
MATHCOUNTS®

2005

■ **State Competition** ■
Target Round
Problems 1 and 2

Name _____

School _____

Chapter _____

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

This round 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. Record your final answer in the designated space on the problem sheet. All answers must be complete, legible and simplified to lowest terms. This round assumes the use of calculators, and calculations may also be done on scratch paper, but no other aids are allowed.

Total Correct	Scorer's Initials

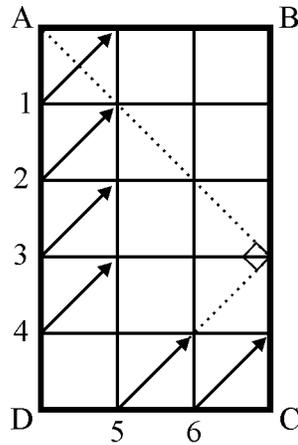
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1. In the Reflecting Ball Game a ball can be launched from points 1, 2, 3, 4, 5 or 6 in the direction shown. When a ball hits a side of rectangle ABCD it bounces at a 90° angle back into the playing field. The path of the ball ends when it hits a corner point A, B, C or D. The path for starting point 5 is shown in the diagram. Each of the 15 non-overlapping squares of the playing field measures 2 cm by 2 cm. What is the length of the longest possible path for a ball launched from a starting point? Express your answer as a decimal to the nearest tenth.



1. _____ centimeters

2. The MATHCOUNTS International Airport had 738,114 departures in 2001. If these were distributed uniformly throughout each 24-hour period, what is the mean number of seconds between each departure time? Express your answer to the nearest whole number.

2. _____ seconds

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■ State Competition ■
Target Round
Problems 3 and 4

Name _____

School _____

Chapter _____

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3. Allowing each soldier five ounces of protein each day, an army of 600 soldiers has enough provisions for five weeks. With the same total amount of provisions, how many soldiers could be fed for 10 weeks if each soldier receives only three ounces of protein per day?

3. _____ soldiers

4. In 1960, there were 450,000 cases of measles reported in the U.S. In 1996, there were 500 cases reported. How many cases of measles would have been reported in 1987 if the number of cases reported from 1960 to 1996 decreased linearly?

4. _____ cases

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■ State Competition ■
Target Round
Problems 5 and 6

Name _____

School _____

Chapter _____

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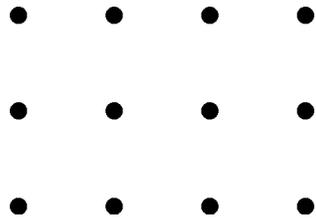
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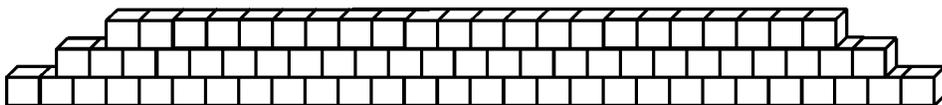
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5. In the rectangular 3 by 4 grid below, horizontally and vertically adjacent dots are one unit apart. Using the grid points as endpoints, it is not possible to draw more than n segments, each with a different length. What is the median length of these n segments? Express your answer as a decimal to the nearest hundredth.



5. _____ units

6. A monument made of a certain number of rows consisting of cube-shaped bricks starts with a row of 34 bricks. The row above has 31 bricks, the row above that has 28 bricks, and so on such that each row has three fewer bricks than the row below it. A portion of the monument is shown below. Later a student notices that the total number of bricks used in the monument is just enough to create the brick floor of a rectangular patio that is one layer of bricks, seven times as long as it is wide. (No bricks are broken to make the floor.) How many rows of bricks does the monument have?



6. _____ rows

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■ State Competition ■
Target Round
Problems 7 and 8

Name _____

School _____

Chapter _____

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7. While staying in a 15-story hotel, Polya plays the following game. She enters an elevator on the 6th floor. She flips a fair coin five times to determine her next five stops. Each time she flips “heads,” she goes up one floor. Each time she flips “tails,” she goes down one floor. What is the probability that each of her next five stops is on the 7th floor or higher? Express your answer as a common fraction.

7. _____



8. Two circles, one of radius 5 inches, the other of radius 2 inches, are tangent at point P. Two bugs start crawling at the same time from point P, one crawling along the larger circle at 3π inches per minute, the other crawling along the smaller circle at 2.5π inches per minute. How many minutes is it before their next meeting at point P?

8. _____ minutes