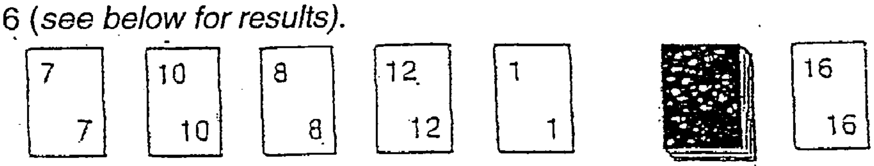
Play continues until all face down cards have been turned over. The player who has taken the most cards to wins.

Example:
<u>*Mae's turn*</u>



The number to be named is 6. It may be named with 4 +2, 8 - 2, or 10 - 4. Mae selects 4 + 2. She takes the 4, 2, and 6. She replaces the 4 and 2 with the top two cards from the face down deck and turns over the next card to replace the 6 (*see below for results).*

<u>*Mike's turn*</u>



The number to be named is 16. Mike can't find two cards with which to name 16, so he loses his turn. He turns over the next card from the face down deck and places it on top of 16. Play continues as before.

Variation: Player tries to reach the target number using a combination of operations - addition, subtraction, multiplication, and division. The goal is to use as many cards as possible.

<u>Sample Turn</u>: Player's numbers 7 5 8 2 10
Target number 16

Possible solutions:

a) 7 x 2 = 14 - 14 = 10 = 24 - 24 - 8 = 16 4 cards used

b) 8 ÷ 2 = 4 - 4 + 10 = 14 14 + 7 = 21 - 21 - 5 = 16
5 cards are used

Recommended Grade Level - Kindergarten

Number Cards

Materials: Blank index cards
Markers

Directions: Have the children make a special deck of playing cards, using blank index cards and markers. The deck will contain 40 cards, 4 each of numbers 1 - 10. Let the children write the numbers and, if they wish, add the appropriate number of small drawings (flowers, X's, smiley faces) to the face of the cards. (The backs, of course, should remain blank.)

The 40-card deck may be reduced to 20 or 30, depending upon the numbers of players and their abilities.

Recommended Grade Level Grades 1 & 2

Penny-Nickel Exchange

Materials: 1 die
40 pennies
8 nickels

Number of Players: 2 or 3

Directions: Partners make a pile of 40 pennies and 8 nickels.
This pile will be the bank.

Players take turns rolling a die and collecting pennies from the bank according to the number rolled on the die. As players acquire 5 or more pennies, they say "exchange" and turn in 5 pennies for a nickel. The game ends when the bank is empty. The partner with the most nickels wins.

Option: Have children play with a larger bank and two dice. This allows them to exchange coins more rapidly. At the end of any turn, each player should have fewer than five pennies.

Penny-Nickel-Dime Exchange

Materials: 1 die
40 pennies
8 nickels
4 dimes

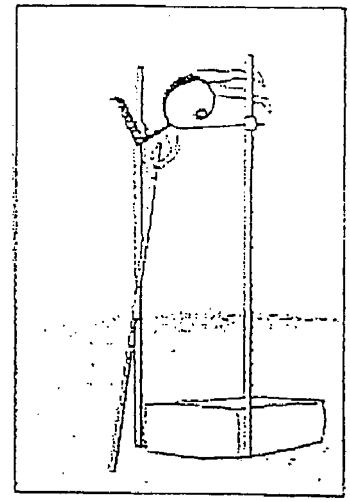
Number of Players: 2 or 3

Directions: Partners make a bank of 40 pennies, 8 nickels, and 4 dimes. They take turns rolling a die and collecting the appropriate amount from the bank. As soon as players have 5 pennies, they exchange them for a nickel, then exchange 2 nickels (or 5 pennies and 1 nickel) for a dime. At the end of any turn, each player should have fewer than 5 pennies or less than a dime.

The game ends when the bank is empty.

Option: Have children play with a larger bank and two dice. Use play coins if needed. This allows children to exchange coins more rapidly.

Recommended Grade Level 4th - 5th



Subtraction Pole Vault

Materials: 1 set of number cards
4 cards each of the numbers 0 through 9
Scratch paper to record results

You will also need a calculator to check answers.

Number of Players: 1 or more

Directions: Shuffle the cards and place the deck face down on the playing surface. Each player starts at 250. They take turns doing the following:

1. Turn over the top 2 cards and make a 2-digit number. (There are 2 possible numbers.) Subtract this number from 250 on scratch paper. Check the answer on a calculator.

2. Turn over the next 2 cards and make another 2-digit number. Subtract it from the result in Step 1. Check the answer on a calculator.

3. Do this 3 more times: Take 2 cards, make a 2-digit number, subtract it from the last result, and check the answer on a calculator.

The object is to get as close to 0 as possible, without going below 0. The closer to 0, the higher the pole-vault jump. If a result is below 0, the player knocks off the bar; the jump does not count.

Sample Jump:

Turn 1:	Draw 4 and 5. Subtract 45 or 54.	250 - 45	=	205
Turn 2:	Draw 0 and 6. Subtract 6 or 60.	205 - 60	=	145
Turn 3:	Draw 4 and 1. Subtract 41 or 14.	145 - 41	=	104
Turn 4:	Draw 3 and 2. Subtract 32 or 23.	104 - 23	=	81
Turn 5:	Draw 6 and 9. Subtract 69 or 96.	81 - 69	=	12

Variation: Players start by subtracting from 1000 instead of from 250 and the target number is -10 rather than 0.

Recommended Grade Level Grades 1 - 5

Top-It Variations

Addition

Materials: Number cards, 4 each of the numbers 1 - 10

Number of Players: 2 or 3

Directions: A player shuffles the cards and places the deck number-side down on the playing surface. Each player turns over two cards and calls out their sum. The player with the largest sum wins the round and takes all the cards.

In case of a tie for the largest sum, each tied player turns over two more cards and calls out his/her sum. The player with the largest sum takes all the cards of both plays.

Play ends when not enough cards are left for each player to have another turn. The player with the most cards wins. Or players may toss a penny to determine whether the player with the most or the fewest cards wins.

Advanced Variation
Players turn over four cards and form two 2-digit numbers which they then add. Players should consider how they form their numbers since different arrangements produce different sums. For example: A player turns over 2, 5, 7, and 4. 74 + 52 will result in a greater sum than 25 + 47.

Subtraction

The game can be played the same way as *Addition Top-it.* Use the cards or dice to generate subtraction problems. The player with the largest difference wins a round. If the advanced version is played, players should once again consider how they form their numbers. (75 - 24 will result in a greater difference than 57 - 42.)

Multiplication

The game is played the same way as *Addition Top-it.* Use the cards or dice to generate multiplication problems. The player with the largest product wins a round.

Division

The game is played the same way as *Addition Top-it.* Use the cards or dice to generate division problems. Players pick three cards. They pick two numbers to form the dividend and the remaining number is the divisor. The player with the largest quotient (dropping the remainder) wins a round.

A more advanced version may be to choose four cards and form a 3-digit number to be divided by the remaining number. Players may eventually notice that changing the arrangement of the numbers may result in a higher quotient. For example, 42/5 is greater than 25/4, but 54/2 is even greater.

Questions Parents Have & Answers to Common Concerns

BASIC FACTS

Q: Will my child learn and practice basic facts?

A: Your child will learn and practice all of the basic facts in many different ways without having to complete an overwhelming number of drill pages. She will play mathematics games in which numbers are generated randomly by dice, dominoes, spinners, or cards. She will work with Fact Triangles, which present fact families and stress the addition/subtraction and multiplication/division relationships. In fourth grade, she will take timed "50-facts" multiplication tests that will require her to learn the facts she does not already know. She will have continuing access to Addition/Subtraction and Multiplication/Division Fact Tables that will serve both as references for the facts she does not yet know and as records of the facts she does. She will take part in short, oral drills to review facts with her classmates during transitional moments throughout the day. Also, there are many other activities and routines that will help your child increase and reinforce her knowledge of basic facts throughout the year.

COMPUTATION

Q: Does my child have opportunities to learn, develop, and practice computation skills?

A: Your child gains the fact knowledge he needs for computation from basic facts practice. He solves problems in a meaningful way through number stories about real-life situations that require him to understand the need for computation, which operations to use, and how to use those operations. He often has the opportunity to develop and explain his own strategies for solving problems through algorithm invention. He practices mental arithmetic during Minute Math or 5-Minute Math. He also performs activities that encourage him to round or estimate numbers mentally.

ALGORITHM INVENTION

Q: What exactly is algorithm invention? And why is it important for my child to invent her own?

A: Algorithm invention means that your child creates and shares her own problem-solving methods instead of simply learning a set of prescribed standard algorithms. In other words she becomes an active participant in developing computational strategies. After the students have had plenty of opportunities to invent computational strategies, the teacher may discuss certain standard algorithms. There is no harm in giving a student a reliable algorithm if she becomes frustrated or resists the challenge of creating her own strategies. However, given a choice, most students do tend to prefer their own procedures. As your child invents her own algorithms, she begins to realize that she can solve a given problem in more than one way. She then becomes a motivated and independent problem-solver who is able to take risks, think logically, reason, and create.

MASTERY

Q: Why does my child have to move on to the next lesson if he hasn't mastered skills in the current lesson?

A: Mastery varies with each child and depends on his learning style and problem-solving style. Because people rarely master a new concept or skill after only one exposure, the program has a "spiral" design that informally introduces topics for two years before formal study. The "spiral" approach offers both consistent follow-up and a variety of experiences. If your child does not master a topic the first time it is introduced, he will have the opportunity to increase his understanding the next time it is presented. Your child will regularly review and practice new concepts by playing content-specific games and by completing written exercises and assessments.

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ADDRESSING INDIVIDUAL NEEDS

Q: *Everyday Mathematics* seems too difficult for my child. Will she be able to succeed in the program? How can the program address her individual needs?

A: If your child is having difficulty, continue to expose her to the program and give her a chance to meet the high expectations it is based on. *Everyday Mathematics* has many open-ended activities that will allow your child to succeed at her current skill level. While playing games, inventing algorithms, writing number stories, and solving problems in Minute Math and Math Boxes exercises, your child will develop her strengths and improve in the weak areas. Rest assured that she will receive repeated exposures to all concepts throughout the program. Furthermore, your child's teacher may group students to best suit their needs. For example, your child may be part of a small group working directly with the teacher or she may be paired with another student. The teacher may also modify or adjust program material according to student needs.

GAMES

Q: Why does my child play games in class?

A: *Everyday Mathematics* games reinforce mathematics concepts in a valuable and enjoyable way. They are designed to help your child practice his basic facts and computation skills and develop increasingly sophisticated solution strategies. These games also lay the foundation for learning increasingly difficult concepts. Certain games give your child experience using a calculator while others emphasize the relationship between the money system and place value or require your child to practice mental calculations. Your child may play *Everyday Mathematics* games at home from time to time. Spend some time learning the games and you will understand how much they contribute to your child's mathematics progress.

ASSESSMENT

Q: How do you measure my child's progress? What can you show me that demonstrates what he has learned?

A: *Everyday Mathematics* teachers assess understanding periodically and on an ongoing basis. Teachers frequently make detailed written observations of students' progress as they watch students working on Math Boxes or slate activities. They also evaluate students' Minute Math responses, the interactions during group work or games, and their written responses to Math Messages. Teachers also use unit review and assessment pages to evaluate individual student progress.

Instead of sending home traditional grade reports for mathematics, the teacher may show you a rubric, a framework for tracking your child's progress. The rubric may be divided into categories describing different skill levels, such as Beginning, Developing, and Secure. Using these categories, the teacher indicates your child's skill in and understanding of a particular mathematical topic. The teacher can use this record of progress to decide which areas need further review and whether certain students need additional help or challenge.

CALCULATORS

Q: Why is my child using a calculator? Will he become dependent on the calculator for solving problems?

A: Your child uses a calculator to learn concepts, recognize patterns, develop estimation skills, and explore problem-solving. He learns when a calculator can help solve problems beyond his current paper-and-pencil capabilities. On the other hand, he also learns that in some situations, he can rely on his own problem-solving power to get an answer more quickly. Your child also uses basic fact and operations knowledge and estimation skills to determine whether the calculator's solution is reasonable. He becomes comfortable with the calculator as one technological tool.

STANDARDIZED TESTS

Q: How do you help your class prepare for standardized tests?

A: *Everyday Mathematics* teachers help students prepare for standardized mathematics tests by giving timed tests more frequently and by spending more time on the *Everyday Mathematics* games that reinforce basic facts. Teachers also review test-taking strategies, such as looking for reasonableness in an answer. Teachers may also include problems in Math Boxes that require students to use these strategies.

PARENT INVOLVEMENT

Q: How can I get involved? How can I reinforce my child's mathematics learning at home?

A: Communicate with your child's teacher on a regular basis. If possible, volunteer to help with Explorations or Projects or observe a mathematics lesson. Attend school functions, such as Math Night, planned to inform you about *Everyday Mathematics* and your child's progress. At home, talk with your child about real-life situations that involve mathematics, such as buying groceries or balancing the checkbook. Ask your child to "teach" you the mathematics lessons he is learning, including favorite games and creative solution strategies.

GEOMETRY VOCABULARY

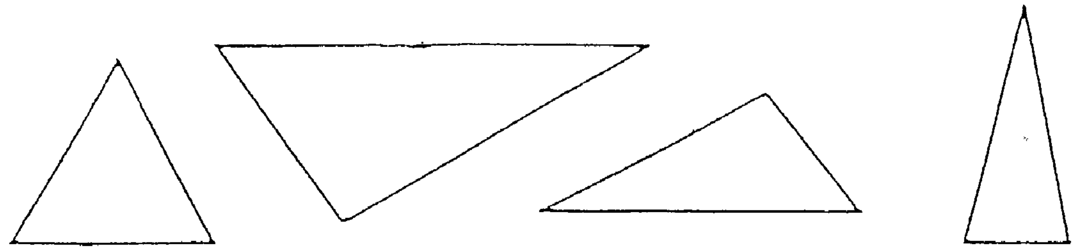
Children start to explore geometry with three-dimensional shapes by collecting real objects, observing similarities and differences, and exploring spatial relationships. Two-dimensional figures are introduced by generating them from three-dimensional shapes. Students experience the properties of different figures by constructing the shapes for themselves, observing common characteristics and different relationships among the different shapes.

As children explore geometric figures and shapes, they are exposed to many words with which you may not be familiar. Children learn the correct names for mathematical concepts by seeing many examples and hearing the correct name used in natural conversations. Teachers use appropriate mathematical terms informally in conversation, as they would any other words. For example, a child may call an angle "corner" because corner is familiar, but as the teacher uses the word "angle" repeatedly in natural conversation, this word will also become familiar, to the child.

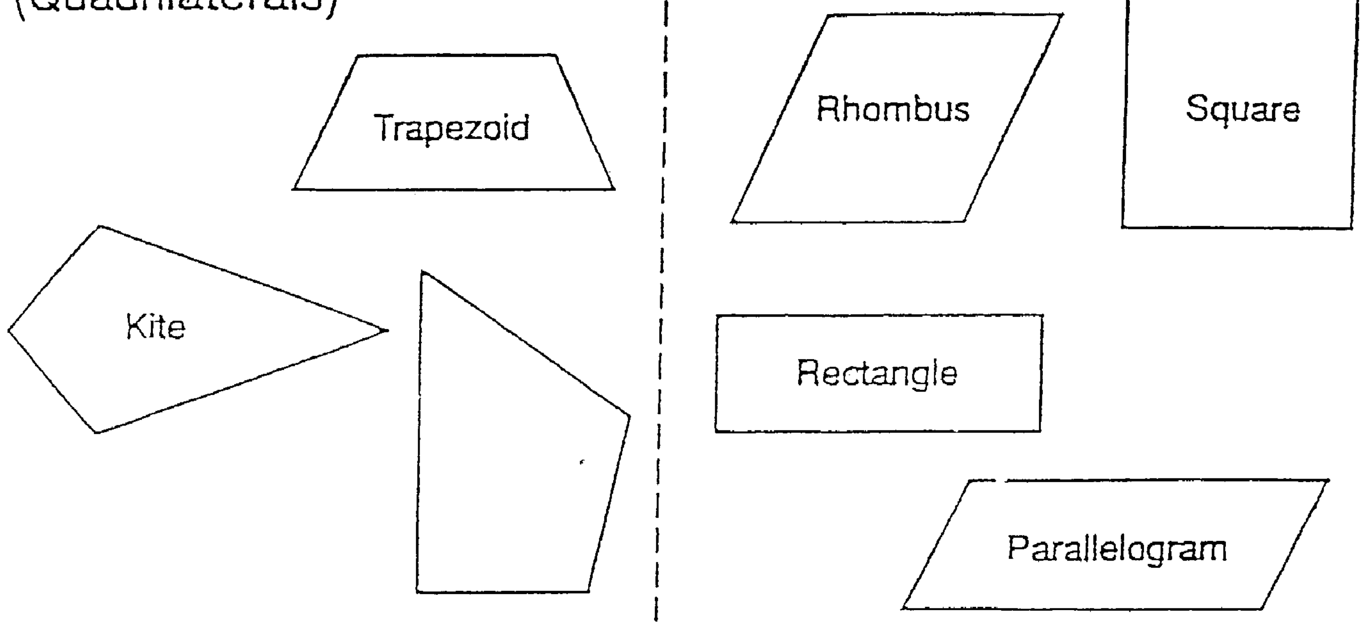
On the next two pages are examples of some two and three dimensional shapes. Additional terms may be found in the glossary section later in the handbook.

Two-Dimensional (2-D) Shapes

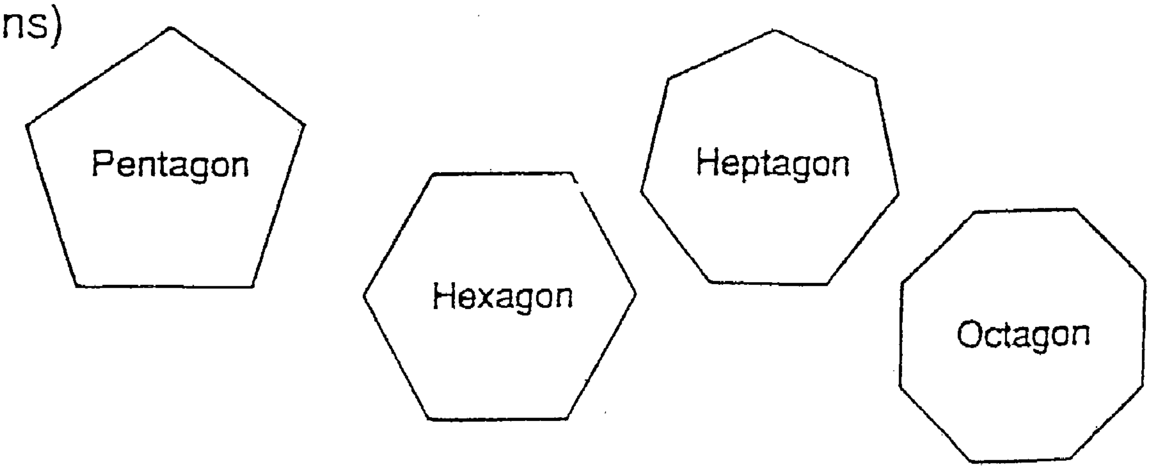
Triangles



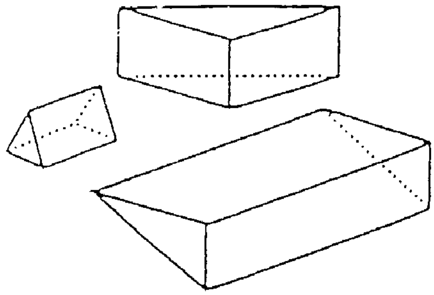
Quadrangles (Quadrilaterals)



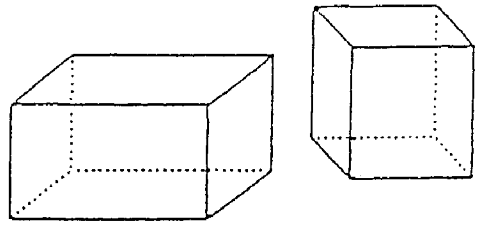
Other Polygons (N-gons)



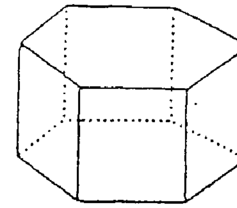
Three-Dimensional (3-D) Shapes



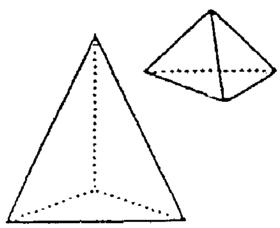
Triangular prisms



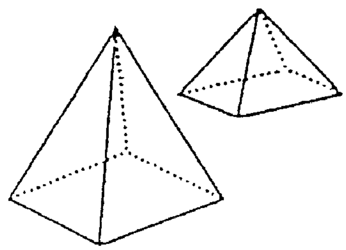
Rectangular prisms



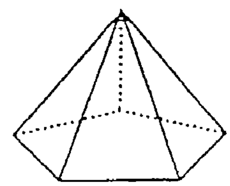
Hexagonal prism



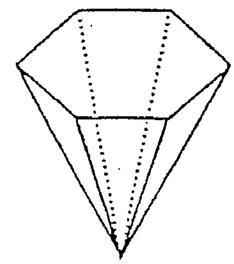
Triangular pyramids



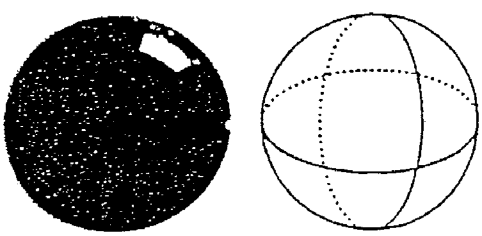
Rectangular pyramids



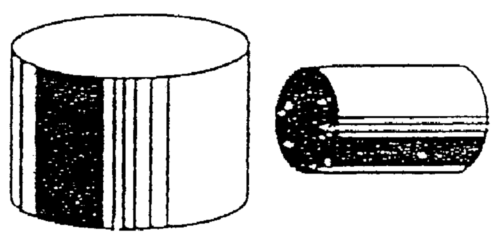
Pentagonal pyramid



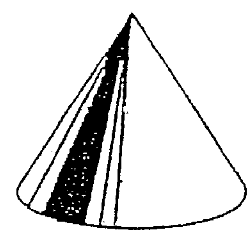
Hexagonal pyramid



Spheres



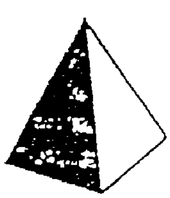
Cylinders



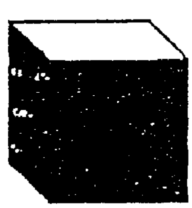
Cone

Five regular polyhedrons

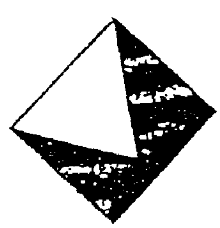
The faces for each shape are identical.



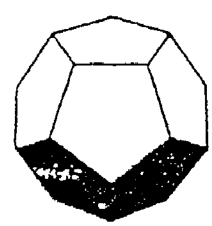
Tetrahedron, pyramid (4 faces)



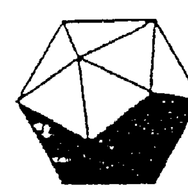
Cube, prism (6 faces)



Octahedron (8 faces)



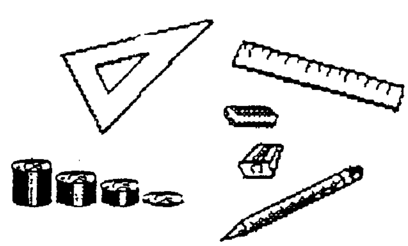
Dodecahedron (12 faces)



Icosahedron (20 faces)

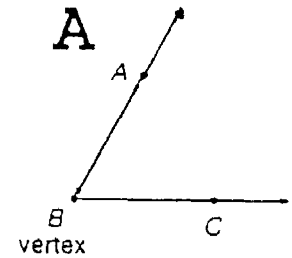
Glossary

The terminology that is used in Everyday Mathematics might not be familiar to you; therefore, we've included this section to assist you as you work with your child.



Glossary

A



acute angle

acute angle An angle greater than 0 degrees and *less than* 90 degrees.

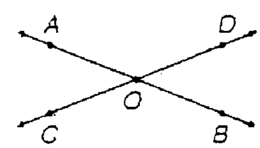
algorithm A set of step-by-step instructions for doing something carrying out a computation. solving a problem, and so on.

analog clock Clock that shows the time by the position of hour and minute hands.

angle A figure consisting of two *rays* with the same endpoint. An angle can be thought of as the result of rotating one ray while keeping the other stationary.

angle (of a polygon) The angle determined by two intersecting sides of a polygon. Since the rays that make up an angle extend without end, only part of the angle is contained in the polygon.

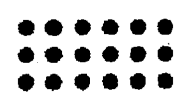
angles. adjacent Two intersecting lines form four angles. In the diagram. angles AOC and AOD are adjacent angles. They have the same vertex and a common side. Their other sides form line CD. The sum of their measures is 180°. Similarly, *angles* BOC and BOD are adjacent angles.



angles, vertical Two intersecting lines form four angles. In the diagram, angles AOC and DOB are vertical angles. They have the same vertex but no sides in common. Their measures are equal. Similarly, angles AOD and COB are vertical angles.

area The number of units (usually squares) that can fit into a bounded surface without gaps or overlaps.

array A rectangular arrangement of objects in rows and columns.


array

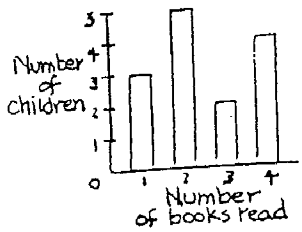
attribute A feature such as size, shape, color, and so on.

average A typical or middle value for a set of numbers. Often used as a synonym for mean (or **arithmetic mean**), which is found by adding the numbers in the set and dividing the sum by the number of numbers.

B

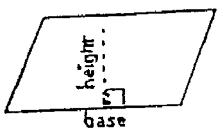
balance 1. The amount of money available in a bank account; the current difference between the debits and credits of the account. 2. A type of weighing device operated by comparing known weights with an unknown weight.

ballpark estimate A rough estimate, usually one that has not been carefully worked out but is good enough; sometimes used to check the reasonableness of an answer.

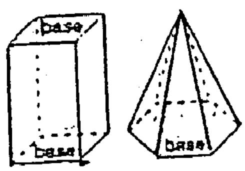


bar graph

bar graph A graph that represents data with horizontal or vertical bars.



base (of a **polygon**) the side on which the polygon "sits;" the side that is perpendicular to the height of the polygon. (of a **polyhedron**) the "bottom" face of a polyhedron: the face whose shape is the basis for classifying a prism.



base line See *protractor.*

base ten The familiar numeration system. consisting of the ten digits 0. 1. 2,..., 9 and a method of assigning values to these digits depending on where they appear in a numeral (ones. tens. hundreds. and so on. to the left of the decimal *point:* tenths. hundredths. and so on, to the right of the decimal point).

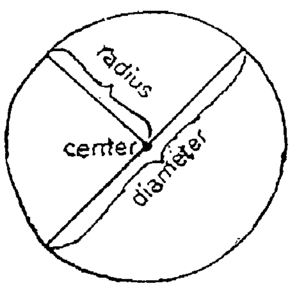
billion A digit(s) followed by 9 whole-number places. Billion written in number form is 1.000,000.000 or 10^9

C

Celsius The temperature scale on which zero degrees is the temperature at which water freezes.

census An official count of a population. usually including the collection of information such as age. sex. income. education. and so on.

centimeter (cm) In the metric system. a unit of length defined as 1/100 of a meter; equal to 10 millimeters or 1/10 of a decimeter.



circle

circle The set of all points in a plane that are a given distance (the *radius* of the circle) from a given point (the *center* of the circle). The term *radius is* also used for a line segment with one endpoint at the center of the circle and the other endpoint on the circle. A *diameter* of a circle is a line segment that passes through the center of the circle and has its endpoints on the circle: also, the term is used for the length of such a segment. A **semicircle** is "half of a circle:" that is. it is either of the two parts of a circle between (and including) the endpoints of a diameter.

circle (pie) graph A graph that uses a circle divided into parts to represent the parts os a set of data while the circle represents the whole set of data. Also called a *pie graph.*

circumference The length of (or distance around) a circle.

clockwise In the same direction as the hands of a clock rotate; to the right.

column A vertical arrangement of objects or numbers in an array or table.

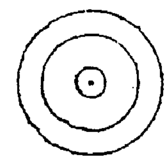
compass 1. A device for drawing circles. The perfect compass for elementary schools (safe, easy to use, flexible, cheap) has yet to be invented. 2. A navigational device that points to Earth's magnetic North Pole.

composite number A whole number that has more than two factors. For example, 10 is a composite number because it has four factors: 1, 2, 5, and 10. A composite number is divisible by at least three whole numbers.

concave polygon A polygon in which at least one vertex is "pushed in." Also called nonconvex.

concave polygons

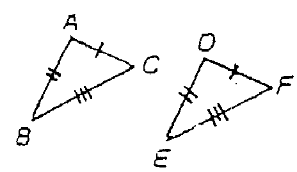
concentric circles Circles that have the same center.



concentric circles

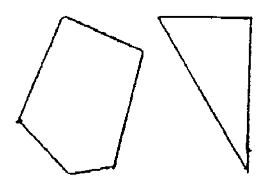
cone A three-dimensional shape having a circular base, curved surface, and one vertex.

congruent Two figures that are identical — the same size and shape — are called congruent figures. If you put one on top of the other, they would match exactly. Congruent figures are also said to be congruent to each other.



congruent figures

convex polygon A polygon in which all vertices are "pushed out."

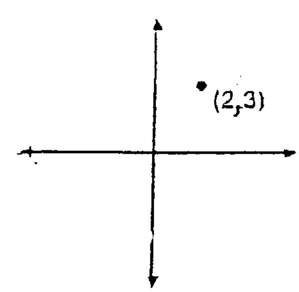


convex polygons

coordinate grid A device for locating points in a plane by means of *ordered pairs* of numbers. A coordinate grid is formed by two number lines that intersect at right angles at their 0 points.

coordinate A number used to locate a point on a number line or coordinate grid.

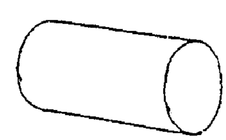
counterclockwise Opposite to the direction in which the hands of a clock rotate; to the left.



coordinate grid

cube A polyhedron with six square faces.

cylinder A three-dimensional shape having a curved surface and parallel circular bases that are the same size. A can is a common object shaped like a cylinder.



cylinder

D

data Information gathered by observation, questioning, or measurement.

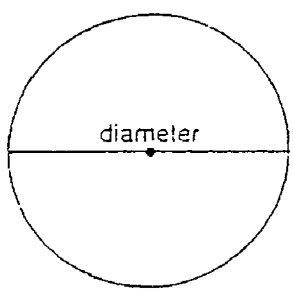
decimal A number represented in the *base ten* numeration system.

degree (°) A unit for measuring angles; based on dividing a circle into 360 equal parts.

degree Celsius (°C) In the metric system, the unit for measuring temperature. On the Celsius scale, water freezes at 0 degrees and boils at 100 degrees.

degree Fahrenheit (°F) In the U.S. customary system, the unit for measuring temperature. On the Fahrenheit scale, water freezes at 32 degrees and boils at 212 degrees.

denominator The number of equal parts into which the whole (or ONE or unit) is divided. In the fraction a/b, b is the denominator.



diameter A line segment that passes through the center of a circle or sphere and has its endpoints on the circle or sphere; also, the length of such a segment.

difference The amount by which one number is greater and less than another.

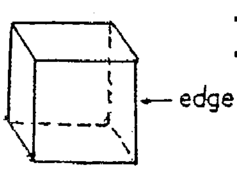
digit In our decimal numeration system, one of the symbols 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, which are used to write any number. For example, the numeral 145 is made up of the digits 1, 4, and 5.

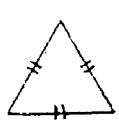
digital clock Clock that uses numbers only to shoe the time in hours and minutes, with a colon used to separate them.

dividend In division, the total before sharing. In 8 / 2 = 4, 8 is the dividend.

divisor If a number n is divisible by a number x, then x is a divisor of n. For example, 21 is divisible by 3, so 3 *is* a divisor of 21.

E





edge The line segment where two faces of a polyhedron meet.

endpoint The point at either end of a line segment; also, the point at the end of a ray. A line segment is named for its endpoints: "Segment *LT*" or "segment TL" is the line segment between (and including) points L and T.

equilateral A polygon with all sides the same length is called an equilateral polygon.

equivalent fractions Fractions that have different numerators and denominators but name the same number.

equivalent names Different ways of naming the same number. For example: 2 + 6, 4 + 4, 12 - 4, 18 - 10, 100 - 92, 5 + 1 + 2, eight, and VIII are some of the names for 8.

estimate Noun: A calculation of a close, rather than exact, answer; a number close to another number. Verb: To use available information to make an estimate.

even number A whole number such as 2, 4, 6, and so on, that can be evenly divided by 2 (divided by 2 with 0 remainder). See also *odd number.*

exploration An independent or small-group activity. The activities include concept development with manipulatives, links to more abstract levels, data collection, classification and ordering, problem solving, games, and skill reviews.

exponent The raised number in a power that tells the number of times the base is used as a factor. For example, the exponent in 4^3 is the raised three, indicating that 4 is a factor three times, 4 * 4 * 4.

extended fact A number sentence obtained by multiplying numbers in a basic fact by 10, 100, and so on. Knowing 5 + 8 = 13 makes it easy to find 50 + 80; knowing 6 * 7 = 42 makes it easy to find 6 * 70.

F

face A flat surface on a 3-dimensional shape.

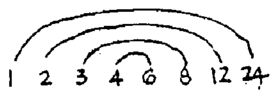
fact extension Calculations with larger numbers by using knowledge of basic facts. Knowing 5 + 8 = 13 makes it easier to solve problems such as 50 + 80 = ?, 35 + 8 = ?, and 65 + ? = 73. Extensions can also be applied to subtraction facts.

fact family A set of numbers related by facts; for example, 6, 7, and 42: 6 * 7 = 42, 7 * 6 = 42, 42 / 6 = 7, 42 / 7 = 6.

fact triangle Triangle card labeled with the number of a fact family for practice with addition/subtraction and multiplication/division facts. The two one-digit numbers and their sum or product (marked with an asterisk) appear in the corners of the triangle.

factor Any numbers that are multiplied together. These numbers may be whole numbers, decimals, or fractions. For example, 4, 3, and 2 are factors in 4 * 3 * 2 = 24; 0.5 and 25 are factors in 0.5 * 25 = 12.5; $^1/_2$ and 9 are factors in $^1/_2$ * 9 = 4 $^1/_2$

factor pair Two factors of a number n whose product is the number n.. A number may have more than one factor pair. For example, the factor pairs of 21 are 1 and 21, and 3 and 7.



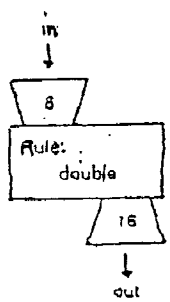
Factors of 24

factor rainbow A way of showing factor pairs in a list of all the factors of a number. This can be helpful in checking whether a list of factors is correct.

Fahrenheit The temperature scale on which 32 degrees is the temperature at which water freezes.

foot (ft) In the U.S. customary system, a unit of length equal to 12 inches or of a yard.

fraction Usually, a number that can be written in the form $^a/_b$ or a/b, where a is a whole number and b , is a non-zero whole number.

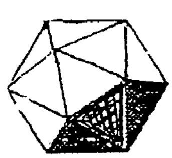


function machine

Frames and Arrows Diagrams to represent number sequences – sets if numbers ordered according to a rule. The diagrams consist of *frames* in which numbers are written and *arrows* that gives the rules for moving from one frame to the another.

function machine An imaginary machine that processes numbers according to a certain rule. A number (input) is put into the machine and is transformed into a second number (output) by application of the rule.

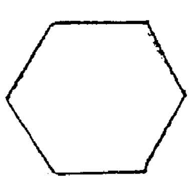
G


geometric solid

geometric solid A 3-dimensional shape bound by surfaces. Common geometric solids include the rectangular prism, square pyramid, cylinder, cone, and sphere. A geometric solid is "hollow;" it does not include the points in its interior.

H

hexagon A polygon with six sides.


regular hexagon

hundreds The place-value position with value equal to 100 times the unit value.

hundredths The place-value position with value equal to 100 of the unit value; the second digit to the right of the decimal *point*.

I

improper fraction A fraction that names a number greater than or equal to 1. A fraction whose numerator is equal to or greater 7 5 than its denominator. Examples of improper fractions are $^7/_3$, $^5/_5$, $^9/_7$, $^{16}/_4$.

inch (in) In the U.S. customary system, a unit of length equal to 12 of a foot. The inch is defined as 2.54 centimeters.

integer Any of the numbers ... -5, -4, -3, -2, -1, 0, 1, 2, 3, 4, 5 ... The integers consist of the whole numbers and their opposites.

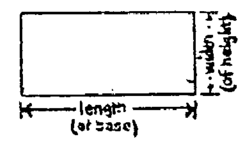
intersect To meet (at a point, line, and so on).

isosceles triangle A triangle that has two sides of the same length.

isosceles triangle

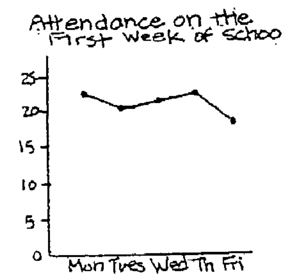
length The measurement of something along its greatest dimension.

L



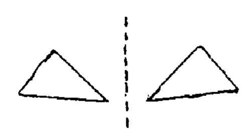
line (straight line) A basic concept of geometry; usually thought of as "straight," without width or thickness, extending without end.

line graph A graph that represents data with points and line segments; useful for showing trends.



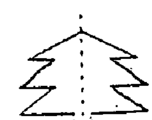
line graph

line of reflection (mirror line) A line halfway between a picture or object (pre-image) and its reflected image.



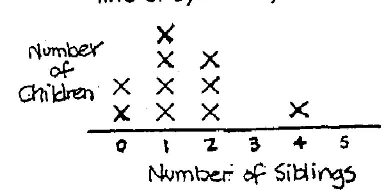
line of reflection

line of symmetry A line of reflection in the middle of a picture or object.



line of symmetry

line plot A sketch showing the values of data. Check marks, X's, or sticky notes are used to show the frequency of each value's occurrence along a number line.



line plot

line segment Two points on a line and all the points on the line between them. A line segment can be any length and is the shortest path between two points.

Math Boxes A format to provide review and practice.

line segment $\overline{AB}$

M

maximum The largest amount; the greatest number in a set of data.

mean See *average.*

median The middle value in a set of data when the data are listed in order from smallest to largest (or largest to smallest).

meter (m) The basic unit of length in the metric system, equal to 10 decimeters, 100 centimeters, or 1000 millimeters.

metric system A measurement system based on the decimal numeration system and used in most countries in the- world

millimeter (mm) In the metric system, a unit of length equal to $^1/_{10}$ of a centimeter or $^1/_{1000}$ of a meter.

minimum The smallest amount; the least number in a set of data.

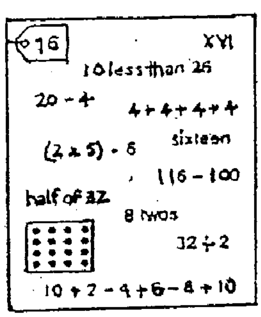
mixed number A number that has a whole number part and a fraction part. Examples of mixed numbers are $2\ ^1/_3$, $4\ ^3/_5$, $1\ ^4/_7$

mode The value or category that occurs most often in a set of data.

multiples Repeated groups of the same amount. A multiple of a number is the product of a whole number and that number; for example, 45 is a multiple of 5, because 45 = 9 * 5.

N

***n*-gon** A synonym for *polygon* in which n represents the number of angles or line segments that make up the polygon. For example, 5-gon or 9-gon.



name-collection box

name-collection box A box-like diagram tagged with a given number and used for collecting equivalent names for that number.

negative numbers Numbers less than (below) zero.

number family A collection of number triplets consisting of two addends and their sum or two factors and their product.

number grid A table in which consecutive numbers are arranged in rows of ten. A move from one number to the next within a row is a change of one: a move from one number to the next within a column is a change of ten.

number line A line on which equidistant points correspond to numbers in order. Used as a frame of reference for counting and numeration activities.

number model A number sentence that shows how the parts of a number story are related; for example: $5 + 8 = 13$; $27 - 11 = 16$; $3 * 30 = 90$; $56 \div 8 = 7$.

number sentence A sentence about numbers, written with mathematical symbols: Numerals, operation signs, grouping signs, variables, and relation symbols. A number sentence can be *true* (for example, $2 + 3 = 5$), *false* ($2 + 3 = 6$), or neither true nor false, also called open ($2 + 3 = x$). A *solution of an open sentence* is a value or values of the variable(s) in an open sentence for which the sentence is true.

numerator In a whole divided into a number of equal parts, the number of equal parts being considered. In the fraction a / b, a is the numerator.

O

obtuse angle An angle greater than 90 degrees and less than 180 degrees.

obtuse angle

octagon An eight-sided *polygon.*

odd number A whole number that is not an *even number,* such as 1, 3, 5, and so on. An odd number cannot be evenly divided by 2; that is, when an odd number is divided by 2, the remainder is 1.

one-dimensional (1-D) Having length but not width or thickness.

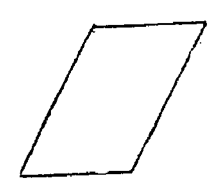
ordered pair Two numbers in a specific order, used to locate points on a *coordinate grid.* Ordered pairs are usually written inside parentheses: (2,3).

ordinal number A number used to express position or order in a series, such as first, third, tenth.

P

parallel Always the same distance apart, no matter how far extended: never meeting.

parallelogram A quadrilateral that has two pairs of parallel sides and equal opposite sides.



parallelogram

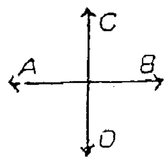
pattern A model or plan by which objects can be arranged so that what comes next can be predicted.

pentagon A polygon with five sides.

percent (%) Per hundred; 1% means $^1/_{100}$ or 0.01. 15% means $^{15}/_{100}$ or 0.15

perimeter The distance around a figure. Peri- comes from the Greek word peri, around, and -meter comes from the Greek word *metron*, measure.

perpendicular Two rays, segments, or lines that form right angles.



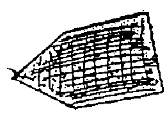
perpendicular lines

place value The relative worth of each digit in a number is determined by its position. Each place has a value ten times that of the place to its right and one-tenth of the value of the place to its left.

placeholder A symbol used in place of another, or to indicate an absence. 0 is sometimes called a placeholder in numerals, because it is used to indicate that there are no groups of a certain size; for example, the 0 in 507 indicates that there are no tens. (However, 0 is a number; it should not be confused with "nothing.")

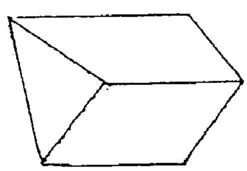
plane A flat surface that extends forever.

point A basic concept of geometry; usually thought of as a location in space, without size. Points are named with capital letters.


polygon with interior shaded

polygon A closed two-dimensional figure consisting of line segments *(sides)* connected endpoint to endpoint, so that each segment intersects exactly one other at their common endpoint.

polyhedron A three-dimensional shape, all of whose surfaces (*faces*) are flat. Each face consists of a *polygon* and the interior of the polygon.

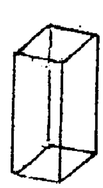

polyhedron

power (of a number) A product of factors that are all the same. For example, 5 * 5 * 5 (or 125) is called 5 to the third power, because 5 is a factor three times. Another way to write 5 to the third power is 5^3

powers of 10 Written in exponential notation, the exponent shows how many times 10 is a factor. It also shows how many zeros are in the standard place name.

prime factorization The longest factor string for a number. It is made up of prime numbers only. For example, the prime factorization of 24 is 2 * 2 * 2 * 3.

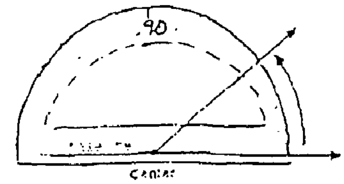
prime number A whole number greater than 1 that has exactly two factors, 1 and itself. For example, 7 is a prime number because its only two factors are 1 and 7. A prime number is only divisible by 1 and itself. The first five prime numbers are 2, 3, 5, 7, and 11.


prism

prism A polyhedron with two parallel faces (called *bases)* that are the same size and shape. Prisms are classified according to the shape of the two parallel bases; the sides (also called *faces)* are always parallelograms, and often rectangular.

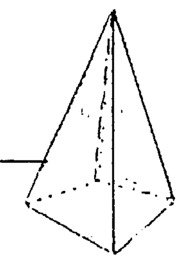
product The result of multiplication. In 4 * 3 = 12, 12 is the product.

protractor A device for measuring or drawing angles. The vertex of the angle should be at the *center* of the protractor and one side of the angle along the *base line* of the protractor.



protractor

pyramid A polyhedron in which one face (the *base*) is a polygon and the other faces are formed by triangles with a common vertex (the *apex*). A pyramid is classified according to the shape of its base.



pyramid

Q

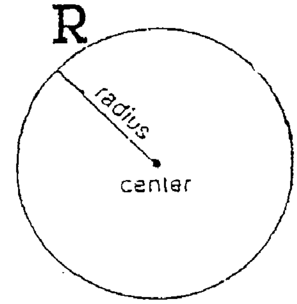
quadrangle A polygon with four sides.

quadrilateral A polygon with four sides.

quotient The result of division. In $8 \div 2 = 4$, 4 is the quotient. If the divisor (2 in this example) is the number of equal groups, then the quotient is the number in each group; if the divisor is the number in each group, then the quotient is the number of equal groups..

R

radius A line segment whose endpoints are the center of a circle or sphere and a point on the circle or sphere; also, the length of such a segment.

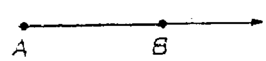


radius.

range The difference between the maximum and minimum in a set of data.

rate The quantity of two quotients with different units. For example, if a and b are quantities with different units, then a / b is the amount of quantity a per quantity b.

rational number Any number that can be represented in the form $^a/_b$, where a is an integer and b is a non-zero integer.

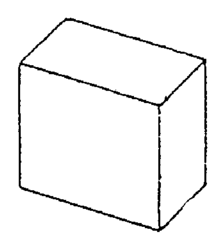


ray *AB*

ray A figure consisting of a point on a line and all the points on the line to one side of that point.

rectangle A parallelogram whose angles are all right angles.

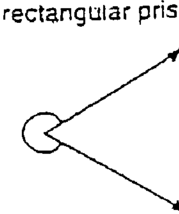
rectangular array A rectangular arrangement of objects in rows and columns in which each row has the same number of parts and each column has the same number of parts.



rectangular prism

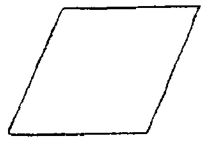
rectangular prism A prism whose faces are all rectangles.

reflex angle An angle whose measure is between 180° and 360°, or -180° and -360°.



reflex angle

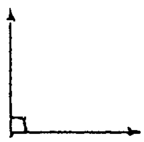
regular polygon A convex polygon in which all sides are the same length and all angles are the same size.



rhombus

remainder The number left over when a set of objects is separated into equal groups or shared equally. In 16 ÷ 3 —> 5 R 1, 1 is the remainder.

rhombus A parallelogram whose sides are all the same length.



right angle

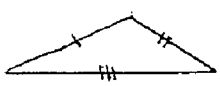
right angle A square corner: an angle of 90°.

rotation A turn around a center point or axis.

round To replace a number with a nearby number that is easier to work with or better reflects the precision of data. 12.964 rounded to the nearest thousand is 13.000.

row A horizontal arrangement of objects or numbers in an array or table.

S



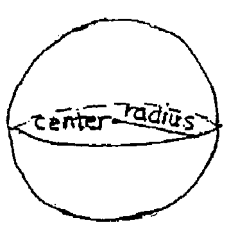
scalene triangle

scalene triangle A triangle that has no sides of the same length.

scientific notation A notational system in which a number is written as the product of a number between 1 and 10 and a power of ten.

scroll a roll of paper with words and/or pictures written on it.

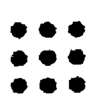
significant figures In a count or measurement, digits that reflect the *precision* of the result: How reliable is the result? How much variation might there be if the count or measurement were repeated? How closely can the measuring instrument measure the object? Significant figures are usually non-zero digits, or 0 when it is between non-zero digits. To two significant figures, the distance from the Earth to the Sun is 93,000,000 miles.



sphere

sphere The set of all points in space that are a given distance (the *radius* of the sphere) from a given point (the *center* of the sphere). A ball is shaped like a sphere, as is Earth. A *hemisphere* is "half of a sphere;" that is, either of the two parts into which the sphere is divided by its *equator* (or by any circle on the sphere with its center at the center of the sphere).

square A rectangle whose sides are all the same length.

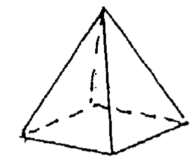


square array

square array A special rectangular array that has the same number of rows as columns. For example, 16 objects will form a square array with 4 objects in each row and 4 objects in each column.

square number A number that is the product of a whole number multiplied by itself, a whole number to the second power. 25 is a square number, because 25 = 5 * 5. A square number can be represented by a square array.

square pyramid A geometric solid consisting of a square base and triangular faces that meet at an apex (point).



square pyramid

square root of a number The square root of a number x is the number which, when multiplied by itself, results in the number x. For example, the square root of 16 is 4 because $4 * 4 = 16$.

square-root ([√‾]) key The key on a calculator that finds the square root of an entered number.

square unit A unit used to measure area-usually a square that is 1 inch, 1 centimeter, 1 yard, or other standard unit of length on each side.

straight angle

straight angle An angle of 180 degrees; a line with one point identified as the vertex of the angle.

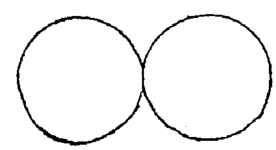
straightedge A tool used to draw a straight line. A ruler may be used as a straightedge, but a straightedge is not necessarily a ruler.

surface A basic concept of geometry; usually thought of as a continuous set of points, flat or curved, without thickness. A surface can be bounded (a circle and its interior or the surface of a cylinder) or unbounded (a plane).

symmetric A picture or object that has at least one line of symmetry.

T

tally chart A table with a list of possible outcomes and tally marks showing how many times each outcome was observed.

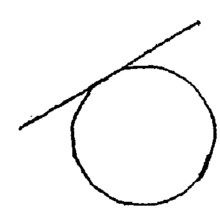


tangent circles

tangent Intersecting at exactly one point.

template A pattern used as a guide in making something accurately.

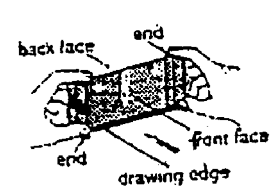
tessellation An arrangement of closed shapes that covers a surface completely without overlaps.



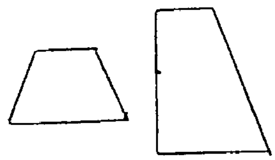
line tangent to a circle

three-dimensional (3-D) Not lying completely within a single flat surface. Three-dimensional objects have thickness as well as length and width.

transparent mirror A mirror with a front and back face that has a recessed edge used for drawing

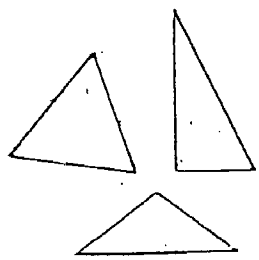


transparent mirror



trapezoids

trapezoid A quadrilateral with exactly one pair of parallel sides.



triangles

triangles A polygon with three sides. An **equilateral** triangle has three sides of the same length. An **isosceles** triangle has two sides of the same length. A **scalene** triangle has no sides of the same length.

triangular prism

triangular prism A prism with triangular bases.

two-dimensional (2-D) Lying completely within a flat surface. Two-dimensional objects have length and width but not thickness.

U

U.S. customary system The measuring system used most often in the United States. Units for linear measure (length, distance) include inch, foot, yard, and mile; units for weight include ounce and pound; units for capacity (amount of liquid or other pourable substance a container can hold) include cup, pint, quart, and gallon.

unit ONE of something.

unit (of measure) An agreed-upon standard with which measurements are compared.

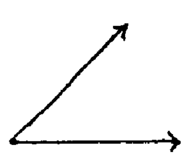
unit box Rectangular box displayed alongside a set of numbers or problems. It contains the unit or label for the numbers in use.

unit fraction A fraction that names one of the equal parts of the whole.

V

variable A symbol (usually a letter) that can have a range of numerical values in a given problem or discussion.

vertex



vertex The point at which rays of an angle, two sides of a polygon, or two edges of a polyhedron meet.

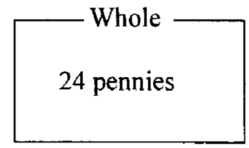
vertical Upright.

vertices Plural of *vertex*.

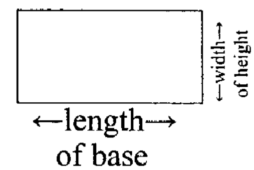
volume A measure of the amount of space a three-dimensional object takes up.

What's My Rule? A routine in which the student is to figure out the rule that relates numbers in a set of number pairs.

W



whole The entire object, collection of objects, or quantity being considered: the ONE, the unit.



width The measurement of the distance of something from one side to the other side.

Y

yard (yd) In the US customary system, a unit of length equal to 3 feet or 36 inches.