MATHCOUNTS®

2001
■ National Competition ■
Team Round
Problems 1–10

DO NOT BEGIN UNTIL YOU ARE INSTRUCTED TO DO SO.

This round has ten problems which the team has 20 minutes to solve. Team members may work together and talk during this round. This round assumes the use of calculators, and calculations may be done on scratch paper, but no other aids are allowed. The team captain must record the answers on his/her problem sheet, and all answers must be complete and legible.

State ______________________________

Team Members ______________________________, Captain

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Total Correct	Scorer's Initials

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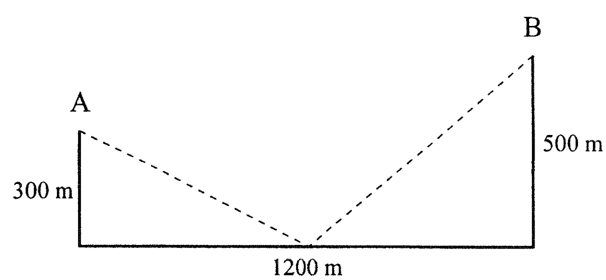
The MATHCOUNTS National Competition is sponsored by the CNA Foundation.

1. The Crunchy Peanut Butter Company plans to increase the height of its jars by 40%. By what percent will the radius of the jar need to be decreased to keep the volume the same? Express your answer as a decimal to the nearest tenth. 1. ____________

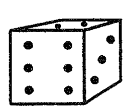
2. The sum of three numbers is 165. When the smallest number is multiplied by 7, the result is n. The value n is obtained by subtracting 9 from the largest number. This number n also results by adding 9 to the third number. What is the product of the three numbers? 2. ____________

3. An Internet service provider allows a certain number of free hours each month and then charges for each additional hour used. Wells, Ted and Vino each have separate accounts. This month the total hours used by Wells and Ted was 105, and each used all of their free hours. Their total cost was $10. Vino used 105 hours by himself and had to pay $26. What is the number of cents charged for each extra hour? 3. ____________

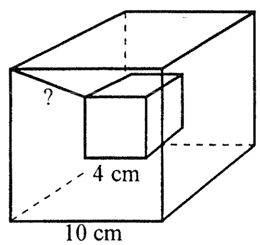
4. The rules for a race require that all runners start at A, touch any part of the 1200-meter wall, and stop at B. What is the number of meters in the minimum distance a participant must run? Express your answer to the nearest meter. 4. ____________



5. Bob rolls a fair six-sided die each morning. If Bob rolls a composite number, he eats sweetened cereal. If he rolls a prime number, he eats unsweetened cereal. If he rolls a 1, then he rolls again. In a non-leap year, how many more days is Bob most likely to eat unsweetened cereal rather than sweetened? 5. ____________



6. A cube whose edge is 4 cm is centered within a cube whose edge is 10 cm. The faces of the smaller cube are parallel to the faces of the larger cube. What is the number of centimeters in the length of a line segment that connects two corresponding vertices? Express your answer in simplest radical form. 6. ____________



7. Point P lies on the line $x = -3$ and is 10 units from the point $(5, 2)$. Find the product of all possible y-coordinates that satisfy the given conditions. 7. ____________

8. A turn consists of rolling a standard die and tossing a fair coin. The game is won when the die shows a 1 or a 6 and the coin shows heads. What is the probability the game will be won before the fourth turn? Express your answer as a common fraction. 8. ____________

9. The numbers $\sqrt{2u-1}$, $\sqrt{2u+1}$ and $2\sqrt{u}$ are the side lengths of a triangle. How many degrees are in the measure of the largest angle? 9. ____________

10. ABCD is a square. Parallel lines m, n and p pass through vertices B, C, and D, respectively. The distance between m and n is 7 units, and the distance between n and p is 9 units. Find the number of square units in the area of square ABCD. 10. ____________