18th Annual

AMC 8

(American Mathematics Contest 8)

Tuesday, NOVEMBER 19, 2002

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.

1. A circle and two distinct lines are drawn on a sheet of paper. What is the largest possible number of points of intersection of these figures?

   (A) 2 **(B)** 3 **(C)** 4 **(D)** 5 **(E)** 6

2. How many different combinations of $5 bills and $2 bills can be used to make a total of $17? Order does not matter in this problem.

   (A) 2 **(B)** 3 **(C)** 4 **(D)** 5 **(E)** 6

3. What is the smallest possible average of four distinct positive even integers?

   (A) 3 **(B)** 4 **(C)** 5 **(D)** 6 **(E)** 7

4. The year 2002 is a palindrome (a number that reads the same from left to right as it does from right to left). What is the product of the digits of the next year after 2002 that is a palindrome?

   (A) 0 **(B)** 4 **(C)** 9 **(D)** 16 **(E)** 25

5. Carlos Montado was born on Saturday, November 9, 2002. On what day of the week will Carlos be 706 days old?

   (A) Monday **(B)** Wednesday **(C)** Friday **(D)** Saturday **(E)** Sunday

6. A birdbath is designed to overflow so that it will be self-cleaning. Water flows in at the rate of 20 milliliters per minute and drains at the rate of 18 milliliters per minute. One of these graphs shows the volume of water in the birdbath during the filling time and continuing into the overflow time. Which one is it?
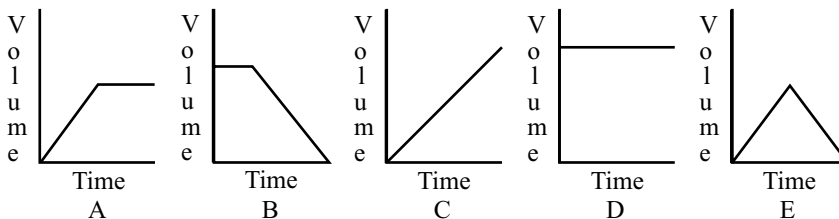
   (A) A **(B)** B **(C)** C **(D)** D **(E)** E

7. The students in Mrs. Sawyer's class were asked to do a taste test of five kinds of candy. Each student chose one kind of candy. A bar graph of their preferences is shown. What percent of her class chose candy E?

SWEET TOOTH
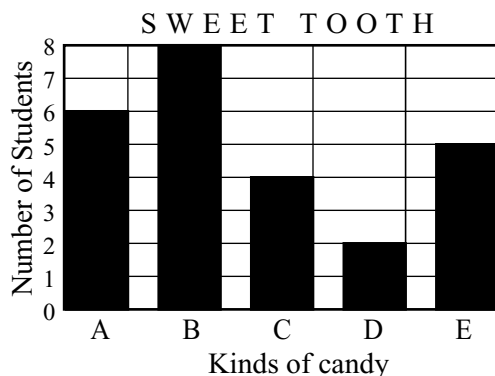
(A) 5   (B) 12   (C) 15   (D) 16   (E) 20

Problems 8,9 and 10 use the data found in the accompanying paragraph and table:

Juan's Old Stamping Grounds

Juan organizes the stamps in his collection by country and by the decade in which they were issued. The prices he paid for them at a stamp shop were: Brazil and France, 6¢ each, Peru 4¢ each, and Spain 5¢ each. (Brazil and Peru are South American countries and France and Spain are in Europe.)

Number of Stamps by Decade

Country	'50s	'60s	'70s	'80s
Brazil	4	7	12	8
France	8	4	12	15
Peru	6	4	6	10
Spain	3	9	13	9

**Juan's Stamp Collection**

8. How many of his European stamps were issued in the '80s?

(A) 9   (B) 15   (C) 18   (D) 24   (E) 42

9. His South American stamps issued before the '70s cost him

(A) $0.40   (B) $1.06   (C) $1.80   (D) $2.38   (E) $2.64

10. The average price of his '70s stamps is closest to

(A) 3.5¢   (B) 4¢   (C) 4.5¢   (D) 5¢   (E) 5.5¢

11. A sequence of squares is made of identical square tiles. The edge of each square is one tile length longer than the edge of the previous square. The first three squares are shown. How many more tiles does the seventh square require than the sixth?
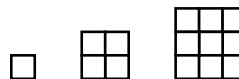
    (**A**) 11　　　(**B**) 12　　　(**C**) 13　　　(**D**) 14　　　(**E**) 15

12. A board game spinner is divided into three regions labeled A, B and C. The probability of the arrow stopping on region A is $\frac{1}{3}$ and on region B is $\frac{1}{2}$. The probability of the arrow stopping on region C is
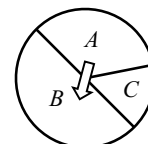
    (**A**) $\frac{1}{12}$　　(**B**) $\frac{1}{6}$　　(**C**) $\frac{1}{5}$　　(**D**) $\frac{1}{3}$　　(**E**) $\frac{2}{5}$

13. For his birthday, Bert gets a box that holds 125 jellybeans when filled to capacity. A few weeks later, Carrie gets a larger box full of jellybeans. Her box is twice as high, twice as wide and twice as long as Bert's. Approximately, how many jellybeans did Carrie get?
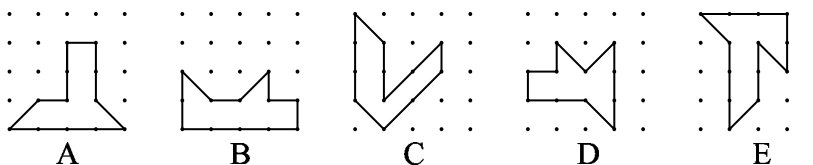
    (**A**) 250　　　(**B**) 500　　　(**C**) 625　　　(**D**) 750　　　(**E**) 1000

14. A merchant offers a large group of items at 30% off. Later, the merchant takes 20% off these sale prices and claims that the final price of these items is 50% off the original price. The total discount is
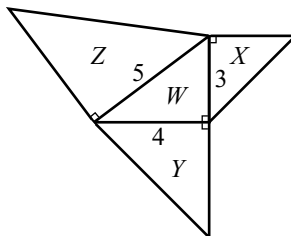
    (**A**) 35%　　(**B**) 44%　　(**C**) 50%　　(**D**) 56%　　(**E**) 60%

15. Which of the following polygons has the largest area?



    (**A**) A　　　(**B**) B　　　(**C**) C　　　(**D**) D　　　(**E**) E

16. Right isosceles triangles are constructed on the sides of a 3-4-5 right triangle, as shown. A capital letter represents the area of each triangle. Which one of the following is true?

(**A**) $X + Z = W + Y$ (**B**) $W + X = Z$ (**C**) $3X + 4Y = 5Z$
(**D**) $X + W = \frac{1}{2}(Y + Z)$ (**E**) $X + Y = Z$

17. In a mathematics contest with ten problems, a student gains 5 points for a correct answer and loses 2 points for an incorrect answer. If Olivia answered every problem and her score was 29, how many correct answers did she have?

(**A**) 5   (**B**) 6   (**C**) 7   (**D**) 8   (**E**) 9

18. Gage skated 1 hr 15 min each day for 5 days and 1 hr 30 min each day for 3 days. How long would he have to skate the ninth day in order to average 85 minutes of skating each day for the entire time?

(**A**) 1 hr (**B**) 1 hr 10 min (**C**) 1 hr 20 min (**D**) 1 hr 40 min (**E**) 2 hr

19. How many whole numbers between 99 and 999 contain exactly one 0?

(**A**) 72   (**B**) 90   (**C**) 144   (**D**) 162   (**E**) 180

20. The area of triangle XYZ is 8 square inches. Points A and B are midpoints of congruent segments $\overline{XY}$ and $\overline{XZ}$. Altitude $\overline{XC}$ bisects $\overline{YZ}$. The area (in square inches) of the shaded region is
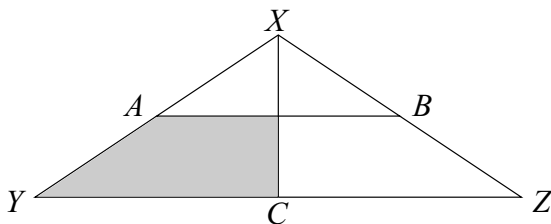
(**A**) $1\frac{1}{2}$ (**B**) 2   (**C**) $2\frac{1}{2}$ (**D**) 3   (**E**) $3\frac{1}{2}$
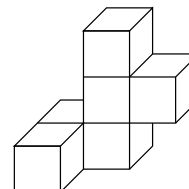
21. Harold tosses a nickel four times. The probability that he gets at least as many heads as tails is

    (A) $\frac{5}{16}$ (B) $\frac{3}{8}$ (C) $\frac{1}{2}$ (D) $\frac{5}{8}$ (E) $\frac{11}{16}$
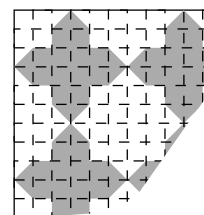
22. Six cubes, each an inch on an edge, are fastened together, as shown. Find the total surface area in square inches. Include the top, bottom and sides.

   (A) 18   (B) 24   (C) 26   (D) 30   (E) 36

23. A corner of a tiled floor is shown. If the entire floor is tiled in this way and each of the four corners looks like this one, then what fraction of the tiled floor is made of darker tiles?

    (A) $\frac{1}{3}$ (B) $\frac{4}{9}$ (C) $\frac{1}{2}$ (D) $\frac{5}{9}$ (E) $\frac{5}{8}$

24. Miki has a dozen oranges of the same size and a dozen pears of the same size. Miki uses her juicer to extract 8 ounces of pear juice from 3 pears and 8 ounces of orange juice from 2 oranges. She makes a pear-orange juice blend from an equal number of pears and oranges. What percent of the blend is pear juice?

    (A) 30   (B) 40   (C) 50   (D) 60   (E) 70
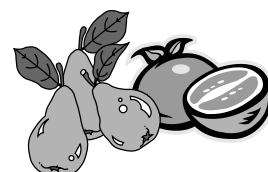
25. Loki, Moe, Nick and Ott are good friends. Ott had no money, but the others did. Moe gave Ott one-fifth of his money, Loki gave Ott one-fourth of his money and Nick gave Ott one-third of his money. Each gave Ott the same amount of money. What fractional part of the group's money does Ott now have?

    (A) $\frac{1}{10}$ (B) $\frac{1}{4}$ (C) $\frac{1}{3}$ (D) $\frac{2}{5}$ (E) $\frac{1}{2}$

SOLUTIONS

Your School Manager will be sent at least one copy of the 2002 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:
Ms. Bonnie Leitch, AMC 8 Chair / bleitch@tenet.edu
548 Hill Avenue, New Braunfels, TX 78130

Comments about administrative arrangements should be addressed to:
Titu Andreescu, MAA AMC Director / tandreescu@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 2003 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:

American Mathematics Competitions
ATTN: Publications
P.O. Box 81606
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MINIMUM ORDER: $10 (Before handling fee), ***PAYMENTS IN US FUNDS ONLY.*** U.S.A. and Canadian orders must be prepaid and will be shipped UPS/DHL or AIRMAIL.

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Make checks payable to the American Mathematics Competitions; or give your Visa, MasterCard or American Express number, expiration date and cardholder's home address.

International Orders: Do **NOT** prepay; an invoice will be sent to you.

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, 2003.
AMC 8 (Junior High/Middle School exam), 1990-2002, $1.00 per copy per year.
AMC 10 & AMC 12 (High School Exam), 1990-2002, $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 ....$18.00

2002 AMC 8

DO NOT OPEN UNTIL
TUESDAY, NOVEMBER 19, 2002

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 19, 2002. Nothing is needed from inside this package until November 19.

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.*