
MATHCOUNTS®

2000

■ Chapter Competition ■

Sprint Round

Problems 1–30

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.

Total Correct	Scorer's Initials

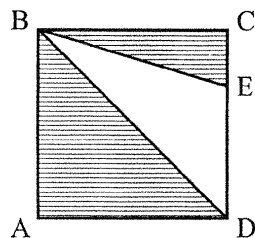
Founding Sponsors

CNA
National Society of Professional Engineers
National Council of Teachers of Mathematics

National Sponsors

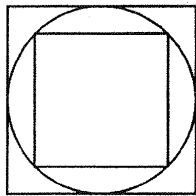
The Dow Chemical Company Foundation
Texas Instruments Incorporated
General Motors Foundation
3M Foundation Foundation
Phillips Petroleum Company
National Aeronautics and Space Administration

1. How many hours will it take to drive 220 miles from Chatham to Birmingham at an average speed of 55 mph? 1. _____
2. In an office building, there are 36 stairs between the 1st and 3rd floors. If there is the same number of stairs between any two floors, how many stairs must be climbed to reach the 6th floor? 2. _____
3. What is the value of $\sqrt{(8)(32)}$? 3. _____
4. There are 16 boys and 24 girls in an algebra class. What percent of the class is girls? 4. _____
5. Seven points are marked on the circumference of a circle. How many different chords can be drawn by connecting two of these seven points? 5. _____
6. Square ABCD has an area of 36 m^2 . $DE = 2EC$. What is the ratio of the area of $\triangle BED$ to the area of square ABCD? Express your answer as a common fraction. 6. _____



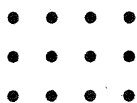
7. Rocky is standing on a sidewalk made of cement squares. He will toss a coin 4 times. For each head, he'll move one square forward. For each tail, he'll move one square backward. What is the probability that after 4 tosses he'll be back in the square where he started? Express your answer as a common fraction. 7. _____

8. The floor of a square room is covered with congruent square tiles. The diagonals of the room are drawn across the floor, and the two diagonals intersect a total of 9 tiles. How many tiles are on the floor? 8. _____
9. A bag contains 3 blue, 4 red and 3 yellow marbles. How many blue marbles must be added to the bag for it to contain 75% blue marbles? 9. _____
10. A four-digit number uses each of the digits 1, 2, 3 and 4 exactly once. What is the probability that the number is a multiple of 4? Express your answer as a common fraction. 10. _____
11. A circle is inscribed in a large square and circumscribed about a smaller square. The area of the larger square is 6 square meters. What is the number of square meters in the area of the smaller square? 11. _____



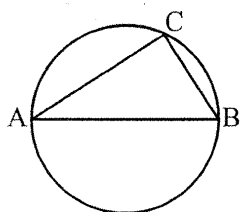
12. Anthony can cut a lawn in 2 hours, Mia can cut the same lawn in 3 hours, and Dandria can cut the same lawn in 2 hours. Anthony cuts the lawn for $\frac{1}{2}$ hour, and then Mia cuts the lawn for 1 hour. How many additional minutes will it take Dandria to finish cutting the lawn? 12. _____
13. The WNBA champions have a twelve-player roster that includes two superstars. How many different starting line-ups of five players can be chosen if the two superstars must be in the starting line-up? 13. _____

14. How many different squares can be formed by using four of the evenly-spaced dots below as vertices of the square?



14. _____

15. In the diagram, right $\triangle ABC$ is inscribed in a circle, the radius of the circle is 5 centimeters, and $BC = 5$ cm. What is the number of centimeters in the length of \widehat{BC} ? Express your answer as a common fraction in terms of π .



15. _____

16. The Rangers won 5 of their first 6 games. How many of their next 30 games must the Rangers win to have twice as many wins as losses?

16. _____

17. Phil Lanthropist won a great deal of money in a contest. He gave 20% of his winnings to his parents, gave 25% of the remaining money to his children, and gave the remaining \$900,000 to his favorite charity. What was the total number of dollars that Phil won?

17. _____

18. The side lengths of a triangle are 4 centimeters, 6 centimeters and 9 centimeters. One of the side lengths of a similar triangle is 36 centimeters. What is the maximum number of centimeters possible in the perimeter of the second triangle?

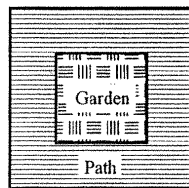
18. _____

19. Twenty students bought tickets for a school party. All of the money received for these 20 tickets was used to purchase beverages. Then, an additional 10 students bought tickets. Rather than use this additional money to buy more refreshments, all 30 students received a \$3.00 refund. How many dollars were used to buy beverages?

19. _____

20. The perimeter of a square garden is 64 meters. The path surrounding the garden has uniform width and has an area of 228 square meters. How many meters of fencing are needed to surround the outer edge of the path?

20. _____



21. Bob chose an integer from the set $\{1, 2, 3, 4\}$, and Sheila chose an integer from the set $\{5, 6, 7, 8\}$. What is the probability that the sum of their numbers is greater than 7? Express your answer as a common fraction.

21. _____

22. For what value of n does $6! = 2^4 \cdot 3^2 \cdot n$?

22. _____

23. The average of 12 different positive integers is 12. What is the greatest possible value of any one of these numbers?

23. _____

24. A cyclist rides a course in 1 hour and 24 minutes at an average rate of 9 miles per hour. A second cyclist travels the same course at an average rate of 6 miles per hour. How many hours will it take the second cyclist to cover the course? Express your answer as a decimal to the nearest tenth.

24. _____

25. In Mr. Edgecomb's math class, 30 students took an exam on statistics. If the average passing grade was 84, the average failing grade was 60, and the overall average was 80, how many students passed the exam? 25. _____
26. The length of the hypotenuse of a right triangle is 41 cm, and the length of one leg is 9 cm. How many square centimeters are in the area of the triangle? 26. _____
27. The *digital sum* of a number is the sum of its digits. For how many of the positive integers 24–125 inclusive is the digital sum a multiple of 7? 27. _____
28. Of the 120 students who are applying for the academic achievement award at Silverton High School, 81 have studied French, and 95 have studied Spanish. Ten students have never studied either French or Spanish. How many students have studied both French and Spanish? 28. _____
29. The first row of a movie theater has 11 seats. Each successive row has one more seat than the previous row. What is the number of seats in the theater if there are 30 rows? 29. _____
30. The areas of three faces of a rectangular prism with whole number dimensions are 54in^2 , 72in^2 , and 108in^2 . What is the number of cubic inches in the volume of the rectangular prism? 30. _____