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# MATHCOUNTS®

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2017

■ **School Competition** ■  
**Sprint Round**  
**Problems 1–30**

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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.

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Total Correct	Scorer's Initials

## Raytheon

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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  $10\pi$ ?

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

4. \_\_\_\_\_ If  $\blacklozenge = 8$  and  $\blacksquare = 4$ , what is the value of the expression  $2 \times \blacklozenge - 4 \times \blacksquare$ ?

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?

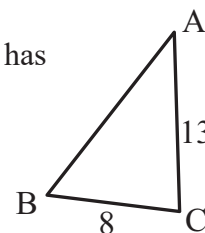


9. \_\_\_\_\_ What is the product of the greatest common factor of 4 and 10 and the least common multiple of 4 and 10?

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

11. \_\_\_\_\_ combinations 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?

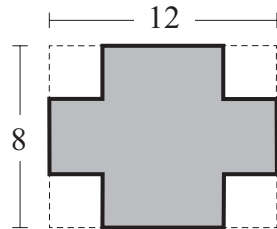
12. \_\_\_\_\_ cm In  $\triangle ABC$ , shown here,  $AC = 13$  cm and  $BC = 8$  cm. If  $\triangle ABC$  has perimeter 36 cm, what is the length of side  $AB$ ?



13. \_\_\_\_\_ What is the value of the sum  $2 + 4 + 6 + \dots + 18 + 20$ ?

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?

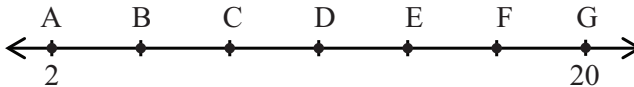
15. \_\_\_\_\_ inches



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. \_\_\_\_\_ units<sup>2</sup> 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  $AC + DG$ ?

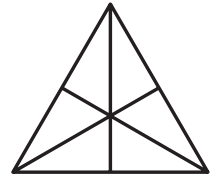


18. \_\_\_\_\_ What decimal is equivalent to  $\frac{4}{5}$  percent?

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?

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

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 (cm <sup>2</sup> )	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.

