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# MATHCOUNTS

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1995-96

■ Chapter Competition ■  
Sprint Round

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Name \_\_\_\_\_

School \_\_\_\_\_

**DO NOT BEGIN UNTIL YOU ARE  
INSTRUCTED TO DO SO**

This round of the competition consists of 30 problems. You will have 40 minutes to complete the problems. You are not allowed to use calculators, slide rules, books, or any other aids during this round. If you are wearing a calculator wrist watch, please give it to your proctor now. 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 right-hand column of the competition booklet. If you complete the problems before time is called, use the remaining time to check your answers.

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| Total Correct | Scorer's Initials |
|---------------|-------------------|
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|               |                   |

MATHCOUNTS is a cooperative project of the National Society of Professional Engineers, The Dow Chemical Company Foundation, the CNA Insurance Companies, the General Motors Foundation, the Intel Foundation, Texas Instruments Incorporated, the National Council of Teachers of Mathematics, and the National Aeronautics and Space Administration.

1. Sara walks to school along a path that is 1.30 miles. She returns on a shortcut that is 0.75 miles. How many total miles does she walk to and from school in 5 days? Express your answer as a decimal to the nearest hundredth.

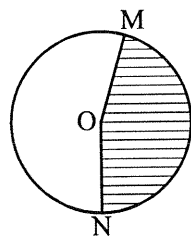
1. \_\_\_\_\_

2. Kristie had \$250 in her savings account. She made deposits of \$25, \$52, and \$38, withdrawals of \$30 and \$15 and earned interest of \$2.15. To the nearest cent, how many dollars were in her account after these transactions?

2. \_\_\_\_\_

3. Forty-five percent of the area of circle O is contained in the shaded region. How many degrees are in the measure of the non-reflex angle,  $\angle MON$ ?

3. \_\_\_\_\_



4. Laura received in change pennies, dimes and quarters totalling \$1.57. What is the minimum number of coins she could have received?


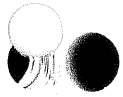

4. \_\_\_\_\_

5. A straight line passes through the three points (2, 5), (4, 8) and (6,  $y$ ). What is the value of  $y$ ?

5. \_\_\_\_\_

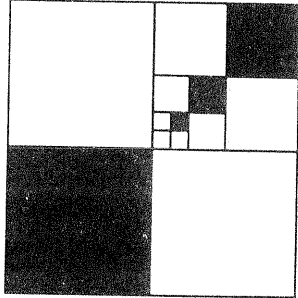
6. Beginning with the second day of a seven-day week, Potter ate 4 more dog biscuits than he ate the day before. He ate a total of 105 biscuits during the week. How many biscuits did he eat on the fifth day?

6. \_\_\_\_\_

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7. By how much does the product of 3, 4 and 5 exceed the sum of the squares of these numbers? 7. \_\_\_\_\_
8. Three angles of a quadrilateral are  $21^\circ$ ,  $66^\circ$  and  $134^\circ$ . How many degrees are in the measure of the fourth angle? 8. \_\_\_\_\_
9. What is the sum of all integers  $n$  satisfying  $-10\pi \leq n \leq 10\pi$ ? 9. \_\_\_\_\_
10. How many positive integer factors of 72 are also multiples of 2? 10. \_\_\_\_\_
11. Two triangles have sides with unit lengths 3, 7 and 9 and 4.5, 10.5 and 13.5, respectively. What is the ratio of the number of square units in the area of the smaller triangle to the number of square units in the area of the larger triangle? 11. \_\_\_\_\_
12. The salary of a salesperson was a 4% commission on all sales. Her commission rate is then raised to 4.5%. What will be the percent of increase in her salary, assuming she sells the same amount of merchandise? 12. \_\_\_\_\_
13. How many different, positive three-digit numbers can be made using any three of the following five digits: 1, 2, 2, 3 and 3? 13. \_\_\_\_\_

14. Each of the figures is a square formed by connecting midpoints of opposite sides of a larger square. What fraction of the largest square is shaded?

14. \_\_\_\_\_



15. A school bus has a maximum capacity of 44 passengers. Clemente school is taking a field trip, and the school rules say that the ratio of students to adults must be at most 10 to 1. Given that 121 students are going on the trip, what is the minimum number of buses needed?

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

16. A number is randomly selected from the following set. Express as a common fraction the probability that the fraction will terminate when written as a decimal.

16. \_\_\_\_\_

$$\left\{ \frac{3}{5}, \frac{1}{2}, \frac{2}{3}, \frac{5}{7}, \frac{3}{12}, \frac{1}{8} \right\}$$

17. A car-rental company charges \$50 for the first 500 miles driven and \$0.25 for each additional mile. Given that Meghan was charged \$239.25 for total mileage, how many miles did she drive?

17. \_\_\_\_\_

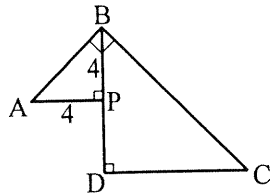
18. A family of four dines at a restaurant where the cost of the buffet is \$13.25 per person, plus 4.5% tax. How many dollars is the total bill, to the nearest cent, if tax is added after the bill is totalled?

18. \_\_\_\_\_

19. Find the value of  $k$  for which  $kx^2 - 5x - 12 = 0$  has solutions  $x = 3$  and  $x = -\frac{4}{3}$ . 19. \_\_\_\_\_

20. How many square units are in the area of the triangle in the first quadrant bounded by the axes and the line with equation  $x + y = 10$ ? 20. \_\_\_\_\_

21.  $P$  is the midpoint of  $\overline{BD}$ ,  $AP = BP = 4$ ,  $\overline{AP} \perp \overline{BD}$ ,  $\overline{BD} \perp \overline{DC}$ ,  $AB \perp \overline{BC}$ . How many units, expressed in simple radical form, are in the perimeter of pentagon  $ABCDP$ ? 21. \_\_\_\_\_



22. Evaluate:  $(80)(80) - (77)(83)$ . 22. \_\_\_\_\_

23. Of the 90% of students in a math class who earned a passing grade, 10% earned a B+ or better. What percent of the entire math class received a B+ or better? 23. \_\_\_\_\_

24. A man has a  $10 \text{ m} \times 10 \text{ m}$  square garden. In the center is a  $2 \text{ m} \times 2 \text{ m}$  square patch which he cannot use. He divides his usable space into four congruent rectangular patches. What is the number of meters in the perimeter of each rectangle? 24. \_\_\_\_\_

25. Which of the following ratios has the largest value? 25. \_\_\_\_\_  
a)  $\frac{8}{17}$  b)  $\frac{9}{19}$  c)  $\frac{10}{21}$  d)  $\frac{11}{23}$

26. Baby Steven weighed six pounds at birth and gained two pounds a week. Mother Ilene weighed 159 pounds when Steven was born. Ilene started exercising and eating low-fat foods and lost one pound per week. How many weeks past his birth did Baby Steven weigh one-fourth as much as Mother Ilene? 26. \_\_\_\_\_
27. When the numerator of a common fraction in simplest form is decreased by 6 and the denominator is decreased by 9, the resulting fraction is equivalent to the original fraction. Express the original number as a common fraction. 27. \_\_\_\_\_
28. In order to direct observers to a school exhibit, the students are building a road of paper sheets that measure 18" by 24" each. The path is 18" wide. They need to tape around the outside of each sheet of paper completely, either to join the sheet to another or to stick the paper to the floor. (When two sheets meet at an edge, only one piece of tape is used to hold the sheets together.) What is the least number of feet of tape they need for a 100-foot-long path? Express your answer as a decimal to the nearest tenth. 28. \_\_\_\_\_
29. The formula  $d = \sqrt{1.5h}$  gives the distance ( $d$ ) in miles you can see to the horizon from a height of  $h$  feet above the earth. To the nearest mile, how many miles can you see to the horizon from the top of the Empire State Building at 1250 feet? 29. \_\_\_\_\_
30. Define  $(x\Delta y)$  to mean  $2x - 3y$ . Evaluate  $((4\Delta 3)\Delta(5\Delta 3))$ . 30. \_\_\_\_\_