MATHCOUNTS®

2012
■ State Competition ■
Target Round
Problems 1 and 2

Name _____

School _____

Chapter _____

DO NOT BEGIN UNTIL YOU ARE INSTRUCTED TO DO SO.

This section of the competition consists of eight problems, which will be presented in pairs. Work on one pair of problems will be completed and answers will be collected before the next pair is distributed. The time limit for each pair of problems is six minutes. The first pair of problems is on the other side of this sheet. When told to do so, turn the page over and begin working. This round assumes the use of calculators, and calculations also may be done on scratch paper, but no other aids are allowed. All answers must be complete, legible and simplified to lowest terms. Record only final answers in the blanks in the left-hand column of the problem sheets. If you complete the problems before time is called, use the time remaining to check your answers.

Total Correct	Scorer's Initials

1. $\$$_____ It took Dr. Gru 30 seconds to pump the first \$9.00 worth of gasoline into his car, and it took a total of 105 seconds to pump 15 gallons of gas. Assuming gas is pumped at a constant rate, what is the cost for one gallon of gas at this station?

2. _____ values If $kx + 12 = 3k$, for how many integer values of k is x a positive integer?

MATHCOUNTS®

2012
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Target Round
Problems 3 and 4

Name _____

School _____

Chapter _____

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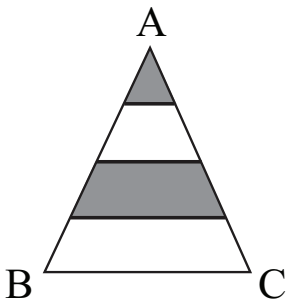
Total Correct	Scorer's Initials

3. _____ In ΔABC, shown here, $\overline{AB}$ and $\overline{AC}$ have each been divided into four congruent segments. What fraction of triangle ABC is shaded? Express your answer as a common fraction.



4. _____ The sum of the first n terms of a sequence, $a_1 + a_2 + \ldots + a_n$, is given by the formula $S_n = n^2 + 4n + 8$. The sum of the first three terms, for example, is $S_3 = (3)^2 + 4(3) + 8 = 29$. What is the value of a_6?

MATHCOUNTS®

2012
■ State Competition ■
Target Round
Problems 5 and 6

Name _____

School _____

Chapter _____

DO NOT BEGIN UNTIL YOU ARE INSTRUCTED TO DO SO.

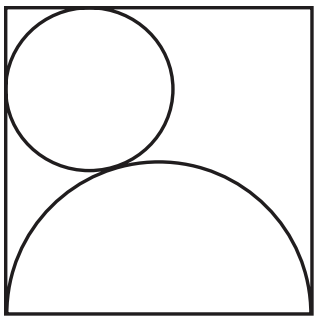
Total Correct	Scorer's Initials

5. _____ students

There are 348 students in Jack's school. Each student's first and last initials form a unique ordered letter pair. How many more students are required to guarantee that there are two students whose initials form the same ordered letter pair?

6. _____ cm

A semicircle and a circle are placed inside a square with sides of length 4 cm, as shown. The circle is tangent to two adjacent sides of the square and to the semicircle. The diameter of the semicircle is a side of the square. In centimeters, what is the radius of the circle? Express your answer as a decimal to the nearest hundredth.



MATHCOUNTS®

2012
■ State Competition ■
Target Round
Problems 7 and 8

Name _____

School _____

Chapter _____

DO NOT BEGIN UNTIL YOU ARE INSTRUCTED TO DO SO.

Total Correct	Scorer's Initials

7. _____ % The diameter of a spherical balloon was increased by 150%. By what percent did its volume increase? Express your answer to the nearest tenth.

8. _____ In one roll of four standard, six-sided dice, what is the probability of rolling exactly three different numbers? Express your answer as a common fraction.