MATHCOUNTS®

2015
■ Chapter Competition ■
Team Round
Problems 1–10

School _____

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. _____ times

On Thursday, January 1, 2015, Devin cleaned his room and then went to the gym. Afterwards, Devin made the decision to go to the gym on alternating days and to clean his room every Thursday. If Devin maintains this schedule for the entire year, how many times during 2015 will he clean his room and go to the gym on the same day, including January 1st?

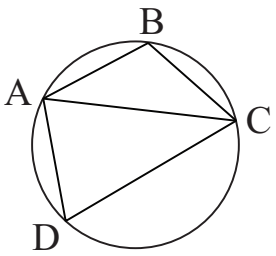
2. _____ cm

The sum of the areas of two equilateral triangles is equal to twice the area of a third equilateral triangle. The side length of the first triangle is 3 cm, and the side length of the second triangle is 5 cm. What is the side length of the third triangle? Express your answer in simplest radical form.

3. _____

The cheetah, one of the fastest mammals, has a top speed of 75 miles per hour. The sloth, one of the slowest mammals, has a top speed of 13 feet per minute. By what factor must the sloth's top speed by multiplied to equal the cheetah's top speed? Express your answer to the nearest whole number.

4. _____ degrees



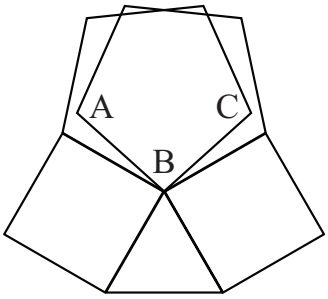
In the figure, AB || CD, $m\angle ADC = 50$ degrees and $m\angle BAC = m\angle BCA$. What is the measure of $\angle BAD$?

5. _____

If $\frac{1}{x} + \frac{1}{y} = 2$ and $\frac{1}{xy} = 4$, what is the value of $\frac{x+y}{2}$? Express your answer as a common fraction.

6. _____ What is the greatest possible sum of the digits of a six-digit number that is a multiple of 2, 3, 4, 5, 6, 7, 8, 9, 10 and 11?

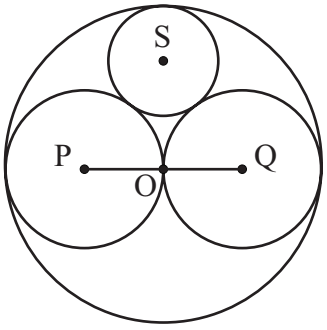
7. _____ degrees In the figure, a side of each square coincides with a side of the equilateral triangle, and one side of each regular pentagon coincides with a side of one of the squares, as shown. What is the degree measure of $\angle ABC$?



8. _____ integers If a *stairstep number* is defined as a number whose digits are strictly increasing in value from left to right, how many positive integers containing two or more digits are stairstep numbers?

9. _____ paths On a coordinate plane, a path consists of a series of moves in the positive x- or y-direction. If the first move is 1 unit in length, the second move is 2 units, the third move is 3 units, and so on, how many such paths exist that start at the origin and end at (14, 14)?

10. _____ cm



Congruent circles P and Q are internally tangent to circle O and externally tangent to each other at point O, as shown. Circle S is internally tangent to circle O and externally tangent to both circle P and circle Q. What is the diameter of circle S, when PQ = 24 cm?