MATHCOUNTS®

2018
■ Chapter Competition ■
Team Round
Problems 1−10

| 0 |
| 1 |
| 2 |
| 3 |
| 4 |
| 5 |
| 6 |
| 7 |
| 8 |
| 9 |

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

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02-C18TEA

1. _____ ways   How many of the ways that 27 cents can be made using quarters, dimes, nickels and pennies use an odd number of coins?
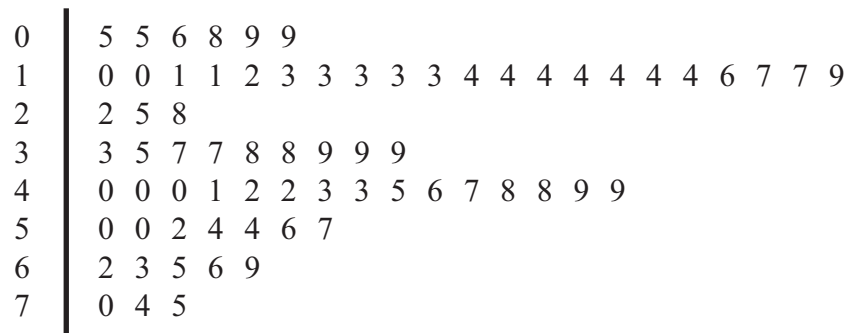
2. _____ degrees   The degree measures of the angles of a hexagon are $x + 10$, $2x + 80$, $3x - 60$, $4x + 40$, $5x - 10$, and $6x - 33$. What is the degree measure of the largest angle of the hexagon?

3. _____   When a different positive integers from 11 to 21, inclusive, is placed in each of the circles in the figure shown, the sum of the three numbers on each segment is the same. What is the greatest possible value of that sum?
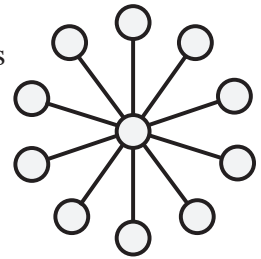
4. _____   If a, b, c, d and k are positive integers and $(ax + by)(cx + dy) = 7x^2 + 9kxy + 5y^2$ for all numbers x and y, what is the value of k?
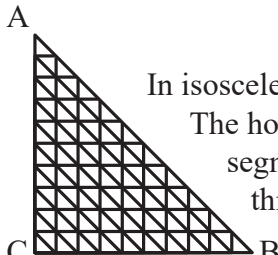
5. $ _____   At a middle school play, tickets for children under 10 years old cost half as much as tickets for seniors 60 and over, which in turn cost half as much as tickets for people from age 10 to age 59, inclusive. The stem-and-leaf plot below shows the ages of people who paid to attend the play. The total ticket sales for the play were $544.50. What was the cost in dollars of a ticket for a child under the age of 10?

```
0 | 5 5 6 8 9 9
1 | 0 0 1 1 2 3 3 3 3 3 4 4 4 4 4 4 4 6 7 7 9
2 | 2 5 8
3 | 3 5 7 7 8 8 9 9 9
4 | 0 0 0 1 2 2 3 3 5 6 7 8 8 9 9
5 | 0 0 2 4 4 6 7
6 | 2 3 5 6 9
7 | 0 4 5
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6. _____   Let $f(x) = \dfrac{x-3a}{x-2b}$ for constants a and b. If $f(5) = 0$ and $f(3)$ is undefined, what is

the value of $f\left(\dfrac{1}{3}\right)$? Express your answer as a common fraction.

7. _____   For a computer code, nine numbers are grouped into three sets of three numbers, with one number in each set designated as a key. The nine numbers are 2, 3, 5, 7, 11, 13, 17, 19 and 29. If they must be used according to the eight rules, what is the product of the three numbers in the set that does not contain 2 or 3?

Computer Code Rules	
2 and 3 must be keys.	13 must be with 11 or 19.
5 and 7 must be in the same set; neither is a key.	7 cannot be in a set with 17 as a key.
13, 17 and 29 must be in different sets.	13 cannot be in a set with 2 as a key.
11 and 19 must be in different sets.	19 cannot be in a set with 29 as a key.

A

8. _____ triangles   In isosceles right triangle ABC, shown here, AC = BC = 10 units. The horizontal segments are spaced 1 unit apart, as are the vertical segments. Including triangle ABC, how many of the triangles in this figure are isosceles right triangles?

C   B

9. $_____   Noah is combining gummy bears and jelly beans in equal parts to create a mixture that he will sell. The bears cost him $20 for 8 pounds, while the beans cost $14 for 4 pounds. He wants his cost to be 40% of his selling price. At what price per pound should he sell the mixture?

10. _____ permuta-
tions   How many five-letter permutations can be made from the letters in the word ADDITION?