MATHCOUNTS®

2007
■ School Competition ■
Target Round
Problems 1 and 2

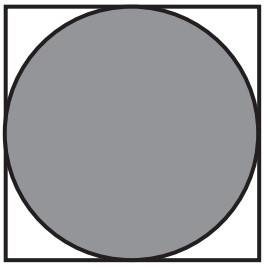
Name _____

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. Record only final answers in the designated blanks 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. If you complete the problems before time is called, use the time remaining to check your answers.

Total Correct	Scorer's Initials

1. A watered circular field (shaded) is inscribed in a square plot of land. The square plot has sides of length 500 meters. What is the area of the land that is not watered? Express your answer to the nearest thousand square meters.



1. _____ sq meters

2. In Sumville, 40% of the citizens are at least 6 feet tall and 25% of the citizens have red hair. Height and hair color have no correlation; the people with red hair are proportionally distributed among the people at least 6 feet tall and the people less than 6 feet tall. Sumville has exactly 500 citizens. How many citizens of Sumville have red hair and are less than 6 feet tall?

2. _____ citizens

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Problems 3 and 4

Name _____

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3. What is the volume of a right, rectangular prism with side, front and bottom faces having area 15 square inches, 10 square inches and 6 square inches, respectively?

3. _____ cu inches

4. For what value of x will $\frac{3+x}{5+x}$ and $\frac{1+x}{2+x}$ be equal?

4. _____

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2007
■ School Competition ■
Target Round
Problems 5 and 6

Name _____

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5. Tony will paint 16 right, cylindrical columns. The top face and bottom face of each column will be covered, so those parts will not be painted. Each column is 18 feet tall and has a diameter of 10 feet. One gallon of paint will cover 350 square feet. If paint is sold only in full gallons, how many gallons of paint must Tony buy to paint all 16 columns?

5. _____ gallons

6. The Hubble constant, H_0, is the ratio of the recessional velocity of a galaxy to its distance. The Hubble constant is estimated to be 70 km/sec per million parsecs of distance. (One parsec is equal to 3.26 light years.) Based on this ratio, how many billions of light years away would a galaxy be if it had a recessional velocity of 300,000 km/sec? Express your answer to the nearest whole number.

6. _____ billion light years

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2007
■ School Competition ■
Target Round
Problems 7 and 8

Name _____

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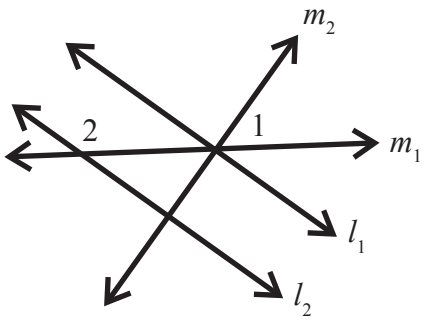
7. Lines m_1, m_2, l_1 and l_2 are coplanar, and they are drawn such that l_1 is parallel to l_2, and m_2 is perpendicular to l_2. If the measure of angle 1 is 50 degrees, what is the measure of angle 2 in the figure below?



7. _____ degrees

8. Boar Ring gave a speech to an assembly of colleagues. After five minutes, half of the audience left; 10 minutes later a third of the remaining audience left. After twenty more minutes, half of the remaining audience left, leaving only three people in the audience. How many people were in the audience at the beginning of Mr. Ring's speech?

8. _____ people