MATHCOUNTS®

2016
■ 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. _____ grams

A particular coin that is composed only of silver and copper has a mass of 5 grams. If copper accounts for $\frac{9}{10}$ of the coin's mass, what is the mass of the silver in the coin? Express your answer as a decimal to the nearest tenth.

2. _____ ordered pairs

How many ordered pairs of integers (a, b) satisfy $a \times b = 60$?

3. $ _____

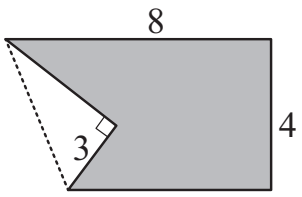
The final bill for the Freeman's dinner, including a 20% tip, was $72. What was the total cost of the Freeman's dinner before the tip was added?

4. _____ marbles

Tucker has a jar containing 4 green and 5 blue marbles. What is the minimum number of marbles Tucker needs to remove from the jar, without replacement, to guarantee that he has at least four marbles of the same color among those removed?

5. _____ in^2

A rectangular piece of paper measures 8 inches by 4 inches. The paper is folded along a crease from the upper left corner to a point located 3 inches from the lower left corner along the bottom edge, creating a right triangle as shown. What is the area of the shaded region?



6. _____ The product of three consecutive prime numbers is 105. What is their sum?

7. _____ hits Everett's batting average is 0.300 after getting 120 hits in 400 times at bat. How many hits must he get in his next 100 times at bat to raise his average to 0.400?

8. _____ The lines given by the equations $y = x + 1$ and $y = ax + b$ are perpendicular and intersect at the point (2, 3). What is the value of $a + b$?

9. _____ ft^3 The Farmington family has two different silos on their farm. The first silo is a circular cylinder of height 20 ft with parallel bases of diameter 14 ft. The second silo is a cylinder of height 22 ft topped by a cone of height 10 ft, both with bases of diameter 12 ft. What is the absolute difference between the volumes of the two silos? Express your answer in terms of π.

10. _____ Regular octagon ABCDEFGH with side length 2 units is placed on a coordinate plane such that side AB lies on the positive y-axis and side CD lies on the positive x-axis. What is the absolute difference between the x- and y-coordinates of F? Express your answer in simplest radical form.