MATHCOUNTS®

2014
■ School Competition ■
Team Round
Problems 1–10

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. _____ The integers 1 to 8, inclusive, are arranged into four pairs of distinct numbers, using each integer exactly once. The product of each pair is calculated, and then the sum of the four products is found. What is the maximum possible value of the sum?

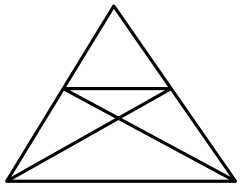
2. _____ What is the largest positive integer such that each digit is at least the sum of all the digits to its left?

3. _____ cm A rectangular box is 9 cm wide, 11 cm tall and 20 cm long. In centimeters, what is the diameter of the smallest circular opening through which the box will fit? Express your answer as a decimal to the nearest tenth.

4. _____ In the table shown, a and b each represent an integer from 1 to 9, inclusive. The sum of each row and each column is given. What is the value of ab?

					Total
	a	8	b	5	23
	2	a	2	b	14
	b	b	a	a	20
	b	8	5	a	23
Total	19	26	17	18	

5. _____ triangles How many triangles of any size are there in this figure?



6. _____ feet

A small rubber ball always bounces to half the height from which it fell. If one bounce is considered to be the downward drop and the upward rebound, how far will the ball travel (up and down combined) in 10 bounces if it is dropped from a height of 10 feet? Express your answer to the nearest whole number.

7. _____ feet

Police can use the formula $s = \sqrt{24d}$ in accident investigations to determine the speed of a vehicle when the brakes are applied on asphalt in dry conditions. The s represents the speed of the vehicle, in miles per hour, when the brakes are applied, and d represents the stopping distance of the vehicle, in feet. Using this formula, how many feet would a car traveling 65 mi/h need in order to come to a stop on asphalt in dry conditions? Express your answer to the nearest whole number.

8. _____ ft^2

In a particular rectangular pool, it is possible to swim a mile by swimming the length 40 times or along the perimeter (the pool's edge) 11 times. There are 5280 feet in a mile. In square feet, what is the area of the region bounded by the edge of the pool?

9. _____ mi/h

Jinting's speed in a seven-person drag race was 153 mi/h. Jinting's speed was 24 mi/h faster than Xavier's. Kasimu's speed was 14 mi/h slower than Misha's. Pierre's speed was 10 mi/h faster than Yoko's and was 38 mi/h faster than Xavier's. Becca's speed was 17 mi/h slower than Kasimu's. Yoko's speed was 15 mi/h faster than Becca's. In miles per hour, what was the speed of the person who finished fourth?

10. _____ units

In rectangle ABCD, shown here, $\overline{CE}$ is perpendicular to $\overline{BD}$. If BC = 15 and DC = 36, what is CE? Express your answer as a common fraction.