MATHCOUNTS®

2024 State Competition
Team Round Problems 1–10

School _____

Chapter _____

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. _____ miles

Erin's fastest centipede can travel $19\frac{17}{25}$ inches per second. At this rate, how many miles can Erin's fastest centipede travel in 2 hours? Express your answer as a decimal to the nearest hundredth.

2. _____ cents

Beatrix is buying carrots to feed the rabbits in her garden. For every five carrots Beatrix buys at the regular price from Carrots 'R' Us, she can buy a sixth carrot for 15 cents. If Beatrix buys 12 carrots from Carrots 'R' Us for a total of $2.60, what is the regular price of a carrot, in cents?

3. _____ terms

Aditya writes down some of his favorite numbers. Every number on his list is a prime number, and no two numbers on his list share any digits in common. What is the greatest possible number of terms in Aditya's list?

4. _____ points

In the exciting new game of Hyperfootball, two teams compete against each other for points. The only ways to score points are by getting a touchdown, a smackdown or a shutdown worth 6, 10 and 15 points, respectively. What is the greatest integer score that a team cannot have during a game of Hyperfootball?

5. _____ cm

Square ABCD has side length 14 cm, and point P lies in its interior so that AP = 15 cm and BP = 13 cm. What is CP? Express your answer in simplest radical form.

6. _____ A geometric sequence has 20 terms. The product of every fourth term, starting with the fourth term, is 32. The product of every fifth term, starting with the fifth term, is 4096. The product of every third term, starting with the third term, can be written as 2^k where k is an integer. What is the value of k?

7. _____ The arithmetic mean of a set of distinct prime numbers is 31. What is the greatest prime number that can be in this set?

8. _____ Rosencrantz has a bag containing ten fair coins, nine of which have a heads face and a tails face, but one of which has two heads faces. Guildenstern randomly draws a coin from the bag then flips it ten times and notices that it comes up heads each time. What is the probability that the coin he drew is the one with two heads faces? Express your answer as a common fraction.

9. _____ integers How many positive integers less than or equal to 1000 can be written as the sum of an even number of distinct powers of 3?

10. _____ cm^2 In concave hexagon ABCDEF, shown here, segments AB and EF are parallel as are segments BC and DE, and $m\angle A + m\angle B + m\angle C = 270$ degrees. What is the area of hexagon ABCDEF?