
MATHCOUNTS

1990-91

■ Chapter Competition ■

Sprint Round

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. You are not allowed to use calculators, slide rules, books, or any 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 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.

Total Correct	Scorer's Initials

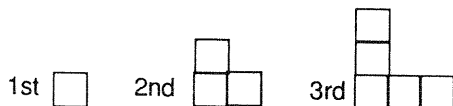
MATHCOUNTS is a cooperative project of the National Society of Professional Engineers, the CNA Insurance Companies, the Cray Research Foundation, the General Motors Foundation, the National Council of Teachers of Mathematics, and the National Aeronautics and Space Administration.

1. Find the value of $8[6^2 - 3(11)] \div 8 + 3$. 1. _____

2. If a stack of eight quarters is exactly one-half inch high, how many quarters will be needed to make a stack one foot high? 2. _____

3. How many miles can a car travel in 20 minutes if it travels $\frac{3}{4}$ as fast as a train going 80 miles an hour? 3. _____

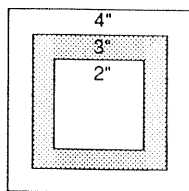
4. Squares are used to build the following sequence of drawings. If the length of a side of each square is one unit, how many units are in the perimeter of the 8th drawing? 4. _____



5. If the sides of a triangle have lengths $6x - 2$, $4x$, and $14 + 11x$, what is the average of the lengths of the sides? 5. _____

6. Solve for x : $\frac{2}{3} = \frac{4}{x-5}$ 6. _____

7. A dart is thrown at the square target shown. Assuming the dart hits the target at a random location, what is the probability that it will be in the shaded region? Express your answer as a common fraction. 7. _____

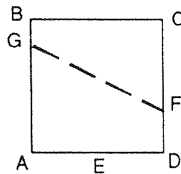


8. Of the numbers $\frac{7}{10}$, $\frac{4}{5}$, and $\frac{3}{4}$, which number is the arithmetic mean of the other two? 8. _____

9. A TV screen measures 24 by 16 inches. If each dimension is increased by 20%, by what percent is the area increased? 9. _____

10. Express $0.\overline{16}$ as a common fraction. 10. _____

11. In the figure below, ABCD is a square piece of paper 6 cm on each side. Corner C is folded over so that it coincides with E, the midpoint of \overline{AD} . If \overline{GF} represents the crease created by the fold, what is the length of \overline{FD} ? Express your answer as a common fraction. 11. _____



12. In the addition problem,
$$\begin{array}{r} \text{E G M} \\ + \text{G M} \\ \hline \text{G M M} \end{array}$$
 12. _____

each letter represents a distinct digit. What is the numerical value of E?

13. Dawn has \$1.20 in nickels, dimes, and quarters. For each nickel she has one dime and for each dime she has one quarter. How many total coins does she have? 13. _____

14. The figure below is composed of rectangles A, B, C, and D with whole number values for length and width. The areas of regions A, B, and C, in square meters, are shown in the diagram. What is the area in square meters of rectangle D?

A	40	B	25
D	?	C	30

14. _____

15. The arithmetic mean of four numbers is 15. Two of the numbers are 10 and 18 and the other two are equal. What is the product of the two equal numbers?

15. _____

16. Look for a pattern in the following and then determine the value of n:

16. _____

$$\frac{22 \times 22}{1 + 2 + 1} = 121$$

$$\frac{333 \times 333}{1 + 2 + 3 + 2 + 1} = 12321$$

$$\frac{4444 \times 4444}{1 + 2 + 3 + 4 + 3 + 2 + 1} = n$$

17. A salesman buys a coat at \$64 less 12.5%. He then sells the coat at a gain of 25% of his cost after allowing a 20% discount on the marked price. What is the marked price, in dollars, of the coat?

17. _____

18. Eleven pencils cost as much as three pens. If seven pens cost \$9.24, what is the cost, in cents, of one pencil?

18. _____

19. Given quadrilateral ABCD with A(3,7), B(3,5), C(-1,1), and D(-1,3), find the number of square units in the area of the quadrilateral.

19. _____

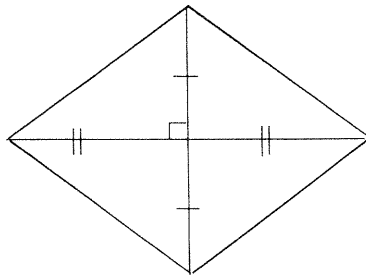
20. The arithmetic mean of 12 scores is 82. When the highest and lowest scores are removed, the new mean becomes 84. If the highest of the 12 scores is 98, what is the lowest score?

20. _____

21. Between what two consecutive integers on the number line is the graph of the sum $\sqrt{30} + \sqrt{50}$ located? 21. _____

22. What is $\frac{1}{4}\%$ of 120? Express your answer as a decimal. 22. _____

23. The diagonals of a rhombus are 6 inches and 8 inches. What is the perimeter, in inches, of the rhombus below? 23. _____



24. A collection of coins consists of one quarter, some dimes and some nickels. If the total value of the collection is 80 cents, what is the greatest possible number of dimes? 24. _____

25. If n and m are whole numbers, $99 < n < 401$, and $19 < m < 81$, what is the greatest value of $\frac{n}{m}$? 25. _____

26. Given $x = -2$, find the value of $2x^2 + 3x + 4$. 26. _____

27. Jennifer had a bag of Gummy Bears. She gave $\frac{1}{2}$ of them to Jessica, $\frac{1}{3}$ of them to Jana, and 15 to Julie. If the bag were then empty, how many Gummy Bears were in the bag at the beginning? 27. _____

28. Given $3! = 3 \times 2 \times 1$, simplify $\frac{6!}{4!2!}$.

28. _____

29. The softball team won nine of its first twenty games. How many of the remaining sixteen games does the team have to win to have a 50% winning record?

29. _____

30. On a line, point B is one unit to the right of point A, point C is 2 units to the left of A, point D is 4 units to the right of A, and point E is 8 units to the left of A. How many units are in the length of segment \overline{BE} ?

30. _____