MATHCOUNTS®

2017
■ **School Competition** ■
Sprint Round
Problems 1−30

Name _____

DO NOT BEGIN UNTIL YOU ARE INSTRUCTED TO DO SO.

This section of the competition consists of 30 problems. You will have 40 minutes to complete all the problems. You are not allowed to use calculators, books or other aids during this round. Calculations may be done on scratch paper. All answers must be complete, legible and simplified to lowest terms. Record only final answers in the blanks in the left-hand column of the competition booklet. If you complete the problems before time is called, use the remaining time to check your answers.

In each written round of the competition, the required unit for the answer is included in the answer blank. The plural form of the unit is always used, even if the answer appears to require the singular form of the unit. The unit provided in the answer blank is the only form of the answer that will be accepted.

Total Correct	Scorer's Initials

0
1
2
3
4
5
6
7
8
9

1. $ _____   Three investors decided to buy a time machine, with each person paying an equal share of the purchase price. If the purchase price was $6000, how much did each investor pay?

2. _____   What integer is closest to 10π?

3. _____   What is the sum of the positive integer factors of 12?

4. _____   If ◆ = 8 and ■ = 4, what is the value of the expression $2 \times$ ◆ $- 4 \times$ ■?

5. _____   If $5x + 2 = 7$, what is the value of $15x + 6$?

6. _____   What is the range of the four high scores in the table shown here?

HIGH SCORES

Player	High Score
PinkNinja	5,736,750
FR33DOM	2,710,275
Marsh-e-mallow	919,475
Gator-231	426,500

7. _____ Given that $4(n - 5) + 2 = 3(n - 1)$, what is the value of n?

8. $ _____ A concession stand sells a 16-ounce drink for $4. If the price is directly proportional to the amount of drink served, what is the price of a 20-ounce drink?

9. _____ What is the product of the greatest common factor of 4 and 10 and the least common multiple of 4 and 10?

10. _____ What is the arithmetic mean of the integers from 16 to 20, inclusive?

11. _____ combi-nations An ice cream shop offers chocolate, strawberry and vanilla flavors of ice cream and sprinkles for a topping. By choosing one flavor of ice cream and a topping of sprinkles or no sprinkles, how many different combinations are possible?
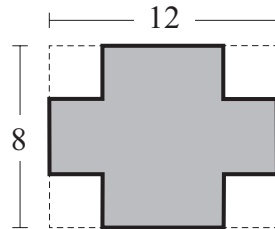
12. _____ cm In $\triangle ABC$, shown here, AC = 13 cm and BC = 8 cm. If $\triangle ABC$ has perimeter 36 cm, what is the length of side AB?
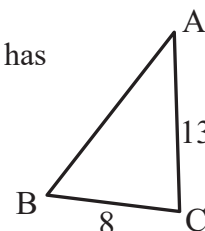
13. _____ What is the value of the sum $2 + 4 + 6 + \cdots + 18 + 20$?

14. _____ quarters Sammy goes to the store and buys \$1.80 worth of produce. He gives the clerk a \$5 bill and receives change consisting of only quarters, dimes, nickels and pennies. What is the greatest number of quarters he could receive?
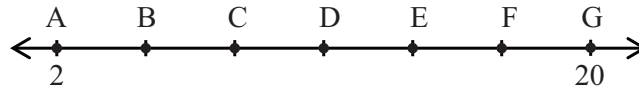
15. _____ inches

An 8-inch by 12-inch piece of cardboard has a 3-inch by 3-inch square cut out of each corner. What is the perimeter of the resulting figure, shown here?

16. _____ units² What is the area of the triangle enclosed by the lines $y = 0$, $x = 8$ and $y = x$?

17. _____ units If A through G are evenly spaced points on the number line shown, what is the value of $AC + DG$?


18. _____ What decimal is equivalent to $\dfrac{4}{5}$ percent?

19. _____ A fair 10-sided die, with faces numbered 1 through 10, is rolled once. What is the probability that the number rolled will be prime? Express your answer as a common fraction.

20. _____ points Five students had a mean score of 90 points on a test. One test was scored incorrectly, and that particular test score was later raised by five points. What is the new mean score?

21. _____ triangles How many triangles of any size are in the figure shown here?
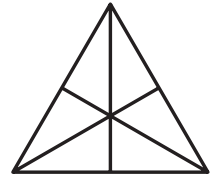
22. _____ If p is prime and n is even such that $p + n = 47$ and $pn = 210$, what is the value of n?

23. _____ If $a \# b = a^2(7 - b)$, what is the value of $(2 \# 5) \# 3$?

24. _number_____ If the permutations of the letters in the word SURE are numbered 1 through 24 in alphabetical order, what number is RUSE?

25. _____ A line contains the points (6, 10) and (15, 22). If the line intersects the y-axis at $(0, b)$, what is the value of b?

26. _____ What is the value of k in the equation shown?

$$2 \cdot 4 \cdot 8 \cdot 5 \cdot 5 \cdot 5 \cdot 5 \cdot 5 \cdot 5 = 10^k$$

27. _____ Samhir writes down all of the odd numbers between 500 and 700 that are divisible by both 7 and 9. What is the sum of the numbers Samhir writes?

28. _____ Sasha's secret passcode is a nine-digit number that begins and ends with 6. The sum of every three consecutive digits in the number is 14. What is the fifth digit of Sasha's passcode?

29. _____ cm Coco buys a very large rectangular chocolate bar and decides that each day, she will cut the largest possible square off of the bar and eat it. When the remaining part of the chocolate bar is a square, she will eat all that is left. The table shows the area, in square centimeters, of the square Coco eats on each day. If Coco finishes the chocolate bar on Day 6, what was the length of the longer side of the chocolate bar when Coco bought it?

Day	1	2	3	4	5	6
Eaten Area (cm²)	225	225	81	36	9	9

30. _____ This figure shows five shaded circles within a circle of radius 7 units. The four small congruent shaded circles are tangent to the outer circle and to the large shaded circle. The radius of each of the smaller shaded circles is $\frac{1}{5}$ the radius of the large shaded circle. What fraction of the largest circle's area is shaded? Express your answer as a common fraction.