

# 1997 MCTM Elementary Mathematics Contest — Sample Test

Grades 4-6

sponsored by the  
Missouri Council of Teachers of Mathematics



## 1997 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 Numbers 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, cm<sup>2</sup>, ft & in, hours & minutes, weeks & days, ...).

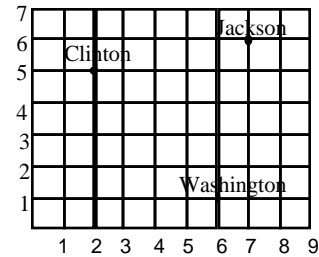
**Student Tools:** Each student needs to bring sharpened pencils, an in/cm ruler, and a calculator (optional). Fifth grade students should also bring a protractor; and sixth grade students should also bring a protractor and a compass.

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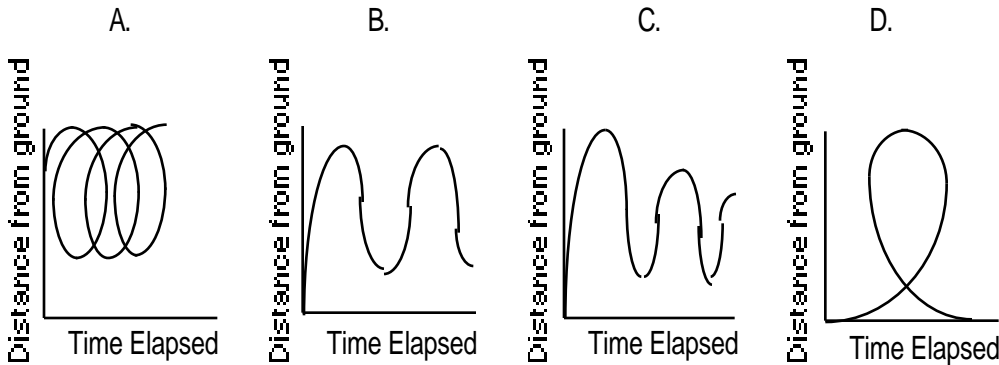
**1997 MCTM Elementary Mathematics Contest — Sample Test**

**4th Grade Concepts**

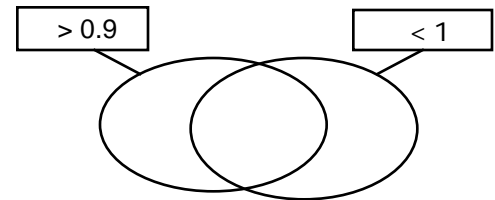
- What is the product of 12 and its reciprocal?
- Find the missing number:  $7 + 7 + 7 + 7 + 7 + 7 + 7 + 7 = \underline{\quad} \times 7$ .
- This map has been divided into a grid to make the cities easier to find. What are the Cartesian coordinates of Jackson?



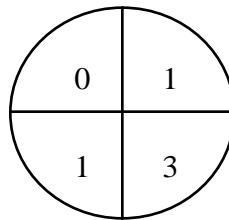
- Which part of a pizza is the smallest piece?  $\frac{1}{8}$   $\frac{1}{10}$   $\frac{1}{2}$   $\frac{1}{5}$
- Choose the graph that best illustrates a person taking a ride on a Ferris wheel.



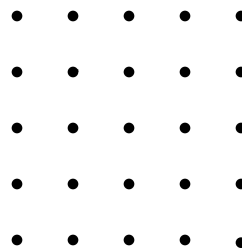
- List three numbers that belong in the intersection of the string adjacent picture.



- What is the probability of spinning a number greater than 1?



- List all numbers whose distance along the real number line from  $-5$  is 8.
- Create a figure, touching the pegs on the given geoboard, whose area is 3 and whose perimeter is 8.

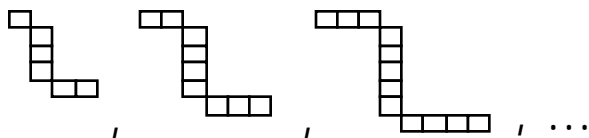


- $\$3.21 + \$.84 + \$7 = \underline{\quad? \quad}$

**1997 MCTM Elementary Mathematics Contest — Sample Test**

**4th Grade Problem Solving**

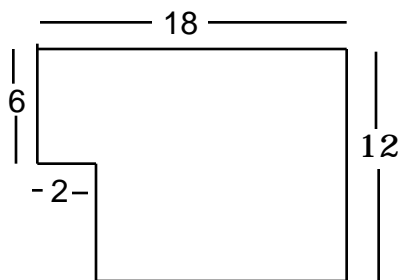
1. If you continue the pattern of figures formed by squares, shown below, how many squares are in the tenth figure?



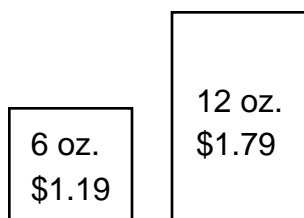
2. Four out of six people surveyed prefer Tastebest gum. Using the results of this survey, how many students would you expect prefer Tastebest in a class of 27 children?
3. To make two dozen cookies, you need  $\frac{2}{3}$  cup of sugar. How much sugar is needed to make 84 cookies?
4. The Mortons spent an average of \$89 per day for meals on their 5-day vacation. How much did they spend for meals?
5. How many toothpicks would be required to make a "train" of toothpicks which is ten "cars" long?



6. The sum of two numbers is 45. Their quotient is 4. What is the larger of the two numbers?
7. Six baseball teams entered a tournament. If each team plays every other team one time, how many different games will be scheduled?
8. What is the perimeter of the figure below?



9. How much is saved by buying 36 oz. of cereal packaged in the larger box?

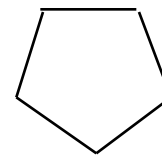


10. A taxi driver charges \$1.25 for the first quarter mile and \$.50 for each quarter mile after that. What should she charge for a trip where the odometer read 469.1 at the beginning of the trip and 470.6 at the end of the trip?

**1997 MCTM Elementary Mathematics Contest — Sample Test**

**5th Grade Concepts**

1. On the answer sheet draw all lines of symmetry for the given regular pentagon:



2. What would you key into a calculator to find the value of n?  $2,395 + n = 76,924$
3. If the tenth's digit and tens' digit of each number are interchanged, which number will be the largest?  
 A. 88.65                      B. 76.85                      C. 68.75                      D. 86.75

4. Find the value of P to make the sentence true:  $\frac{3}{P} \times \frac{4}{9} = \frac{1}{3}$  .

5. How long is this line segment to the nearest one-eighth inch?



6. List all prime factors of 90.
7. Write the next two numbers in this sequence: 120, 108, 96, 84, \_\_\_\_, \_\_\_\_ .
8. Using the chart below, list the foods in order of decreasing amount of vitamin C.

<b>Vitamin C Content (in mg)</b>	
Chicken	8.7516
Green Beans	12.34
Corn	14.7
Tomato	28.39
Baked Potato	31

9. Write a comparison symbol to compare:  $48 - 6 - 6 - 6 - 6 - 6 - 6 - 6 - 6$  ?  $48 \div 8$

10. What is the name of this polygon that bends inward?



**1997 MCTM Elementary Mathematics Contest — Sample Test**

**5th Grade Problem Solving**

1. What is the largest product you can obtain by placing the digits 4, 3, 8, 2, and 5 in this array?

$$\begin{array}{r} \square\square\square \\ \times \square\square \\ \hline \end{array}$$

2. List five numbers that could be placed inside the diagram so that ...

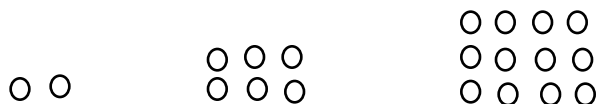
all of them are multiples of 7  
 no more than one is odd  
 all are less than 60  
 exactly one is a multiple of 5  
 none are negative



3. Keisha has an equal number of quarters, dimes, nickels, and pennies. The total value of all of her coins is \$6.56. How many coins does she have in total?
4. A sheet of plywood measuring 2 m by 3 m costs \$30. How much would the shaded portion below cost?



5. The sum of three consecutive prime numbers is 49. What is the largest of the primes?
6. There are five brown socks and five black socks in a drawer. If you reach into the drawer blindfolded, what is the least number of socks you must pull out in order to be sure of getting a brown pair?
7. Which package of candy bars is the best buy? (All candy bars are the same size.)  
 A. 6 bars for \$0.70      B. 8 bars for \$1.00      C. 10 bars for \$1.18      D. 12 bars for \$1.45
8. What is the smallest whole number answer possible when you rearrange these symbols, using each exactly once?  
 ( x - ) 7 3 4
9. How many dots would the eleventh term in this series contain?

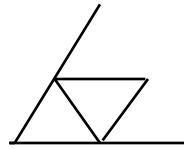


10. A taxi driver charges \$1.25 for the first quarter mile and \$.50 for each eighth mile after that. What should she charge for a trip if the odometer read 469.1 at the beginning of the trip and 471.6 at the end of the trip?

1997 MCTM Elementary Mathematics Contest — Sample Test

6th Grade Concepts

1. Write this product with the decimal point in the correct position.  $12.5 \times 3.95 = 49375$
2. There are two nets which fold into the 3-dimensional shape called a tetrahedron. One net looks like a large triangle and is given below. Draw a second net for a tetrahedron that is not a large triangle.

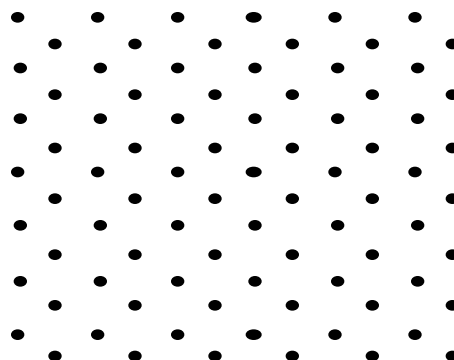


3. Write the following number sentence using digits and a comparison symbol.  
"Eight hundred six million and four tenths is more than one thousand fifty-three and two hundredths."
4. Write the next two numbers in this sequence: 0, 3, 8, 15, 24, ...
5. Which of the following is equal to  $4^5$ ?  
A.  $4 \times 5$                       B.  $5 \times 5 \times 5 \times 5$                       C.  $4 \times 5 \times 5$                       D.  $4 \times 4 \times 4 \times 4 \times 4$
6. If a and b are both larger than one, which fraction has the smallest value?  
 $\frac{a}{b-1}$      $\frac{a}{b+1}$      $\frac{a}{b \div 1}$      $\frac{a}{b \times 1}$
7. List the smallest three positive whole numbers which have exactly three different positive divisors each.
8.  $50\%$  of  $80 = 80\%$  of ?
9. What is the greatest common factor of 24 and 42?
10. What does **CXLV** stand for in Roman numerals?

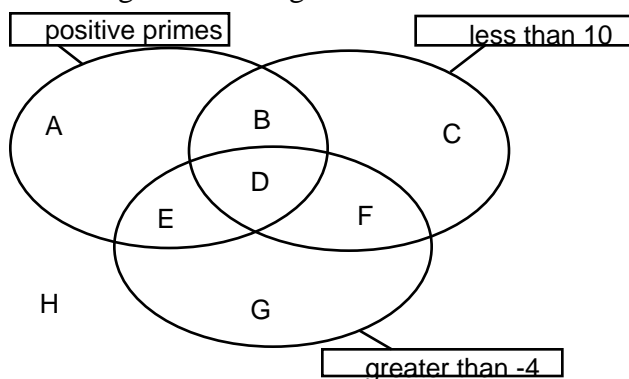
1997 MCTM Elementary Mathematics Contest — Sample Test

**6th Grade Problem Solving**

1. On the triangular (isometric) dot paper, draw a 3-dimensional "L"-shape made from 4 cubes.

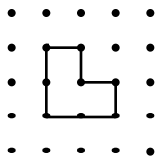
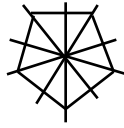
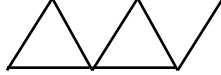
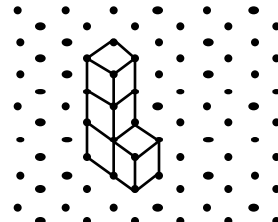
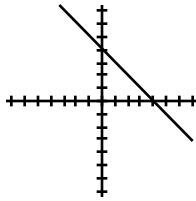


2. Sue got on an elevator. She went up six floors, down eight floors, and then up three floors. She was then on the fourth floor. Where did she get on?
3. Graph the set of all points  $(x, y)$  such that  $x + y = 4$ .
4. The original price of a sweater is \$48. You buy the sweater on sale for 20% off. What is your total cost after adding on 6% sales tax?
5. In a triangle ABC, angle A has a measure of 40 degrees. Angle B is three times as large as angle C. What is the measure of angle B?
6. What is the smallest positive integer that belongs in area F?



7. Container A is half full of water. Container B will hold 9 cups of water. When the contents of container A are poured into container B, container B is  $\frac{2}{3}$  full. How much will container A hold?
8. A rectangular prism with square bases and whole number sides has volume 200 cu. in. and surface area 210 sq. in. What is its height?
9. David has \$500 in a savings account. If his money earns 4% interest at the end of each year, how much money will he have after 6 years?
10. A ball is dropped from a height of 88 feet. On each bounce it rises three fourths the height of the previous height. How many times will it bounce before it rises to a height less than ten feet?

**1997 MCTM Elementary Mathematics Contest — Sample Test Solutions**

Grade 4	Grade 5	Grade 6
<p><b><u>Concepts</u></b></p> <p>1. 1</p> <p>2. 8</p> <p>3. (7,6)</p> <p>4. 1/10</p> <p>5. B</p> <p>6. any three numbers between 0.9 and 1.0; for example 0.91, 0.925, etc.</p> <p>7. 1/4 <u>or</u> 0.25 <u>or</u> 25%</p> <p>8. -13 <u>and</u> 3</p>  <p>9.</p> <p>10. \$11.05</p>	<p><b><u>Concepts</u></b></p>  <p>1.</p> <p>2. <math>76924 - 2395 =</math> <u>or</u> <math>76924</math> enter 2395 -</p> <p>3. B</p> <p>4. 4</p> <p>5. <math>4 \frac{2}{8}</math> in. <u>or</u> <math>4 \frac{1}{4}</math> in.</p> <p>6. 2, 3, and 5</p> <p>7. 72, 60</p> <p>8. Potato, Tomato, Corn, Beans, Chicken</p> <p>9. =</p> <p>10. concave octagon</p>	<p><b><u>Concepts</u></b></p> <p>1. 49.375</p>  <p>2.</p> <p>3. <math>806,000,000.4 &gt; 1053.02</math></p> <p>4. 35, 48</p> <p>5. D</p> <p>6. <math>a/(b+1)</math></p> <p>7. 4, 9, 25</p> <p>8. 50</p> <p>9. 6</p> <p>10. 145</p>
<p><b><u>Problem Solving</u></b></p> <p>1. 33</p> <p>2. 18</p> <p>3. <math>\frac{7}{3}</math> cups <u>or</u> <math>2 \frac{1}{3}</math> cups <u>or</u> <math>2.\overline{33}</math> cups</p> <p>4. \$445</p> <p>5. 31</p> <p>6. 36</p> <p>7. 15</p> <p>8. 60</p> <p>9. \$1.77</p> <p>10. \$3.75</p>	<p><b><u>Problem Solving</u></b></p> <p>1. 44986</p> <p>2. 14, 28, 35, 42, 56</p> <p>3. 64</p> <p>4. \$17.50</p> <p>5. 19</p> <p>6. 7</p> <p>7. A</p> <p>8. 5</p> <p>9. 132</p> <p>10. \$10.25</p>	<p><b><u>Problem Solving</u></b></p>  <p>1.</p> <p>2. 3rd floor</p>  <p>3.</p> <p>4. \$40.70 <u>or</u> \$40.71</p> <p>5. 105 degrees</p> <p>6. 1</p> <p>7. 12 cups</p> <p>8. 8 in. <u>or</u> 5 in.</p> <p>9. \$632.66</p> <p>10. 8</p>