MATHCOUNTS®

2013
■ 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.

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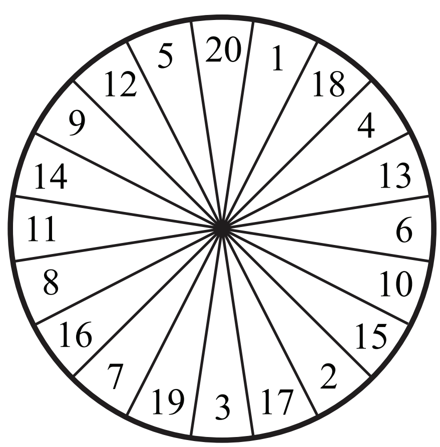
1. __________ games

Before the last game of the basketball season, Jonas had scored 88 points. He scored 23 points in the last game, making his season average 18.5 points per game. How many games did Jonas play during the season?

2. ____________

The dart board shown here contains 20 uniquely numbered sectors. When Malaika aims for a particular number, she hits it half the time. The other half of the time, she randomly hits an adjacent number on either side with equal probability. The number in the sector that her dart hits is the number of points scored. Trying to earn the highest possible score, Malaika decides to aim for the same number for each of her next 20 throws. Based on the given information, for which number should Malaika aim?



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2013

■ State Competition ■

Target Round

Problems 3 and 4

Name ______________________________

School ______________________________

Chapter ______________________________

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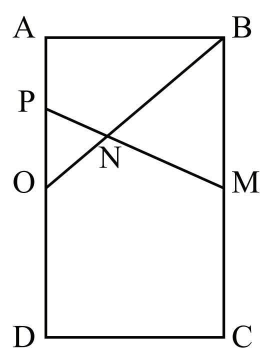
3. ____________ m/s

Joy is riding her bicycle up a hill. After traveling 3 km, Joy passes Greg, who is walking down the hill at a rate of 1 m/s. Joy continues up the hill for another 7 km before riding down at double the average speed she rode up. Joy and Greg arrive at Joy's starting point at the same moment. In meters per second, what was Joy's average speed going down the hill?

4. ____________ units^2

In rectangle ABCD, BC = 2AB. Points O and M are the midpoints of $\overline{AD}$ and $\overline{BC}$, respectively. Point P bisects $\overline{AO}$. If OB = $6\sqrt{2}$ units, what is the area of ΔNOP?



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2013
■ State Competition ■
Target Round
Problems 5 and 6

Name ______________________________

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Chapter ______________________________

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5. ____________ If $40q = p + \frac{p}{3} + \frac{p}{9} + \frac{p}{27}$, what is the ratio $\frac{q}{p}$? Express your answer as a common fraction.

6. ____________ units What is the length of the shortest segment that can be drawn from the point (4, 1) to $2x - y + 4 = 0$? Express your answer as a decimal to the nearest hundredth.

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2013
■ State Competition ■
Target Round
Problems 7 and 8

Name ____________________

School ____________________

Chapter ____________________

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7. ____________ integers How many positive two-digit integers have exactly 8 positive factors?

8. ____________ units In right ΔABC, shown here, $AC = 24$ units and $BC = 7$ units. Point D lies on $\overline{AB}$ so that $\overline{CD} \perp \overline{AB}$. The bisector of the smallest angle of ΔABC intersects $\overline{CD}$ at point E. What is the length of $\overline{ED}$? Express your answer as a common fraction.