MATHCOUNTS®

2022 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. _____ If $\frac{2}{3}$ of 75% of $0.85x$ is equal to 100, what is $\frac{4}{5}$ of 70% of $0.75x$? Express your answer as a decimal to the nearest tenth.

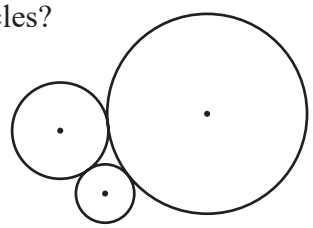
2. _____ legs This chart shows the number of each type of organism collected by a team of entomologists. Insects always have six legs and worms always have zero legs. Arachnids usually have eight legs, but occasionally there are arachnids with six legs. A millipede has between 34 and 750 legs and a centipede has between 30 and 354 legs. What is the median number of legs of the organisms collected?

Insects	3252
Arachnids	1542
Worms	317
Millipedes	17
Centipedes	16

3. _____ Phil wrote down a six-digit number on the board, and then Caleb erased two of the digits. What remains on the board is 234__6__. Phil remembers that the original number is divisible by 2, 3 and 5. What is the greatest possible value of Phil's original number?

4. $ _____ Zander, Ailey and Liz are partners in a babysitting business. Zander and Ailey, the elder two, charge $1\frac{1}{4}$ times as much as Liz, the youngest. Each of the partners in the business puts 5% of their earnings into the business for expenses. Last week, Ailey worked 3 hours and earned $47.25 before putting any money into the business. Zander worked 5 hours and Liz worked 12 hours. How much money went into the business last week? Express your answer in dollars to the nearest cent.

5. _____ m^2 Three circles are pairwise externally tangent, as shown below. The circles have radii of 1 meter, 2 meters and 3 meters. In square meters, what is the area of the polygon formed by connecting the centers of the circles?



6. _____ words

For her 16th birthday, Kate receives a book. On each page whose digits sum to 16, there is one word of a secret birthday message written in the margin. If the book is 280 pages, how many words are in the secret birthday message?

7. _____

What is the sum of all the five-digit positive integers in which each of the digits 1, 2, 3, 4 and 5 appear exactly once?

8. _____

In a regular icosagon (20-sided polygon), all the diagonals are drawn. If a diagonal is selected at random, what is the probability of selecting a diagonal that is neither the shortest possible length nor the longest possible length? Express your answer as a common fraction.

9. _____ haiku

A *haiku* is a poem with three lines: the first line contains 5 syllables, the second line 7 syllables, and the last line 5 syllables. If each word in each list shown is used at most once, how many different haiku can be made with these words?

2-syllable	**3-syllable**
UNKNOWN	ALGEBRA
MEASURE	TRIANGLE
COUNTING	REASONING
LOGIC	

10. _____

The Heronian mean H(a, b) is defined as H(a, b) = $\frac{a+\sqrt{ab}+b}{3}$. What is the least positive integer $b > 40$ such that H(40, b) is also a positive integer?