MATHCOUNTS®

2016
■ Chapter Competition ■
Team Round
Problems 1–10

School _____

Team Members _____ , Captain

_____

_____

_____

DO NOT BEGIN UNTIL YOU ARE INSTRUCTED TO DO SO.

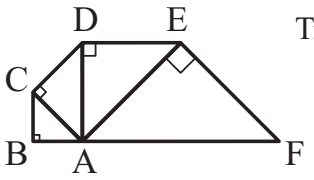
This section of the competition consists of 10 problems which the team has 20 minutes to complete. Team members may work together in any way to solve the problems. Team members may talk to each other during this section of the competition. This round assumes the use of calculators, and calculations also 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. _____ percent

A package of 8 frankfurters costs $5.00 and a package of 12 hot dog buns costs $3.00. If Jeffrey makes a hot dog sandwich using only a frankfurter and a bun, what percent of the cost of his hot dog sandwich comes from the bun? Express your answer to the nearest whole number.

2. _____



Triangles ABC, ACD, ADE and AEF are isosceles right triangles as shown. What is the value of $\frac{AB}{AF}$? Express your answer as a common fraction.

3. _____

What 6-digit number has the following properties?

- None of the digits repeat.
- The hundred-thousands digit is neither prime nor composite.
- The sum of the digits is 21.
- The ones digit is a prime number.
- The ones digit is the sum of the tens and hundreds digits.
- The thousands digit is the sum of the hundreds and ten-thousands digits.

4. _____ feet

A bicycle tire has a diameter of 22 inches and a motorcycle tire has a diameter of 25 inches. After each tire has made 1000 revolutions, how many more feet has the motorcycle traveled than the bicycle? Express your answer in terms of π.

5. _____

What is the sum of the positive integers from 1 through 500 that are divisible by 2, 3, 4, 5 and 6?

6. _____ The mean, median, unique mode and range of a list of ten integers are all 10. What is the greatest possible integer in the list?

7. _____ ml A 200 milliliter solution is 7% detergent. How many milliliters of 100% detergent need to be added so the solution will be 14% detergent? Express your answer as a decimal to the nearest tenth.

8. _____ numbers How many 3-digit numbers are there such that each of the digits is prime, and the sum of the digits is prime?

9. _____ paths

```
          A
        L   L
      G   G   G
    E   E   E   E
  B   B   B   B   B
R   R   R   R   R   R
A A A A A A A
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Starting with the A on top and only moving one letter at a time down to the left or down to the right, how many different paths from top to bottom spell ALGEBRA?

10. _____ tokens Kevin and Devin each have a positive integer number of tokens, and the number of tokens Devin has is a square number less than 100. Devin says to Kevin, "If you give me all of your tokens, my total number of tokens will still be a square number." Kevin says, "Yes, if, on the other hand, you give me the same number of tokens that I already have, your total number of tokens will also be a square number." How many tokens does Kevin have?