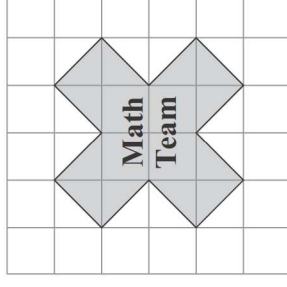


1. The Math Team designed a logo shaped like a multiplication symbol, shown below on a grid of 1-inch squares. What is the area of the logo in square inches?



- (A) 10 (B) 12 (C) 13 (D) 14 (E) 15

2. Consider these two operations:

$$a \blacklozenge b = a^2 - b^2$$

$$a \blackstar b = (a - b)^2$$

What is the value of $(5 \blacklozenge 3) \blackstar 6$?

- (A) -20 (B) 4 (C) 16 (D) 100 (E) 220

3. When three positive integers a , b , and c are multiplied together, their product is 100. Suppose $a < b < c$. In how many ways can the numbers be chosen?

- (A) 0 (B) 1 (C) 2 (D) 3 (E) 4



MAA AMC

American Mathematics Competitions

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37th Annual

AMC 8

Tuesday, January 18, 2022 through Monday, January 24, 2022

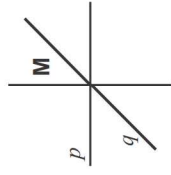
INSTRUCTIONS

1. DO NOT OPEN THIS BOOKLET UNTIL YOUR COMPETITION MANAGER TELLS YOU TO BEGIN.
2. This is a 25-question multiple-choice competition. For each question, only one answer choice is correct.
3. Mark your answer to each problem on the answer sheet with a #2 pencil. Check blackened answers for accuracy and erase errors completely. Only answers that are properly marked on the answer sheet will be scored.
4. SCORING: You will receive 1 point for each correct answer, 0 points for each problem left unanswered, and 0 points for each incorrect answer.
5. Only blank scratch paper, rulers, and erasers are allowed as aids. Prohibited materials include calculators, smartwatches, phones, computing devices, compasses, protractors, and graph paper. No problems on the competition will require the use of a calculator.
6. Figures are not necessarily drawn to scale.
7. Before beginning the competition, your competition manager will ask you to record your name and other information on the answer sheet.
8. You will have 40 minutes to complete the competition once your competition manager tells you to begin.
9. When you finish the competition, sign your name in the space provided on the answer sheet.

The MAA AMC office reserves the right to disqualify scores from a school if it determines that the rules or the required security procedures were not followed.

The publication, reproduction, or communication of the problems or solutions of this competition during the period when students are eligible to participate seriously jeopardizes the integrity of the results. Dissemination via phone, email, or digital media of any type during this period is a violation of the competition rules.

4. The letter **M** in the figure below is first reflected over the line q and then reflected over the line p . What is the resulting image?



- (A) (B) (C) (D) (E)

5. Anna and Bella are celebrating their birthdays together. Five years ago, when Bella turned 6 years old, she received a newborn kitten as a birthday present. Today the sum of the ages of the two children and the kitten is 30 years. How many years older than Bella is Anna?

- (A) 1 (B) 2 (C) 3 (D) 4 (E) 5

6. Three positive integers are equally spaced on a number line. The middle number is 15, and the largest number is 4 times the smallest number. What is the smallest of these three numbers?

- (A) 4 (B) 5 (C) 6 (D) 7 (E) 8

7. When the World Wide Web first became popular in the 1990s, download speeds reached a maximum of about 56 kilobits per second. Approximately how many minutes would the download of a 4.2-megabyte song have taken at that speed? (Note that there are 8000 kilobits in a megabyte.)

- (A) 0.6 (B) 10 (C) 1800 (D) 7200 (E) 36000

8. What is the value of

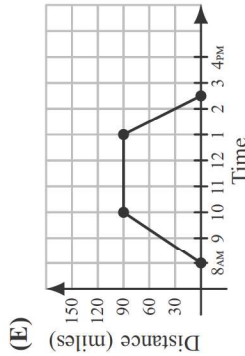
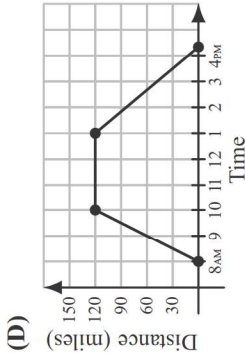
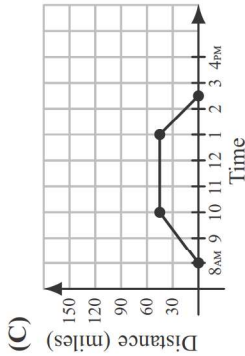
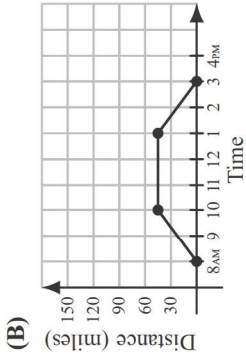
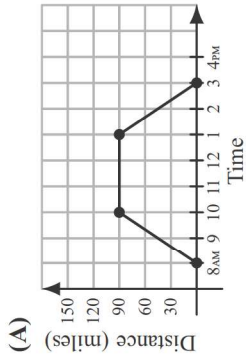
$$\frac{1}{3} \cdot \frac{2}{4} \cdot \frac{3}{5} \cdots \frac{18}{20} \cdot \frac{19}{21} \cdot \frac{20}{22} ?$$

- (A) $\frac{1}{462}$ (B) $\frac{1}{231}$ (C) $\frac{1}{132}$ (D) $\frac{2}{213}$ (E) $\frac{1}{22}$

9. A cup of boiling water (212°F) is placed to cool in a room whose temperature remains constant at 68°F . Suppose the difference between the water temperature and the room temperature is halved every 5 minutes. What is the water temperature, in degrees Fahrenheit, after 15 minutes?

- (A) 77 (B) 86 (C) 92 (D) 98 (E) 104

10. One sunny day, Ling decided to take a hike in the mountains. She left her house at 8 AM, drove at a constant speed of 45 miles per hour, and arrived at the hiking trail at 10 AM. After hiking for 3 hours, Ling drove home at a constant speed of 60 miles per hour. Which of the following graphs best illustrates the distance between Ling's car and her house over the course of her trip?



11. Henry the donkey has a very long piece of pasta. He takes a number of bites of pasta, each time eating 3 inches of pasta from the middle of one piece. In the end, he has 10 pieces of pasta whose total length is 17 inches. How long, in inches, was the piece of pasta he started with?

(A) 34 (B) 38 (C) 41 (D) 44 (E) 47