

MATHEMATICAL ASSOCIATION OF AMERICA
American Mathematics Competitions
PRESENTED BY THE AKAMAI FOUNDATION



17th Annual



AMC 8

(American Mathematics Contest 8)

Tuesday, NOVEMBER 13, 2001

INSTRUCTIONS

1. DO NOT OPEN THIS BOOKLET UNTIL YOUR PROCTOR TELLS YOU.
2. This is a twenty-five question multiple choice test. Each question is followed by answers marked A, B, C, D and E. Only one of these is correct.
3. The answers to the problems are to be marked on the AMC 8 Answer Form with a #2 pencil. Check the blackened circles for accuracy and erase errors and stray marks completely. Only answers properly marked on the answer form will be graded.
4. There is no penalty for guessing. Your score on this test is the number of correct answers.
5. No aids are permitted other than scratch paper, graph paper, rulers, erasers, and calculators that are accepted for use on the SAT. No problems on the test will require the use of a calculator.
6. Figures are not necessarily drawn to scale.
7. Before beginning the test, your proctor will ask you to record certain information on the answer form.
8. When your proctor gives the signal, begin working on the problems. You will have 40 minutes to complete the test.
9. When you finish the exam, ***sign your name*** in the space provided on the Answer Form.

The Committee on the American Mathematics Competitions reserves the right to re-examine students before deciding whether to grant official status to their scores. The Committee also reserves the right to disqualify all scores from a school if it is determined that the required security procedures were not followed.

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1. Casey's shop class is making a golf trophy. He has to paint 300 dimples on a golf ball. If it takes him 2 seconds to paint one dimple, how many minutes will he need to do his job?



(A) 4 (B) 6 (C) 8 (D) 10 (E) 12

2. I'm thinking of two whole numbers. Their product is 24 and their sum is 11. What is the larger number?

(A) 3 (B) 4 (C) 6 (D) 8 (E) 12

3. Granny Smith has \$63. Elberta has \$2 more than Anjou and Anjou has one-third as much as Granny Smith. How many dollars does Elberta have?

(A) 17 (B) 18 (C) 19 (D) 21 (E) 23

4. The digits 1, 2, 3, 4 and 9 are each used once to form the smallest possible **even** five-digit number. The digit in the tens place is

(A) 1 (B) 2 (C) 3 (D) 4 (E) 9

5. On a dark and stormy night Snoopy suddenly saw a flash of lightning. Ten seconds later he heard the sound of thunder. The speed of sound is 1088 feet per second and one mile is 5280 feet. Estimate, to the nearest half-mile, how far Snoopy was from the flash of lightning.



(A) 1 (B) $1\frac{1}{2}$ (C) 2 (D) $2\frac{1}{2}$ (E) 3

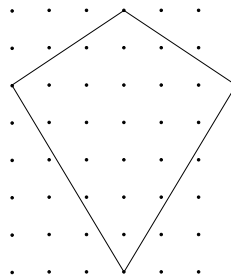
6. Six trees are equally spaced along one side of a straight road. The distance from the first tree to the fourth is 60 feet. What is the distance in feet between the first and last trees?

(A) 90 (B) 100 (C) 105 (D) 120 (E) 140

KITES ON PARADE

Problems 7, 8 and 9 are about these kites.

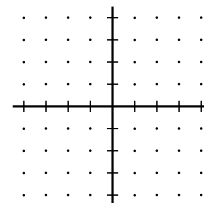
To promote her school's annual Kite Olympics, Genevieve makes a small kite and a large kite for a bulletin board display. The kites look like the one in the diagram. For her small kite Genevieve draws the kite on a one-inch grid. For the large kite she triples both the height and width of the entire grid.



7. What is the number of square inches in the area of the small kite?
 (A) 21 (B) 22 (C) 23 (D) 24 (E) 25
8. Genevieve puts bracing on her large kite in the form of a cross connecting opposite corners of the kite. How many inches of bracing material does she need?
 (A) 30 (B) 32 (C) 35 (D) 38 (E) 39
9. The large kite is covered with gold foil. The foil is cut from a rectangular piece that just covers the entire grid. How many square inches of waste material are cut off from the four corners?
 (A) 63 (B) 72 (C) 180 (D) 189 (E) 264

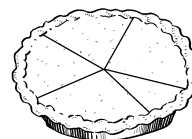
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10. A collector offers to buy state quarters for 2000% of their face value. At that rate how much will Bryden get for his four state quarters?
 (A) \$20 (B) \$50 (C) \$200 (D) \$500 (E) \$2000

11. Points A, B, C and D have these coordinates: $A(3, 2)$, $B(3, -2)$, $C(-3, -2)$ and $D(-3, 0)$. The area of quadrilateral $ABCD$ is
 (A) 12 (B) 15 (C) 18 (D) 21 (E) 24



12. If $a \otimes b = \frac{a+b}{a-b}$, then $(6 \otimes 4) \otimes 3 =$
 (A) 4 (B) 13 (C) 15 (D) 30 (E) 72

13. Of the 36 students in Richelle's class, 12 prefer chocolate pie, 8 prefer apple, and 6 prefer blueberry. Half of the remaining students prefer cherry pie and half prefer lemon. For Richelle's pie graph showing this data, how many degrees should she use for cherry pie?



- (A) 10 (B) 20 (C) 30 (D) 50 (E) 72
14. Tyler has entered a buffet line in which he chooses one kind of meat, two different vegetables and one dessert. If the order of food items is not important, how many different meals might he choose?

Meat: beef, chicken, pork

Vegetables: baked beans, corn, potatoes, tomatoes

Dessert: brownies, chocolate cake, chocolate pudding, ice cream

- (A) 4 (B) 24 (C) 72 (D) 80 (E) 144
15. Homer began peeling a pile of 44 potatoes at the rate of 3 potatoes per minute. Four minutes later Christen joined him and peeled at the rate of 5 potatoes per minute. When they finished, how many potatoes had Christen peeled?
- (A) 20 (B) 24 (C) 32 (D) 33 (E) 40

16. A square piece of paper, 4 inches on a side, is folded in half vertically. Both layers are then cut in half parallel to the fold. Three new rectangles are formed, a large one and two small ones. What is the ratio of the perimeter of one of the small rectangles to the perimeter of the large rectangle?



- (A) $\frac{1}{3}$ (B) $\frac{1}{2}$ (C) $\frac{3}{4}$ (D) $\frac{4}{5}$ (E) $\frac{5}{6}$

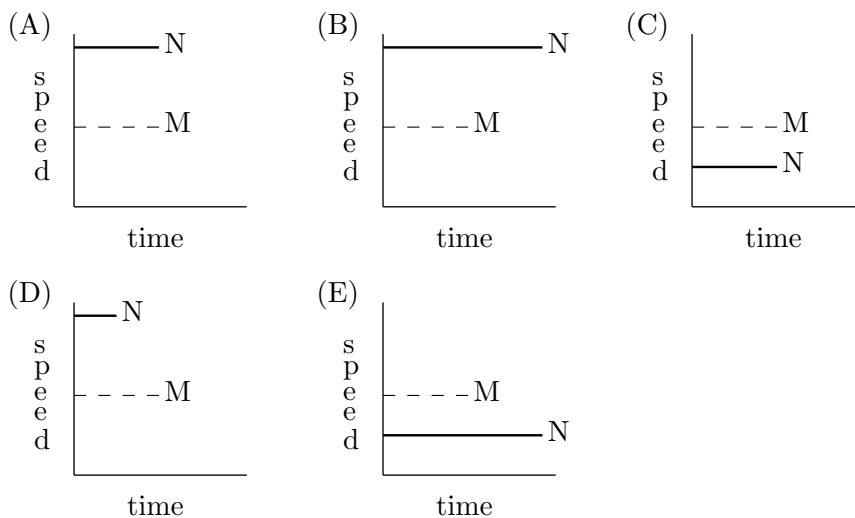
17. For the game show *Who Wants To Be A Millionaire?*, the dollar values of each question are shown in the following table (where K = 1000).



Question	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Value	100	200	300	500	1K	2K	4K	8K	16K	32K	64K	125K	250K	500K	1000K

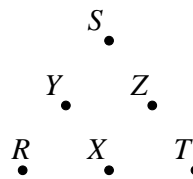
Between which two questions is the percent increase of the value the smallest?

- (A) From 1 to 2 (B) From 2 to 3 (C) From 3 to 4
 (D) From 11 to 12 (E) From 14 to 15
18. Two dice are thrown. What is the probability that the product of the two numbers is a multiple of 5?
- (A) $\frac{1}{36}$ (B) $\frac{1}{18}$ (C) $\frac{1}{6}$ (D) $\frac{11}{36}$ (E) $\frac{1}{3}$
19. Car M traveled at a constant speed for a given time. This is shown by the dashed line. Car N traveled at twice the speed for the same distance. If Car N's speed and time are shown as solid line, which graph illustrates this?



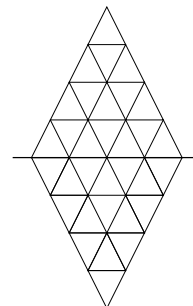
20. Kaleana shows her test score to Quay, Marty and Shana, but the others keep theirs hidden. Quay thinks, "At least two of us have the same score." Marty thinks, "I didn't get the lowest score." Shana thinks, "I didn't get the highest score." List the scores from lowest to highest for Marty (M), Quay (Q) and Shana (S).
 (A) S,Q,M (B) Q,M,S (C) Q,S,M (D) M,S,Q (E) S,M,Q
21. The mean of a set of five different positive integers is 15. The median is 18. The maximum possible value of the largest of these five integers is
 (A) 19 (B) 24 (C) 32 (D) 35 (E) 40
22. On a twenty-question test, each correct answer is worth 5 points, each unanswered question is worth 1 point and each incorrect answer is worth 0 points. Which of the following scores is **NOT** possible?
 (A) 90 (B) 91 (C) 92 (D) 95 (E) 97

23. Points R, S and T are vertices of an equilateral triangle, and points X, Y and Z are midpoints of its sides. How many noncongruent triangles can be drawn using any three of these six points as vertices?



- (A) 1 (B) 2 (C) 3 (D) 4 (E) 20

24. Each half of this figure is composed of 3 red triangles, 5 blue triangles and 8 white triangles. When the upper half is folded down over the centerline, 2 pairs of red triangles coincide, as do 3 pairs of blue triangles. There are 2 red-white pairs. How many white pairs coincide?



- (A) 4 (B) 5 (C) 6 (D) 7 (E) 9

25. There are 24 four-digit whole numbers that use each of the four digits 2, 4, 5 and 7 exactly once. Only one of these four-digit numbers is a multiple of another one. Which of the following is it?
 (A) 5724 (B) 7245 (C) 7254 (D) 7425 (E) 7542

SOLUTIONS

Your School Manager will be sent at least one copy of the 2001 AMC 8 Solutions Pamphlet. It is meant to be loaned to students (but not duplicated).

WRITE TO US

Comments about the problems and solutions for this AMC 8 should be addressed to:
Prof. Joseph W. Kennedy, AMC 8 Chair / kennedj@muohio.edu
Department of Mathematics and Statistics, Miami University, Oxford, OH 45056

Comments about administrative arrangements should be addressed to:
Titu Andreescu, MAA AMC Director / titu@amc.unl.edu
American Mathematics Competitions, University of Nebraska-Lincoln
P.O. Box 81606, Lincoln, NE 68501-1606

AMC 10 & AMC 12

The AMC 10 and AMC 12 are 25-question, 75-minute contests with 5 choices of answers for each problem (A through E). Schools with high scoring students on the AMC 8 will receive an Invitation Brochure for the 2002 AMC 10. The best way to prepare for these upper level contests is to study exams from previous years. Orders for all publications listed below should be addressed to:

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Each price is for an exam and its solutions for one year. Specify the years you want and how many copies of each exam. All prices effective to September 1, 2002.

AMC 8 (Junior High/Middle School exam), 1985-2001, \$1.00 per copy per year.

AMC 10 & AMC 12 (High School Exam), 1990-2001, \$1.00 per copy per year.

Books (Exams and Solutions)

Problem Book I, AHSMEs 1950-1960,	\$10.00
Problem Book II, AHSMEs 1961-1965,	\$10.00
Problem Book III, AHSMEs 1966-1972,	\$13.00
Problem Book IV, AHSMEs 1973-1982,	\$13.00
Problem Book V, AHSMEs & AIMEs 1983-1988,	\$30.00
Problem Book VI, AHSMEs 1989-1994	\$24.00

2001 AMC 8

DO NOT OPEN UNTIL
TUESDAY, NOVEMBER 13, 2001

****Administration On An Earlier Date Will Disqualify Your School's Results****

1. All information (Rules and Instructions) needed to administer this exam is contained in the TEACHERS' MANUAL, which is outside of this package. PLEASE READ THE MANUAL BEFORE NOVEMBER 13, 2001. Nothing is needed from inside this package until November 13.
2. Your PRINCIPAL or VICE-PRINCIPAL must verify on the AMC 8 CERTIFICATION Form that all rules associated with the conduct of the exam were followed.
3. The Answer Forms must be mailed First Class to the AMC office no later than 24 hours following the exam.
4. THE AMC 8 IS TO BE ADMINISTERED DURING A CONVENIENT 40 MINUTE PERIOD. THE EXAM MAY BE GIVEN DURING A REGULAR MATH CLASS.
5. *The publication, reproduction or communication of the problems or solutions of this test during the period when students are eligible to participate seriously jeopardizes the integrity of the results. Duplication at any time via copier, telephone, e-mail, World Wide Web or media of any type is a violation of the copyright law.*

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