

# 2004 MCTM Elementary Mathematics Contest – Sample Test

Grades 4-6

Sponsored by the  
Missouri Council of Teachers of Mathematics



## 2004 Sample Test Questions and Solutions

**Concepts Test:** This test will attempt to assess knowledge of and about mathematics. Recall of facts and understanding of relationships will be essential. Items involving Number and Number Sense, Geometry (including visualization, transformations and Logo), Measurement, Data Analysis, and Probability and Statistics will be included in this section of the test.

**Problem Solving Test:** This test will assess higher order thinking skills. These items should require an application of mathematics utilizing both concepts and/or computation. A wide variety of problems can be expected, all of which can be solved utilizing problem solving strategies found in current literature. Expect to spend more time on some items of this test than on items on the Concepts Test.

**Labels on Solutions:** Solutions will require labels when they involve money (\$ or ¢), time (a.m. or p.m.), or measurement (cm, in,  $\text{cm}^2$ , ft & in, hours & minutes, weeks & days...).

**Student Tools:** Each student needs to bring sharpened pencils, an in/cm ruler, and a calculator (optional). Fifth grade students should also bring a protractor; and sixth grade students should also bring a protractor and a compass.

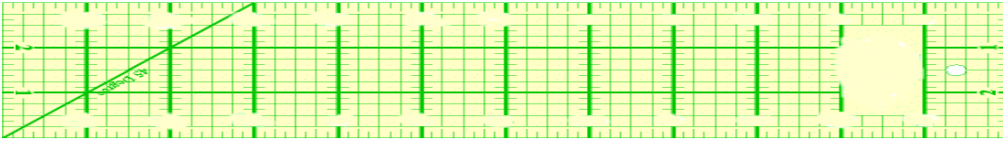
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# 2004 MCTM Elementary Mathematics Contest – Sample Test

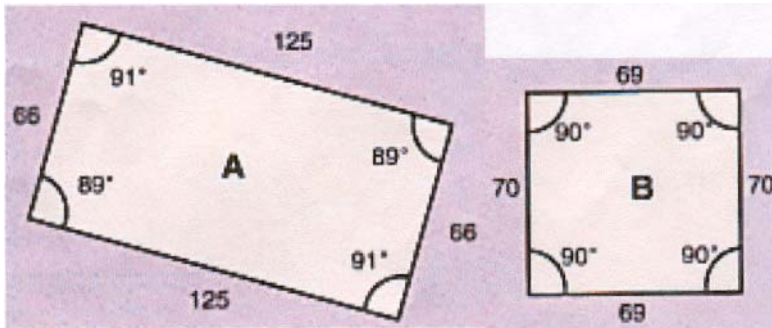
## 4<sup>th</sup> Grade Concepts

1. Forty eight ounces of punch will serve 10 people. How many ounces will serve 75 people?
2. My mom used special ribbon to make a bow for a teddy bear. The ribbon was 8 yards long. If she uses  $1\frac{1}{2}$  feet of ribbon for each teddy bear, how many bows can she make?
3.  $420 \times [(810 \div 9) - 89] = \underline{\hspace{2cm}}$
4. A number is multiplied by 308. One-tenth of that product is divided by 3. The result was 462. What was the original number?
5. Use your ruler to draw a trapezoid which is not isosceles.

6. Show how to cut this board into two pieces so that one piece is seven-twelfths of the board.

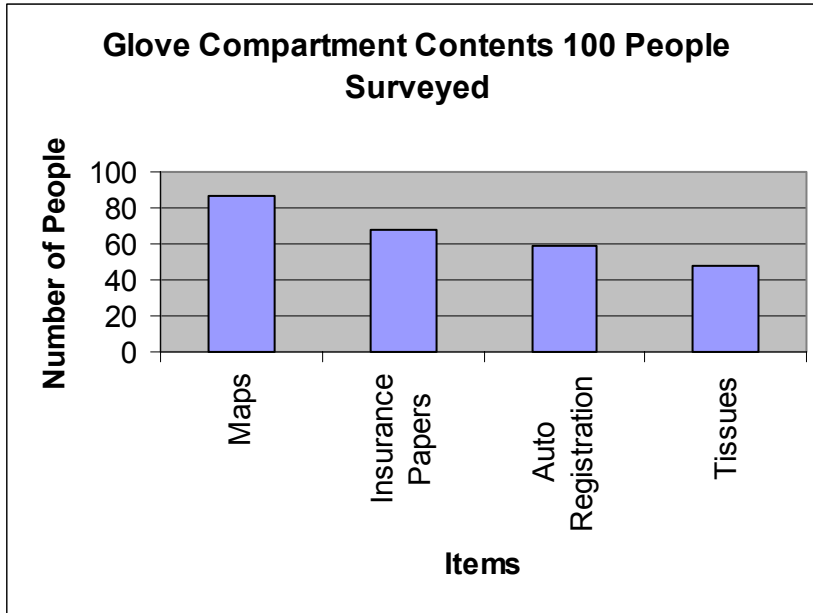


7. The measures of the angles and lengths of the sides of two geometric shapes are shown below. Which statement about the shapes is TRUE?

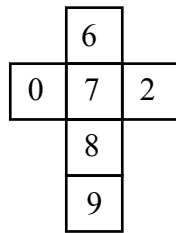


- a. Shape A is a rectangle and shape B is a square.
  - b. Shape A is not a rectangle and shape B is not a square.
  - c. Shape A is not a rectangle and shape B is a square.
  - d. Shape A is a rectangle and shape B is not a square.
8. A refrigerator that is 5 ft. 6 in. tall is how tall is the refrigerator in inches?
  9. Which item was found in the greatest number of glove compartments?

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10. The faces of a number cube are labeled as shown below. What is the probability of rolling a number greater than 2?



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# KEY

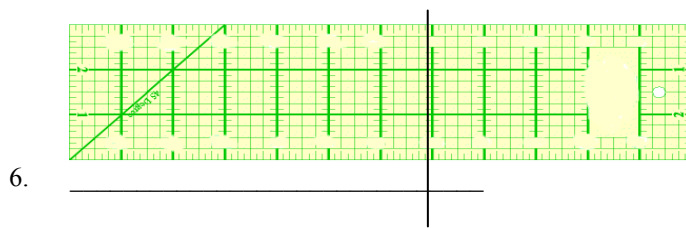
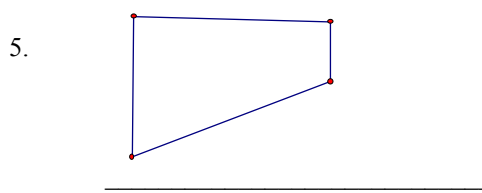
Name 4th Grade Concepts

1. 360

2. 16

3. 420

4. 45



7. b

8. 66

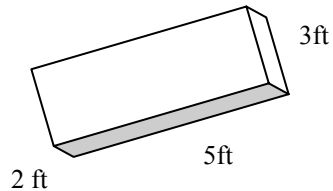
9. Maps

10. 4/6 or 2/3 or .666 or 66.6%

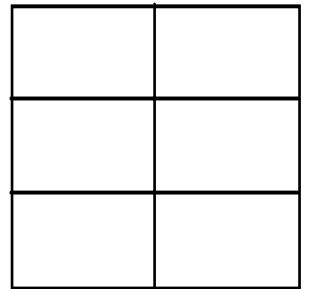
## 2004 MCTM Elementary Mathematics Contest – Sample Test

### 4<sup>th</sup> Grade Problem Solving

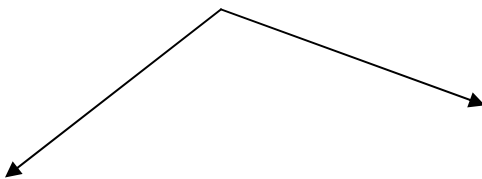
1. Into every third package of a certain brand of popcorn snacks is placed a balloon. Into every tenth package is placed a baseball card. How many packages out of 100 will contain both prizes?
2. What number is two-thirds of one-half of one-fourth of 240?
3. In the first week of production a play sells 1572 tickets. In its second week it sells 1753 tickets. In its third week it sells 152 less than in its second week. How many tickets were sold in the three weeks?
4. Connie is the youngest of three siblings. Jim is four years older than Connie. Bob is 8 years older than Connie. The sum of their ages is 174. How old is Bob?
5. Find the amount of square feet of **surface area** for the following figure:



6. A square has an area of 144 square inches. Suppose the square is partitioned into 6 congruent rectangles as shown at the right. How many inches are there in the perimeter of one of the 6 rectangles?



7. Is the angle shown below acute, right, or obtuse?



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8. Eight per cent of 2000 people surveyed said they got their pet from a pet store. How many people was that?

9. In the addition table below, find the sum(s) which occurs most often and the sums which occur least often.

	first die					
	1	2	3	4	5	6
1	2	3	4	5	6	7
2	3	4	5	6	7	8
3	4	5	6	7	8	9
4	5	6	7	8	9	10
5	6	7	8	9	10	11
6	7	8	9	10	11	12

10. If a 6-sided die with its sides numbered 1 through 6 is tossed 100 times, about how many times would you expect 5 to come up?

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# KEY

Name 4<sup>th</sup> Grade Problem Solving

1. **3**  
\_\_\_\_\_

2. **20.**  
\_\_\_\_\_

3. **4926**  
\_\_\_\_\_

4. **62**  
\_\_\_\_\_

5. **62**  
\_\_\_\_\_

6. **20**  
\_\_\_\_\_

7. **Obtuse**  
\_\_\_\_\_

8. **160**  
\_\_\_\_\_

**Most Often = 7  
Least = 2 and 12**

9. \_\_\_\_\_

10. **16 or 17 accept either**  
\_\_\_\_\_

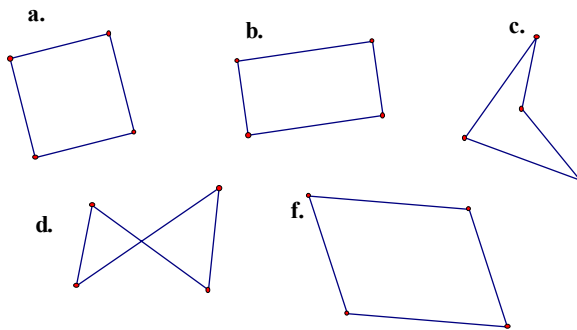
## 2004 MCTM Elementary Mathematics Contest – Sample Test

### 5<sup>th</sup> Grade Concepts

1. Find  $((2 + 31) \cdot (5 + 6)) \times 3$ .
2. How many positive factors of 36 are also multiples of 4?
3. A drawing of a bicycle has a scale of 1 inch = 2.5 feet. If the distance between the centers of the wheels is  $1 \frac{3}{8}$  inches in the drawing, what is the actual distance in feet?
4. List these fractions from **smallest to largest** in value:  $\frac{13}{16}$ ;  $\frac{9}{11}$ ;  $\frac{7}{8}$ ;  $\frac{2}{3}$
5. Find the value of P which makes this sentence true:

$$\frac{3}{P} + \frac{2}{9} = \frac{1}{3}.$$

6. Which of the following figures are rectangles?:



7. What number is missing in this sequence?  $\frac{1}{10}$   $\frac{1}{5}$  \_\_\_\_\_  $\frac{2}{5}$  ...
8. List all the factors of 124.
9. Chari has one each of navy, white, red, and fuchsia blouses. She has one each of gray, khaki, and plaid pants. How many different combinations of blouses and pants can she make?
10. If a 5-sided die with its sides numbered 1 through 5 is tossed 50 times, how many times would you expect an odd number to come up?

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# KEY

Name 5th Grade Concepts

1. 9

2. 3

3. 3.4375

4.  $\frac{2}{3}$ ;  $\frac{13}{16}$ ;  $\frac{9}{11}$ ;  $\frac{7}{8}$

5. 27

6. a and b

7.  $\frac{3}{10}$

8. 1, 2, 4, 31, 62, 124

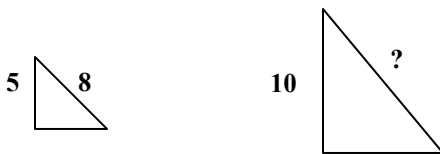
9. 12

10. 30

## 2004 MCTM Elementary Mathematics Contest – Sample Test

### 5<sup>th</sup> Grade Problem Solving

1. Mom was putting bows on teddy bears for the craft show. She has a ribbon 6 yards long. If it takes  $1\frac{1}{2}$  feet for each bow, how bows can she make?
2. There are 11 people at a party who make a toast. Each person clinks glasses with every other person, **only once**. How many clinks were there?
3. According to experts the first 4 moves in a chess game can be played in 197,299 totally different ways. If it takes 30 seconds to make one move, how many minutes would it take one player to try every possible set of 4 moves?
4. Angelina, Sara, and Gena have a specific amount of money. The sum of Angelina's and Sara's money is \$45, the sum of Sara's and Gena's is \$60, and the sum of Gena's and Angelina's is \$55. How much money does Gena have?
5. Ellen baked cookies for the neighborhood children. She gave each child 6 cookies and had 7 cookies remaining. So, she gave one more cookie to each child, but was one cookie short. How many cookies did she bake in total?
6. Keisha has an equal number of quarters, dimes, nickels, and pennies. The total value of all her coins is \$6.56. How many coins does she have in total?
7. Boys V, W, X, Y, and Z went fishing. V caught more fish than Z did. W caught 20 fish, while X and Y caught 24 and 18 fish respectively. They caught an average of 20 fish each. If Z caught at least one fish, what is the most fish V could have caught?
8. For the following pair of similar triangles, find the missing hypotenuse of the larger triangle.



9. A cylindrical gasoline storage tank on Mr. Baker's farm needs to be painted, top, bottom, and cylinder. The tank is 8ft. long and has a diameter of 4 ft. If one gallon of paint covers 350 square feet, how many cans of paint will Mr. Baker need? Use  $\pi = 3.14$ .
10. The stem and leaf plot below shows the high temperatures for the first 14 days of January in a northern city. What was the median temperature?
  - a. 6
  - b. 1 1 4 5 8 9
  - c. 1 3 5 5 6
  - d. 2 6

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# KEY

Name: 5<sup>th</sup> Grade Problem Solving

1. 12

2. 55

3. 394,598

4. \$35

5. 55

6. 64

7. \_\_\_\_\_

8. 37

9. 16

10. \_\_\_\_\_

11. 1

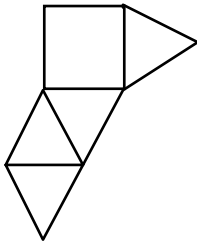
12. 20

13. \_\_\_\_\_

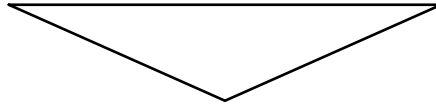
## 2004 MCTM Elementary Mathematics Contest – Sample Test

### 6<sup>th</sup> Grade Concepts

1. What is the least common multiple of 36 and 63?
2. What are the next two numbers in the following pattern? -2, 8, 6, 14, 20, 34, \_\_, \_\_.
3. Write the next three numbers in this sequence: 22, 16, 10, 4 \_\_\_\_, \_\_\_\_, \_\_\_\_
4. The average of 10 students' test scores was 69. Three students scored 80, 60, and 40 respectively. Three other students scored 90, and two students scored 50. The other two students received the same score. What were their scores?
5. Solve:  $x + (-4) = -7$
6. What 3-dimensional shape will this net fold into?



7. Triangles are best named using words to describe both their angles and their sides. Acute, obtuse, right, scalene, isosceles, and equilateral are all words that can be used when describing a triangle. What is the best name for this triangle?



8. Find the range for this set of data: 2,450; 144; 789; 3,488; 360; 2,840; 1,500; 936; 221; 1,958
9. Which of the following items is different from the others?  
A. 300% of 4 B. 430% of 30 C. 10% of 120 D. 5% of 240
10. Solve this proportion:  $\frac{7}{11} = \frac{m}{33}$

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# KEY

Name 6<sup>th</sup> Grade Concepts

1. 252
2. 54, 88
3. -2, -8, -14
4. 70
5. -3

6. Square Pyramid
7. Obtuse isosceles
8. 3,344
9. B
10. 21

## 2004 MCTM Elementary Mathematics Contest – Sample Test

### 6<sup>th</sup> Grade Problem Solving

1. The school's parent association plans a pencil sale as a money-making project. They purchase 1000 school pencils at the price of 5 for \$1. At what price must all the pencils be sold to make a profit of \$100?

2. Jenny bought t-shirts, one for each of her seven brothers, for \$9.95 each. The cashier charges her an additional \$13.07 in sales tax. She left the store with \$7.28. How much money did she have at the start?

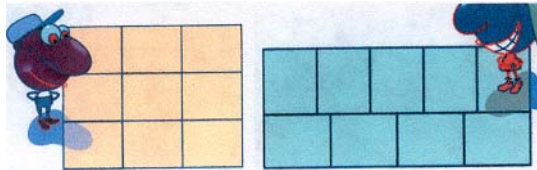
3. Mike took four tests: English, Math, Science, and History. He got a 74 in English, and an 84 in History. His Math score was better than his Science score by 6 points. The average of the four tests was 72. What was the Science score?

4. What number is represented by the A in the problem below?

$$\begin{array}{r} 6 \text{ A } 5 \\ \times 7 \text{ 4 } 1 \\ \hline 4 \text{ 6 } 3 \text{ 1 } 2 \text{ 5} \end{array}$$

5. At his fruit stand Pete sells apples for 25¢ each. One day he sold three-fourths of his apples and had 33 apples left. How much money did he make on the apples he sold?

6.



Helix and Polygon both used the same number of identical concrete tiles to make their patios. The area of each patio is the same: 180 square meters. What are the dimensions of a single piece of concrete?

7. A square piece of paper is folded in half along the diagonal. The area of the resulting triangle is 50 cm<sup>2</sup>. How many centimeters was the perimeter of the original square?

8. The length of each edge of a cube is increased by 50%, then the surface area has increased by what %?

9. A jacket costs \$50. The price is raised 20% and then, after it sits on the shelf for 2 months, is reduced 20%. What is the final price of the jacket?

10. Yolanda had 8 different colored pens in a bag. If she chooses 6 times, each time replacing the pen before choosing the next one, what is the probability that she chooses a different color each time without looking? Write your answer as a fraction in lowest terms.

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**KEY**

Name 6<sup>th</sup> Grade Problem Solving

**Maria is 50 in. tall**

**40**

1. **30 cents/pencil**  
\_\_\_\_\_

7. \_\_\_\_\_

2. **\$90**  
\_\_\_\_\_

**225%**

3. **62**  
\_\_\_\_\_

8. \_\_\_\_\_

4. \_\_\_\_\_

**\$48**

5. **2**  
\_\_\_\_\_

9. \_\_\_\_\_

6. **\$24.75**  
\_\_\_\_\_

**(315)/(4096)**

7. **4 m by 5 m**  
\_\_\_\_\_

10. \_\_\_\_\_