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# MATHCOUNTS

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1989-90

■ Chapter Competition ■

Sprint Round

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Name \_\_\_\_\_

School \_\_\_\_\_

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

This booklet contains 30 questions. You will have 40 minutes to complete all the questions. Calculators, slide rules, books, or any other aids are not permitted to be used during the contest. Calculations may be done on scratch paper. All answers must be complete, legible, and simplified to lowest terms. Record only final answers in the blank in the right column of the contest booklet. If you complete the round before time is called, use the remaining time to check your answers.

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Total Correct	Scorer's Initials

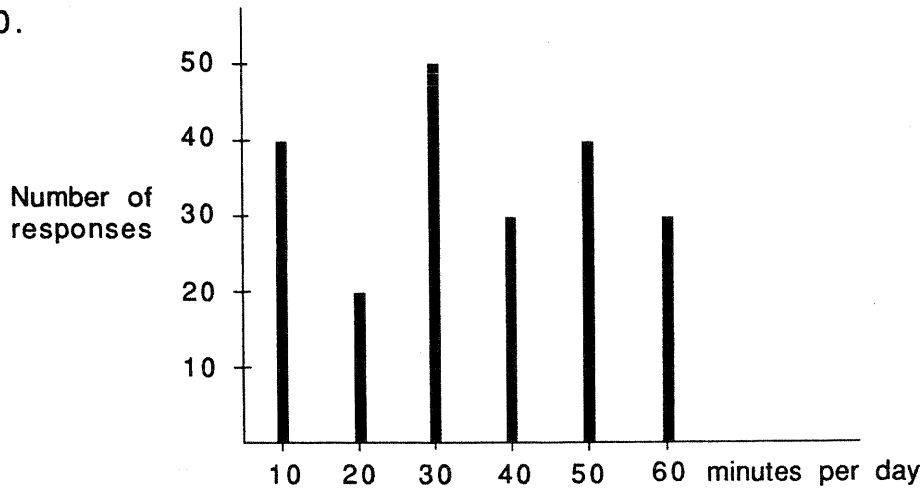
MATHCOUNTS is a cooperative project of the National Society of Professional Engineers, the CNA Insurance Companies, the Cray Research Foundation, the General Motors Foundation, the National Council of Teachers of Mathematics, the National Aeronautics and Space Administration, and the United States Department of Education.

1. A motorist travels 402 miles in 6 hours. At that rate, how many hours will it take to travel 737 miles? 1. \_\_\_\_\_
  
2. What is the greatest common factor (GCF) of 238 and 374? 2. \_\_\_\_\_
  
3. The length and width of a rectangle have a ratio of 9:6. The perimeter is 40 cm. Find the length of the rectangle in centimeters. 3. \_\_\_\_\_
  
4. If  $a * b$  is defined as  $2a - b^a$ , what value is associated with  $3 * 2$ ? 4. \_\_\_\_\_
  
5. Find the difference between the sum of all even numbers and the sum of all odd numbers from 0 through 1000. 5. \_\_\_\_\_
  
6. Find the coordinate of the point on the number line midway between the points whose coordinates are  $-.076$  and  $.924$ . 6. \_\_\_\_\_
  
7. If  $x = 17 - 3^2$ , what is the value of  $\frac{3}{2}x$ ? 7. \_\_\_\_\_
  
8. A family purchased a washer for \$496. If they paid 25% down and agreed to pay the remainder in twelve equal payments, how much, in dollars, was each payment? 8. \_\_\_\_\_

9. The sum of three consecutive positive integers is  $3x$ . Express the smallest of the three integers in terms of  $x$ .

9. \_\_\_\_\_

10.



10. \_\_\_\_\_

The results of a recent survey of subscribers to the local daily newspaper were summarized in the table above showing the number of people who responded and the number of minutes per day they devote to reading the newspaper. What fractional part of the people surveyed spend 20 - 40 minutes per day reading the paper?

11. Express as a fraction:  $\overline{.1} + \overline{.001}$

11. \_\_\_\_\_

12. A worker gets a 25% increase in salary. If the new salary is \$18,750, what was the old salary in dollars?

12. \_\_\_\_\_

13. The arithmetic mean of eight numbers is 75. If the mean of three of these numbers is 60, find the mean of the remaining five numbers.

13. \_\_\_\_\_

14. What are the coordinates of the point that is two-thirds of the way from (2,4) to (-1,1)? 14. \_\_\_\_\_

15. John purchased three cassette tapes regularly priced at \$8.88 each. One tape was reduced 12.5%, another was reduced 25%, and the other was half off. Find the total cost, in dollars, of the purchase. 15. \_\_\_\_\_

16. The base of a triangle is three times the length of the altitude. If the area of the triangle is  $73.5 \text{ cm}^2$ , find its altitude in centimeters. 16. \_\_\_\_\_

17. Mary is 10 years younger than Gary. The sum of their ages is five times the difference of their ages. How many years old is Gary? 17. \_\_\_\_\_

18. Ninety-nine decreased by  $\frac{4}{5}$  of 80 is the same as  $\frac{5}{8}$  of what number? 18. \_\_\_\_\_

19. The area of a trapezoid is  $144 \text{ m}^2$ . The length of one base is 14 m. The altitude is 12 m. Find the length of the second base in meters. 19. \_\_\_\_\_

20. There are 16 coins in a bank. If the coins are all nickels and dimes and they total \$1.05, how many nickels are there? 20. \_\_\_\_\_

21. A student purchased a one-year membership in a health club for \$390. She plans to visit the facility three times per week during the first year. To the nearest half-dollar, what is the cost per visit? 21. \_\_\_\_\_

22. What is the largest prime factor of 360? 22. \_\_\_\_\_

23. Round to the nearest whole number:  $\sqrt{139}$ . 23. \_\_\_\_\_

24. If a pair of regular fair dice are rolled, what is the probability that the sum of the dots showing on the upper faces is a prime number? 24. \_\_\_\_\_

25. Simplify:  $\frac{6 + \frac{4}{3} - 3 \div (2 + 2^2)}{1 + 2 \cdot 3}$  25. \_\_\_\_\_

26. Given  $3^1 = 3$ ,  $3^2 = 9$ ,  $3^3 = 27$ ,  $3^4 = 81$ ,  $3^5 = 243$ , etc., what is the units digit in  $3^{25}$ ? 26. \_\_\_\_\_

27. Evaluate:  $x^2(x - m)$  if  $x = -2$  and  $m = 3$ . 27. \_\_\_\_\_

28. Express in simplest form:  $\frac{8!}{5!3!}$  28. \_\_\_\_\_

29. Andre is reading "War and Peace" as a summer assignment. The book contains 1326 pages. He can read 234 pages in 6 days. If he always reads at the same rate, how many days will it take for him to read the entire book? 29. \_\_\_\_\_

30. Solve for n:  $3n - 2n - n + 2n = 4$  30. \_\_\_\_\_

**STOP HERE. GO BACK AND CHECK YOUR WORK.**