MATHCOUNTS®

2018
■ School Competition ■
Team Round
Problems 1–10

Team Members _____ , Captain

_____

_____

_____

DO NOT BEGIN UNTIL YOU ARE INSTRUCTED TO DO SO.

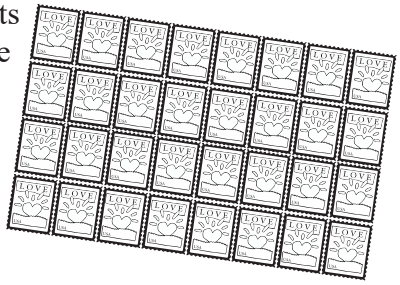
This section of the competition consists of 10 problems which the team has 20 minutes to complete. Team members may work together in any way to solve the problems. Team members may talk to each other during this section of the competition. This round assumes the use of calculators, and calculations also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

0 1 2 3 4 5 6 7 8 9

1. _____ If $a \copyright b = a^2 + ab + b^2$, what is the value of $(3 \copyright 4) - 12$?

2. _____ Sammi has a sheet of stamps containing 4 rows of stamps, with 8 stamps in each row. Sammi wants to separate all of the stamps by tearing the sheet in as few tears as possible. So, after she makes one tear, she puts the two pieces of the sheet on top of each other before making the next tear. What is the fewest number of tears she can use to get all the stamps separated?



3. _____

$$\begin{array}{r} \text{ONE} \\ +\ \text{ONE} \\ \hline \text{TWO} \end{array}$$

In the addition problem shown, each letter represents a different digit between 1 and 9, inclusive. If E and T represent 6 and 5, respectively, what digit does N represent?

4. _____ fluffy friends

All the kittens in a certain litter, which includes Billy and Peaches, are either fluffy or sleek and are friends with one another. Billy, a fluffy kitten, has 7 more fluffy kitten friends than sleek kitten friends. How many more fluffy friends than sleek friends does sleek kitten Peaches have?

5. _____ pounds Marcia wants to estimate the total weight of the sand in her sandbox. She has a drinking glass whose interior is a cylinder with diameter 2 inches and height 4 inches; the glass weighs 4.1 ounces when empty. After she fills the glass with sand, the weight of the glass is 14.8 ounces. If the sandbox is a rectangle measuring 6 feet by 4 feet, and the average depth of the sand is 6 inches, what is the total weight of the sand in the sandbox? Express your answer as a whole number to the nearest hundred. (1 foot = 12 inches; 1 pound = 16 ounces.)

6. _____ There are three integer values of x that make the equation $x^3 + 6x^2 + 11x + 6 = 0$ true. What is the least of these values?

7. _____ A dorm dining hall has three tables. Currently one student is seated at one table, two are seated at another and three are seated at the remaining table. Each student who enters the dining hall picks a table to join with probability proportional to the number of students already seated at the table. Terri enters the dining hall and sits at a table. Ursula then enters the dining hall and sits at a table. What is the probability that there is now a table at which at least four students are seated? Express your answer as a common fraction.

8. _____ A list of numbers of the form $\frac{x}{2}$, for positive integers x, has a sum of 7. What is maximum product of the list of numbers? Express your answer as a common fraction.

9. _____ The figure on the left is a portion of a standard multiplication table that contains the products of all pairs of positive integers. The figure on the right is a contiguous 2-by-2 section of the standard multiplication table, with some digits replaced with question marks. What is the sum of the four numbers in this section?

	1	2	3	4	5	⋯
1	1	2	3	4	5	
2	2	4	6	8	10	
3	3	6	9	12	15	
4	4	8	12	16	20	
5	5	10	15	20	25	
⋮						

7?2	??9
??2	8??

10. _____ ways Prentice has five daughters and ten identical pens. In how many ways can the pens be distributed among his daughters if two of them, Charlotte and Emily, must get the same number of pens, and every daughter is not required to get a pen?