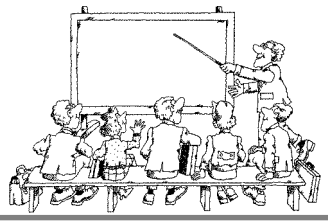
Math Trivia

The number names for numbers greater than 999 in order with number of zeros are as follows: Thousand (3), Million (6), Billion (9), Trillion (12), Quadrillion (15), Quintillion (18), Sextillion (21), Septillion (24), Octillion (27), Nonillion (30), Decillion (33).



Investigations

There are applications of geometry all around us. Investigate these and add your own:

1. What might be some reasons why the caps of fire hydrants are pentagonal?
2. Why do architects and engineers use so many triangles in construction?
3. Why are the white lines on the interstate highways a set length and a set distance apart?
4. Why are so many products packaged in rectangular prisms?
5. Why are manholes round?

(3.01)

Using Numbers in Powerful Ways

You can use your calculator to change any fraction to an equivalent decimal number.

To show that one-half is equivalent to 0.5, divide the numerator by the denominator.

Follow the same procedure to show that three-fourths is equal to 0.75.

Experiment to find out what fraction would give you 0.7777777 on the calculator display.

(1.03)

Fraction Fun

What are two possible replacements for *R* that will make this statement true?

$$\frac{1}{2} - \frac{1}{4} + \frac{3}{8} > \frac{1}{3} + R$$

(1.01c, 5.02)

For Further Study

Find L, M, and N, different integers, such that LM + LM + LM = NNN

(1.03)

Exploring Polygons

Name _____

Partner _____

1. Suppose you are standing and facing north. If you turn completely around, you have turned 360°, a full circle. Think about the minute hand on a clock. Every hour it travels from 12 all the way around and back to 12; that is, 360°. How many degrees does the long hand travel in each of these situations?

   12 to 6 _____ What fraction of the circle is this? _____

   12 to 3 _____ What fraction of the circle is this? _____

   12 to 9 _____ What fraction of the circle is this? _____

   12 to 1 _____ What fraction of the circle is this? _____

2. Using the quadrilaterals A - D and the triangles F - J, measure the angles of each figure and write the sum of the angles in the center of each figure. Notice that you may need to use a straight edge to extend the sides if you are using a large protractor.

3. Cut out quadrilaterals A, B, C, and D (next page). Tear off the corners and fit them side by side around the point. Do each quadrilateral separately. Answer on notebook paper:
   A. What did you discover?
   B. What can you say about the sum of the angles of these quadrilaterals?
   C. Would this work for all quadrilaterals? Prove your statement.

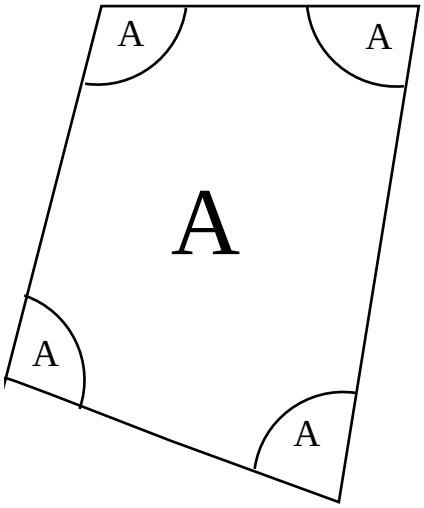
4. Explore the five triangles F through J in the same way. Cut each one out and fit the sides together around the point.
   A. What do you notice about all five triangles?
   B. If you were to draw a diagonal from opposite corners of a quadrilateral, how many triangles would you have?

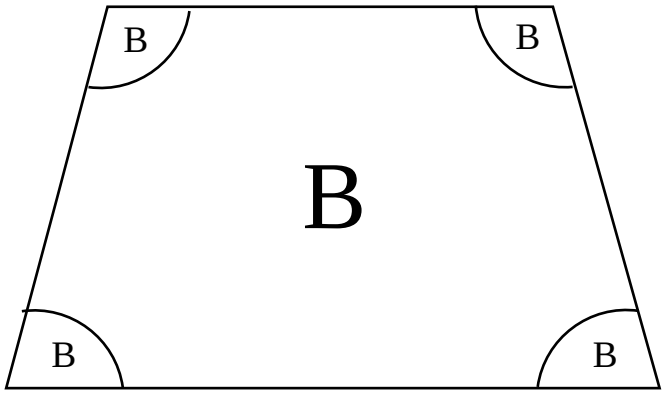
5. Think about the work you have done in parts 2, 3, and 4 of this exploration. Why is it difficult to measure angles exactly? What is the sum of the angles of quadrilaterals? _____ the sum of the angles in triangles? _____

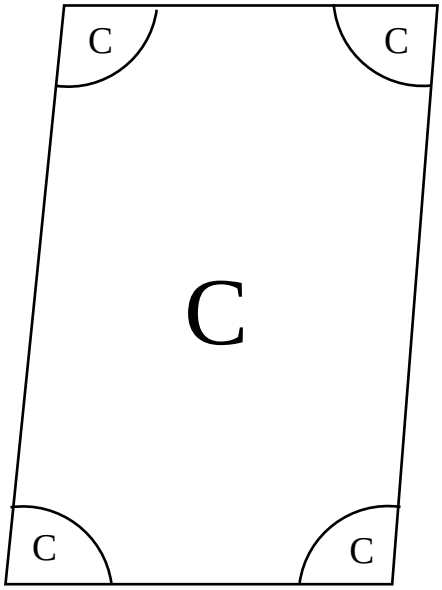
6. Would this process work with pentagons and hexagons? Explore and explain what you think.

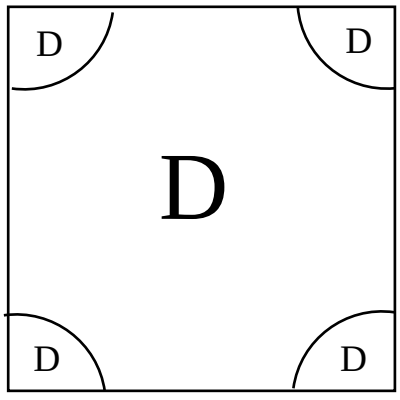
(3.02a)

Quadrilaterals Have Four Angles

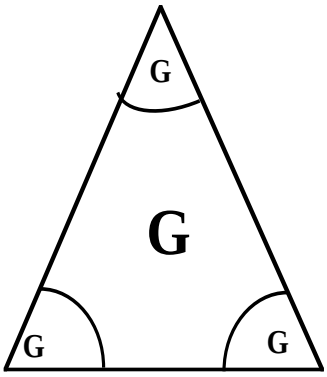


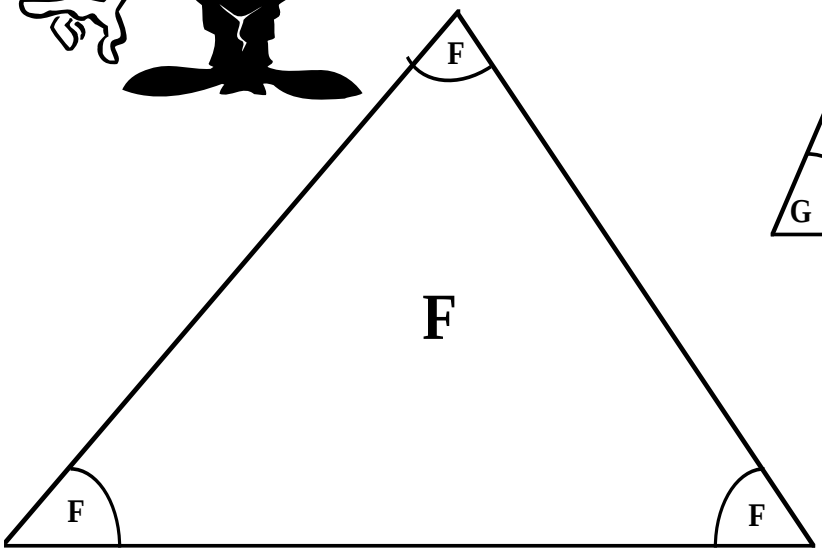


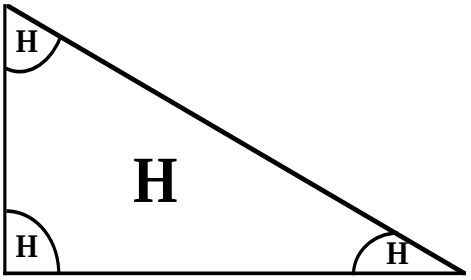


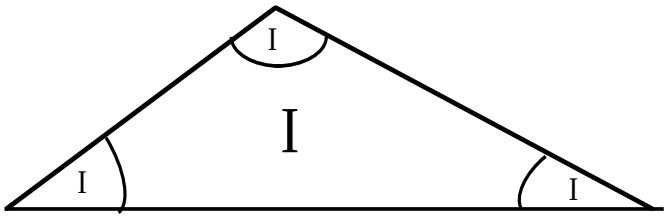


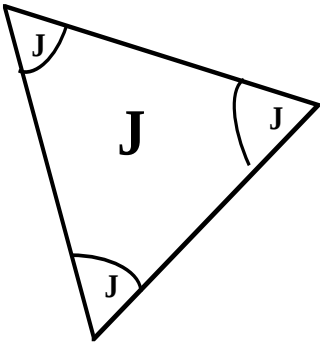
Triangles Have Three Angles











Keeping Skills Sharp

10

1. 56 + 29 = n n = ?

2. 86 + 37 + 4 + 205 =

3. Round to the nearest hundred: 673

4. What numbers must replace each dot?

$$\begin{array}{r} 54\bullet6 \\ +\ 3\bullet7\bullet \\ \hline \bullet752 \end{array}$$

5. Elaine took $5.00 to the store. She bought some glue and a marker. When she got home, she had $1.11. How much were her purchases?

6. If a hockey puck weighs 6 ounces, how many pucks would be in a carton that weighs 6 pounds?

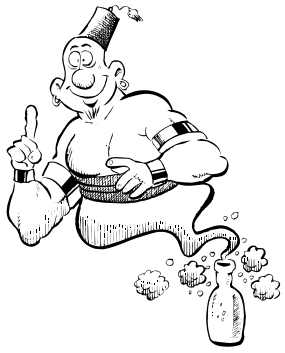
7. (15 + 15) x 3 =

8. Write as a decimal: 45/100

Solve this!

(1.03, 5.01)

With only seconds remaining in the game the forward rushes in for a layup shot and scores. Southwest Middle School has won their first championship basketball game. To celebrate the victory, all nine players run around the court giving each other high fives.



If each Southwest player gave each teammate a high five, how many high fives would be given altogether?

To the Teacher

Grade 5
WEEK 10

Using Numbers in Powerful Ways:
Students probably know that some divisions give patterns. $1 \div 3$ gives 0.3333333. If students explore division by various numbers, they can find a special characteristic of division by 9; $1 \div 9 = 0.1111111$,
$2 \div 9 = 0.2222222$, etc.
$7 \div 9 = .7777777$

For Further Study: One solution is L = 7, M = 4 , N = 2

Solve This:

# of Players	# of High Fives
2	1
3	3
4	6
5	10
6	15
7	21
8	28
9	36
n	$\frac{N(N-1)}{2}$

Mental Math

Directions to Students: Number your paper from 1 to 10. Write your answers as the questions are called out. Each question will be repeated only once.

1. $(20 - 8) \div 3 \times 9$
2. $(45 - 15) \div 6 \times 5$
3. Expanded form for 20, 699
4. Round to nearest thousand: 5,591
5. Factors of 21
6. The name of an angle between 0 and 90 degrees
7. Millimeters in centimeter
8. Quarts in a gallon
9. Seconds in 1 1/2 minutes
10. A dime less than 3 quarters

Keeping Skills Sharp

1. 85
2. 332
3. 700
4. 8 *thousands* - 2 *hundreds* - 7 *tens* - 6 *ones*
5. $3.89
6. 16 pucks
7. 90
8. 0.45

Math Trivia

Joseph Louis Lagrange (1736 - 1813) was a French physicist and mathematician. He chaired the committee which determined the length of a meter.

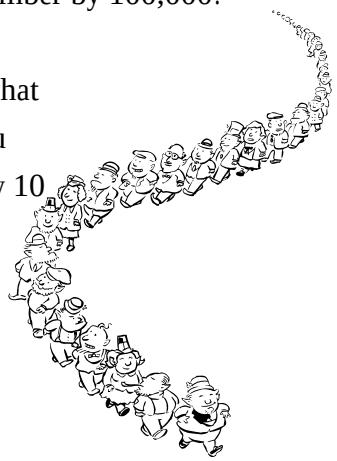
You can read more about Lagrange in *Mathematicians Are People Too* by Luetta and Wilbert Reimer.

Challenge: Find out more about the development of the metric system.

Using Numbers in Powerful Ways

List 5 different 3-digit numbers. Use a calculator and multiply each number by 10, 100, and then 1000. Can you predict the products if you multiply each number by 100,000?

Write a rule stating what happens any time you multiply a number by 10 or any power of 10.



Explain why this will always work.

(1.01b, 1.03)

Investigations

Complete the *Exploring Polygons* worksheet with a partner.

Keep detailed notes on your work for question 6 with pentagons and hexagons. Be ready to share your ideas and discuss your results with the class.

(3.01)

Fraction Fun

The trapezoid pattern block represents three-fifths of a whole.

What could the whole figure look like?

If the cost of two-fifths of this whole is 40¢, what is the cost of the whole figure?

(1.03)

For Further Study

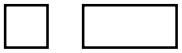
Which four times during a day will the clock hands form a right angle?

(2.02)

Get In To The Flow: Chart It!

Background information:

1. Ovals and circles indicate starting and ending points. 

2. Rectangles are for directions. 

3. Diamonds indicate questions and decisions.
   There are two possible paths from these diamonds. 

Tasks:

1. With a partner, try the flow charts "Your Number Is Up."

   a. Each of you try a different number to begin.
   b. Compare your results.
   c. Try this several more times.

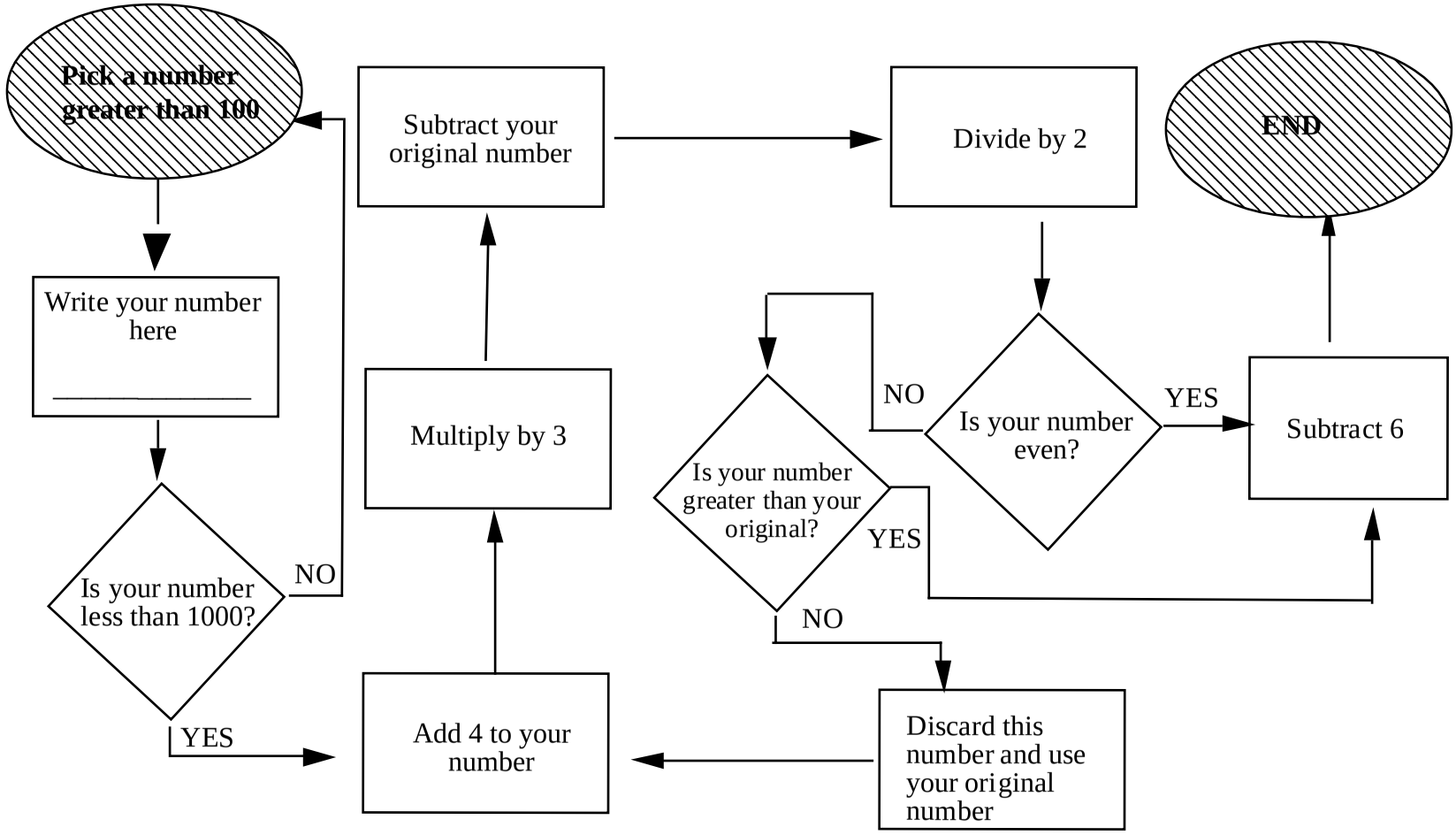
2. Now try the "Double Dutch Treat" flow chart.

   a. What check points do you have in each flow chart?
   b. Why are these necessary?

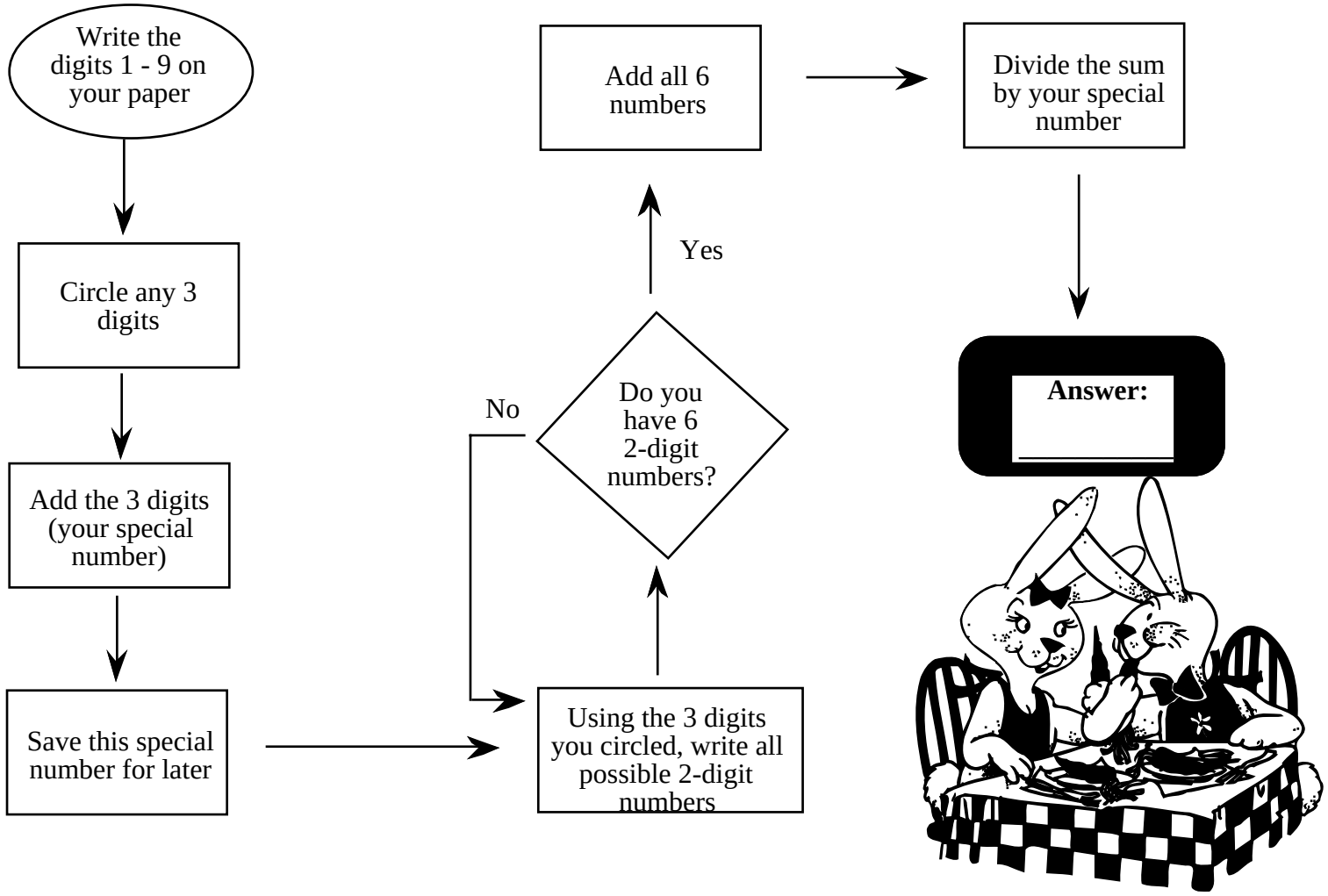
3. With your friend, explain why (and how) each of these flow charts works even though students start with different numbers.

4. Choose a task and write a flow chart. The task might be to solve a long division problem or to make a cube with toothpicks and marshmallows. Or you may wish to create a number puzzle flow chart like the ones you used in tasks 1 and 2. Whatever you choose, be sure to use some decision and question boxes.

Your Number Is Up!



Double Dutch Treat



Keeping Skills Sharp

1. Write the most sensible answer. Three classes went to the Legislature. How many students went? 10 100 1000

2. 379 + n = 400 n = ?

3. 6 x 9 = ____ x 6

4. Use < or >: 8309 ____ 8039

5. 5,324 x 100 =

6. Mrs. Sittya paid the sale price of $384.98 for a freezer. The original price was $478.00. How much had it been reduced?

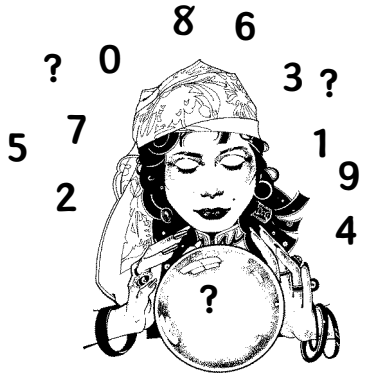
7. 174 students are going on a field trip. Their lunches cost four dollars each. What will the total bill be?

8. 3604 - 1957

Solve this!

ONE + ONE = TWO

If **E, N, O, T,** and **W** each represent a different integer, can you find more than one solution to this problem?



Note: problems of this type are called alphnumerics or alphametrics.

(1.03)

To the Teacher

Grade 5
WEEK 11

For Further Study: 9:00 a.m., 3:00 a.m., 9:00 p.m. and 3:00 p.m.

Solve This:

E	N	O	T	W
1	3	2	4	6
7	1	4	8	3
6	8	2	5	7
2	3	4	8	6

these are some solutions.

Mental Math

Directions to Students: Number your paper from 1 to 10. Write your answers as the questions are called out. Each question will be repeated only once.

1. (30 + 12) ÷ 7
2. (27 + 5) ÷ 8
3. Word form for 666,666
4. Round to nearest thousand: 4,711
5. Largest factor of 30 other than 30
6. Geometric figure that is the shape of a shoe box
7. Symbol for millimeter
8. Inches in 3 feet
9. 5 quarters = ? nickels
10. 15 minutes before 8:00 on a digital clock

Keeping Skills Sharp

1. 100
2. 21
3. 9
4. >
5. 532,400
6. $93.02
7. $696.00
8. 1647

Math Trivia

Carl Friedrich Gauss (1777 - 1855) is regarded as the greatest mathematician of the 19th century. When he was nine years old, his teacher asked the class to add all the numbers from 1 to 100. He figured it out mentally, wrote the answer on his slate, and put it on the teacher's desk. How do you suppose he did this? Gauss may have used the strategy looking for a pattern. By considering 1 + 100 = 101, 2 + 99 = 101, 3 + 98 . . . 50 + 51 = 101, there are 50 pairs of numbers, each with a sum of 101. Thus, the total sum is 50(101) or 5050.

Can you think of another way he could have figured it out?

Using Numbers in Powerful Ways

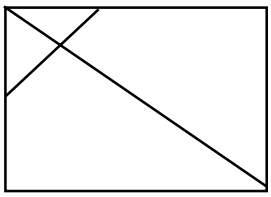
Score this figure:

3 points for triangles

4 points for quadrilaterals

5 points for pentagons

6 points for hexagons.

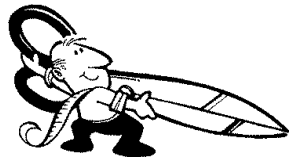


(3.01)

Investigations

Inventions occur when people think creatively about new and different ways of using materials.

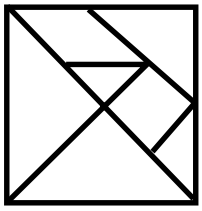
Suppose you have a piece of paper that is one-fourth the size of a sheet of notebook paper. How can you cut a hole in that piece of paper that is large enough for a bicycle (or a person) to pass through the hole?



(3.02b)

Fraction Fun

Look at a full set of tangram shapes. If they represent one whole, what fraction does each shape represent?



(1.01a, 1.03)

(3.01)

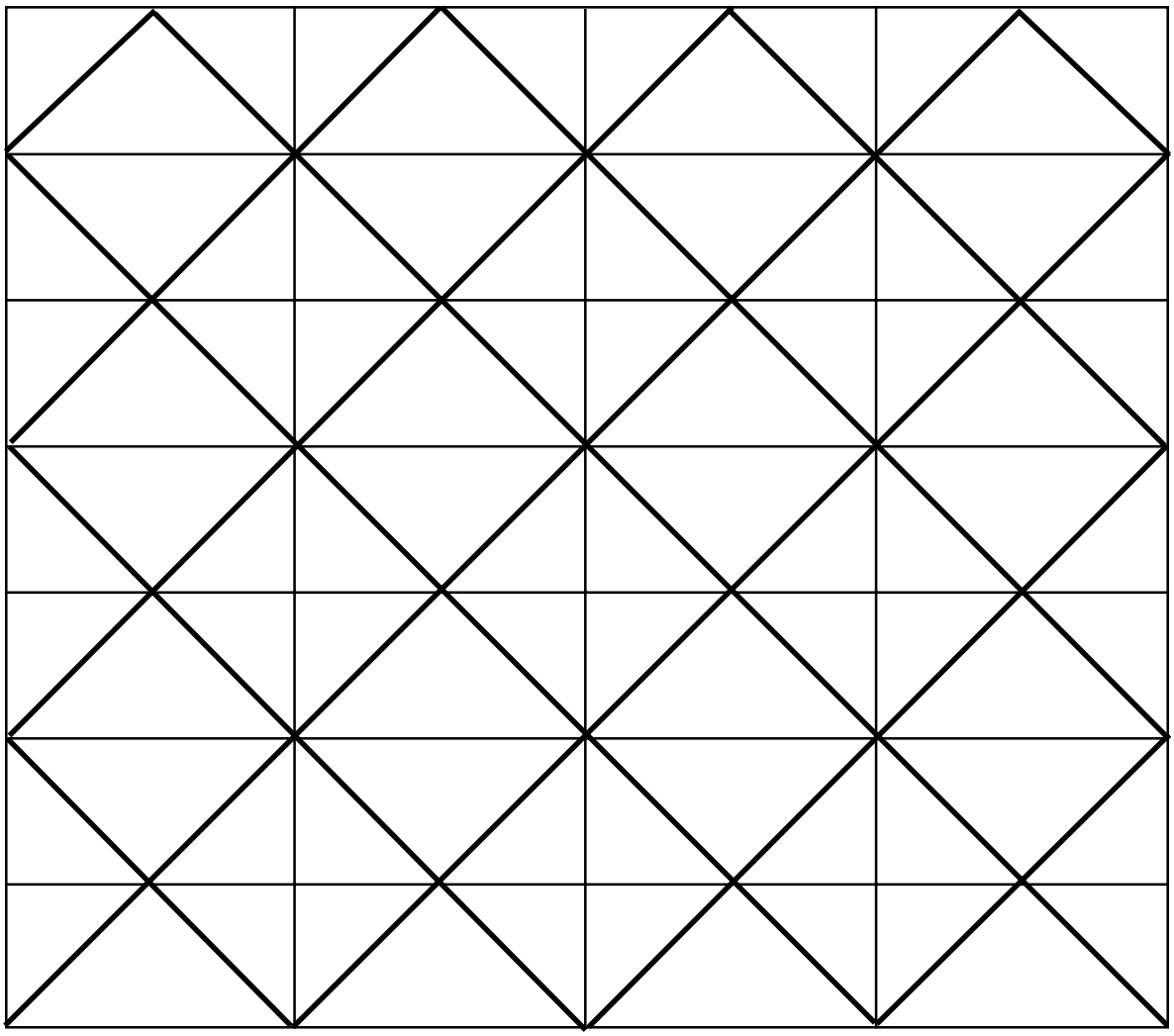
For Further Study

Use nine toothpicks to form five equilateral triangles.

Colorful Clues

Use a different color to shade in or trace around the following figures. Color-code your answers to match the directions.

1. a rectangle
2. a parallelogram that is not a rectangle
3. an isosceles triangle
4. a quadrilateral that does not have symmetry
5. a trapezoid
6. a different-shaped trapezoid
7. a pentagon
8. an acute angle
9. a hexagon
10. a heptagon
11. an octagon
12. a scalene triangle
13. a square
14. an obtuse angle
15. a right angle
16. perpendicular lines



(3.01)

Keeping Skills Sharp

1. $43.62 - $15.81

2. Write these from least to greatest: 6015 6105 6051

3. n + 17 = 83 n =?

4. Number of minutes between 2:45 p.m. and 3:30 p.m.

5. Round to the nearest thousand: 56,375

6. Count by tens: 3500, _____, _____, _____, _____, _____

7. Charlie bought a glove for $28.34 and a baseball for $11.49. How much change did he get from $50.00?

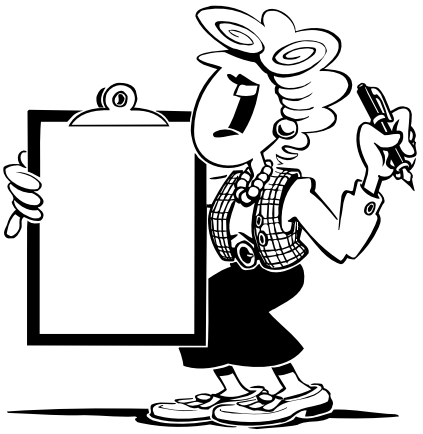
8. Warren is older than Mari. Lois is younger than Mari. Kelly is older than Lois but younger than Mari. Who is the youngest? The oldest?

Solve this!

Seven jars of candy contain a total of 140 pieces. If each jar contains 2 more pieces than the previous jar, how many are in each jar?

If each jar contains 5 more pieces than the previous jar, how many are in each jar?

Extension: Write a similar problem for someone else to solve.



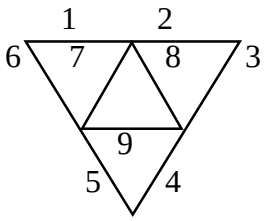
(5.01, 1.03)

To the Teacher

Grade 5
WEEK 12

Using Numbers in Powerful Ways: 54 points.
There are 5 triangles, 3 quadrilaterals, 3 pentagons, and 2 hexagons.

For Further Study:



Investigation Hint: Don't give students the hint until they've worked on the problem for a couple of days. Fold the paper in half and cut in an unusual way. The solution is found on the following page.

Solve this:
Hint: Divide the total number of pieces of candy by number of jars. That is your median #.
___ ___ ___ 20 ____ ___ ___
Then subtract 2 to the left, and add 2 to the right and repeat.

Solutions:
1) 14, 16, 18, 20, 22, 24, 26
2) 5, 10, 15, 20, 25, 30, 35

Suggested Strategy:
Guess and check

Mental Math

Directions to Students: Number your paper from 1 to 10. Write your answers as the questions are called out. Each question will be repeated only once.

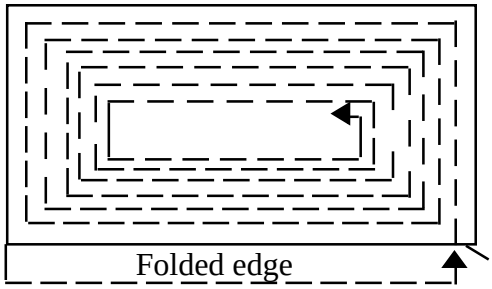
1. (8 x 7- 2) ÷ 6
2. (6 + 9 + 3) ÷ 2 x 7
3. Word form for 708,192
4. Estimate the difference: 87 - 34
5. Prime numbers between 10 and 20
6. Degrees in right angle
7. Centimeters in 4 meters
8. Feet in 24 inches
9. Months in 3 years
10. Number of stripes on 2 American flags

Keeping Skills Sharp

1. $27.81
2. 6015 6051 6105
3. 66
4. 45 minutes
5. 56,000
6. 3510, 3520, 3530, 3540, 3550
7. $10.17
8. Lois, Warren

Directions for creating a big circle out of a small piece of paper.

Take a piece of paper the size of an index card.
Fold in half.



Do not cut this part of the fold.

Follow the pattern in the drawing.
Start cutting the paper (index card size works) as close as you can without cutting the strip off.
Continue cutting into the center.
When you cannot cut any more in the center, cut the longest folded edge.
Open carefully.
Attach the ends (from the center).

Directions for creating a big circle out of a small piece of paper.

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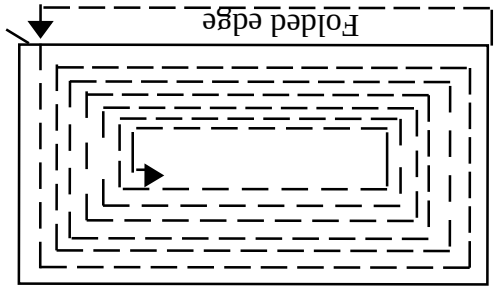

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