# MATHCOUNTS®

**2011**
■ **State Competition** ■
**Team Round**
**Problems 1–10**

School _____

Chapter _____

Team
Members _____ , Captain

_____

_____

_____

## DO NOT BEGIN UNTIL YOU ARE INSTRUCTED TO DO SO.

This section of the competition consists of 10 problems which the team has 20 minutes to complete. Team members may work together in any way to solve the problems. Team members may talk to each other during this section of the competition. 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. The team captain must record the team's official answers on his/her own competition booklet, which is the only booklet that will be scored. If the team completes the problems before time is called, use the remaining time to check your answers.

| Total Correct | Scorer's Initials |
|---|---|
|  |  |
|  |  |

1. Kevin, Cindi and Marcus have a total of 1020 widgets. Marcus has half the number of widgets that Cindi has. Kevin has 219 widgets. How many widgets does Cindi have?

1. _____ widgets

2. Emily is thinking of a positive three-digit integer. All of the digits in her number are prime and distinct. The digits also increase in order from left to right. How many possibilities are there for Emily's number?

2. _____ possibilities

3. As a special promotion for the grand opening of the sporting goods store, it was advertised that every 25th customer would receive a free Frisbee and every 35th customer would receive a free baseball hat. Johnny was the first customer to receive both a Frisbee and a hat. How many customers had entered the store before Johnny?

3. _____ customers

4. A train travels at a constant rate of 55 miles per hour through a tunnel. Forty-five seconds after the front of the train enters the tunnel the front of the train exits the tunnel. How many feet long is the tunnel?

4. _____ feet

5. The L-shaped piece shown will be placed on the grid so that it covers exactly three unit squares of the grid. The sum of the numbers in the grid's covered three unit squares will be S. If rotating the L-shaped piece is permitted, what is the sum of all the values of S for all possible placements on this grid of the L-shaped piece?

5. _____
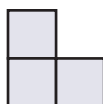
| 1 | 2 | 3 |
|---|---|---|
| 4 | 5 | 6 |
| 7 | 8 | 9 |

6. An urn contains marbles of four colors (red, yellow, blue and green). All but 45 of the marbles are red; all but 45 are yellow; all but 45 are blue; and all but 60 are green. How many of the marbles are green?

6. _____ marbles

7. Mrs. Jackson baked a batch of cookies. If she makes bags of cookies with 3 cookies in each bag, 2 cookies are left over. If she makes bags with 5 cookies in a bag, no cookies are left over. If she makes bags with 8 cookies in each bag, 6 cookies are left over. What is the fewest number of cookies Mrs. Jackson could have baked?

7. _____ cookies

8. Let M be the midpoint of the segment FG. Let A and B be points coplanar to points F and G. Points A and B are positioned on the same side of the line containing segment FG such that triangles FMA and MGB are equilateral. The lines FB and GA intersect at point K. What is the measure of angle GKB?

8. _____ degrees

9. A bag contains five red marbles, three blue marbles and two green marbles. Six marbles are to be drawn from the bag, replacing each one after it is drawn. What is the probability that two marbles of each color will be drawn? Express your answer as a common fraction.

9. _____

10. The geometric mean of two positive numbers $a$ and $b$ is $\sqrt{ab}$. The third term of an arithmetic sequence of positive numbers, in which the difference between the terms is not zero, is the geometric mean of the first and eleventh terms. What is the ratio of the second term to the first term of the sequence? Express your answer as a common fraction.

10. _____