MATHCOUNTS®

2014
■ State Competition ■
Target Round
Problems 1 & 2

Name _____

School _____

Chapter _____

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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.

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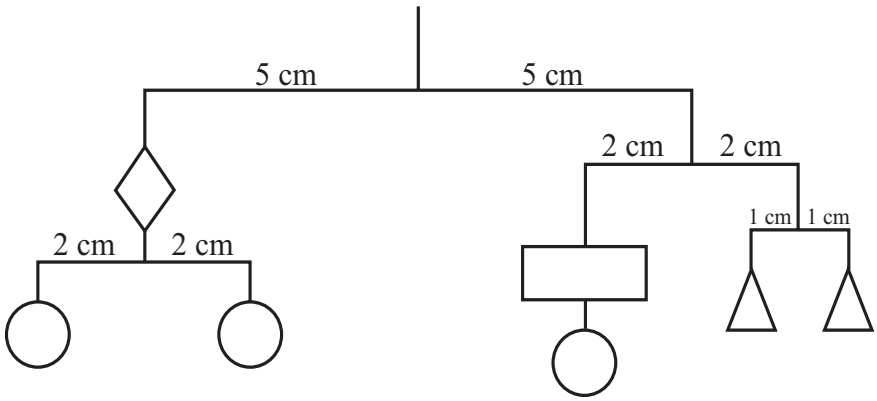
1. $_____$

Including tax, Mr. Magoo paid $94.94 for a birthday present for Mrs. Magoo. Sales tax in his state is 5.5%. What was the price of the present before sales tax?

2. _____ pounds

The sides of the following scale balance. Each distinct shape has a unique integer weight from 1 to 10 pounds. The total weight of the seven shapes in the diagram is 32 pounds. What is the weight of the rectangle, if the weight of the rhombus minus two pounds equals the weight of the rectangle plus the weight of the circle? Assume all arms and strings have no weight.



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MATHCOUNTS®

2014
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Target Round
Problems 3 & 4

Name _____

School _____

Chapter _____

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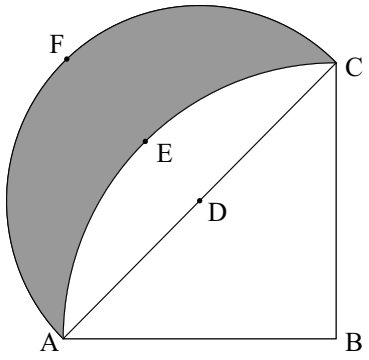
3. _____ ft^2 In the figure shown, $\overset{\frown}{AEC}$ is drawn on isosceles right triangle ABC, with center B. $\overset{\frown}{AFC}$ is drawn with center D, which is the midpoint of hypotenuse AC. If the length of $\overline{AB}$ is 90 feet, what is the area of the shaded region?



4. _____ The sum of a list of seven positive integers is 42. The mean, median and mode are consecutive integers, in some order. What is the largest possible integer in the list?

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2014
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Target Round
Problems 3 & 4

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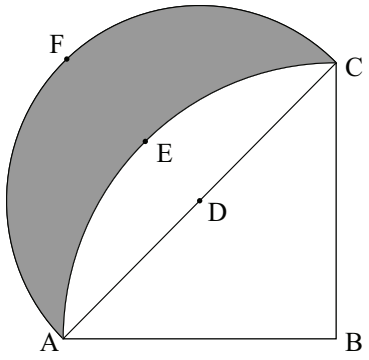
3. _____ ft^2 In the figure shown, $\overset{\frown}{AFC}$ is drawn on isosceles right triangle ABC, with center B. $\overset{\frown}{AFC}$ is drawn with center D, which is the midpoint of hypotenuse AC. If the length of $\overline{AB}$ is 90 feet, what is the area of the shaded region?



4. _____ The sum of a list of seven positive integers is 42. The mean, median and mode are consecutive integers, in some order. What is the largest possible integer in the list?

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Problems 5 & 6

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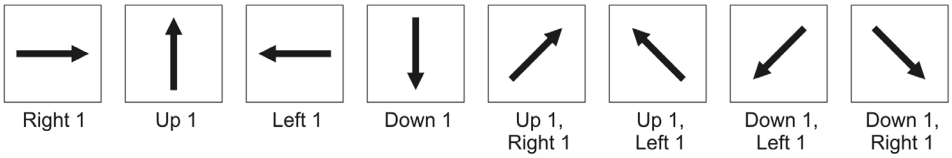
5. _____ A grid contains all of the integers 1 through 100 in ten rows of ten numbers each. The numbers are arranged in increasing order from left to right so that 1 through 10 are in the top row, 11 through 20 are in the second row, and so on, with 91 through 100 in the bottom row. A token placed on the board can be moved in any of eight different directions, as shown here.



If the token is initially placed on 27 and the following series of moves is made, on what number will the token end?

6. _____ When Mandi shoots free throws, she consistently makes the shot with a probability of p, where $p < \frac{1}{2}$. When she shoots six free throws, the probability that she makes exactly half of them is $\frac{4^4}{5^5}$. What is the value of p? Express your answer as a common fraction.

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2014
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Problems 7 & 8

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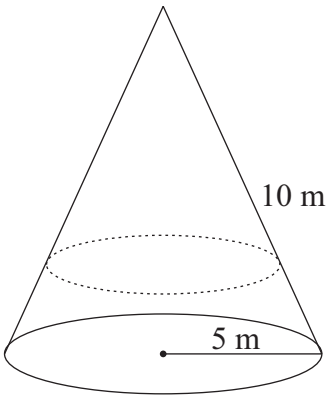
7. _____ An ant is standing at the origin of a coordinate grid. The ant will take four steps, each 1 unit in length. Each step taken is either forward, backward, right or left, chosen at random. What is the probability that the ant's fourth step places the ant back at the origin? Express your answer as a common fraction.

8. _____ m^2 A solid right, circular cone has a base radius of 5 meters and a slant height of 10 meters. A top cone will be removed so that the volume of the remaining frustum will be $\frac{1}{3}$ that of the original cone. In square meters, what is the total surface area, including both bases, of the frustum? Express your answer to the nearest whole number.



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