AMERICAN MATHEMATICS COMPETITIONS

11th ANNUAL
AMERICAN JUNIOR HIGH SCHOOL MATHEMATICS EXAMINATION
(AJHSME)

THURSDAY, NOVEMBER 16, 1995

Sponsored by

Mathematical Association of America
Society of Actuaries Mu Alpha Theta
National Council of Teachers of Mathematics
Casualty Actuarial Society American Statistical Association
American Mathematical Association of Two-Year Colleges
American Mathematical Society
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INSTRUCTIONS

1. DO NOT OPEN THIS BOOKLET UNTIL TOLD TO DO SO BY YOUR PROCTOR.
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 AJHSME 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 sheet will be graded.
4. There is no penalty for guessing. Your score on this test is the number of correct answers.
5. No aids other than calculators, scratch paper, graph paper, rulers and erasers are permitted. 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 the problems. You will have **40 MINUTES** working time for the test.

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.

1. Walter has exactly one penny, one nickel, one dime and one quarter in his pocket. What percent of one dollar is in his pocket?

   (A) 4% **(B)** 25% **(C)** 40% **(D)** 41% **(E)** 59%

2. Jose is 4 years younger than Zack. Zack is 3 years older than Inez. Inez is 15 years old. How old is Jose?

   (A) 8 **(B)** 11 **(C)** 14 **(D)** 16 **(E)** 22

3. Which of the following operations has the same effect on a number as multiplying by $\frac{3}{4}$ and then dividing by $\frac{3}{5}$?

   (A) dividing by $\frac{4}{3}$ **(B)** dividing by $\frac{9}{20}$ **(C)** multiplying by $\frac{9}{20}$

   (D) dividing by $\frac{5}{4}$ **(E)** multiplying by $\frac{5}{4}$

4. A teacher tells the class,

   "Think of a number, add 1 to it, and double the result. Give the answer to your partner. Partner, subtract 1 from the number you are given and double the result to get your answer."

   Ben thinks of 6, and gives his answer to Sue. What should Sue's answer be?

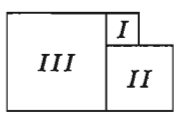
   (A) 18 **(B)** 24 **(C)** 26 **(D)** 27 **(E)** 30

5. Find the smallest whole number that is larger than the sum

$$2\frac{1}{2}+3\frac{1}{3}+4\frac{1}{4}+5\frac{1}{5}.$$

   (A) 14 **(B)** 15 **(C)** 16 **(D)** 17 **(E)** 18

6. Figures I, II and III are squares. The perimeter of I is 12 and the perimeter of II is 24. The perimeter of III is



   (A) 9 **(B)** 18 **(C)** 36 **(D)** 72 **(E)** 81

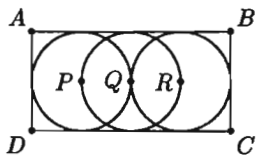
7. At Clover View Junior High, one half of the students go home on the school bus. One fourth go home by automobile. One tenth go home on their bicycles. The rest walk home. What fractional part of the students walk home?

   (A) $\frac{1}{16}$ **(B)** $\frac{3}{20}$ **(C)** $\frac{1}{3}$ **(D)** $\frac{17}{20}$ **(E)** $\frac{9}{10}$

8. An American traveling in Italy wishes to exchange American money (dollars) for Italian money (lire). If 3000 lire = \$1.60, how many lire will the traveler receive in exchange for \$1.00?

(A) 180 (B) 480 (C) 1800 (D) 1875 (E) 4875

9. Three congruent circles with centers P, Q and R are tangent to the sides of rectangle $ABCD$ as shown. The circle centered at Q has diameter 4 and passes through points P and R. The area of the rectangle is

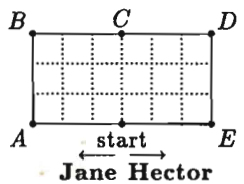


(A) 16 (B) 24 (C) 32
(D) 64 (E) 128

10. A jacket and a shirt originally sold for \$80 and \$40, respectively. During a sale Chris bought the \$80 jacket at a 40% discount and the \$40 shirt at a 55% discount. The total amount saved was what percent of the total of the original prices?

(A) 45% (B) $47\frac{1}{2}\%$ (C) 50% (D) $79\frac{1}{6}\%$ (E) 95%

11. Jane can walk any distance in half the time it takes Hector to walk the same distance. They set off in opposite directions around the outside of the 18-block area as shown. When they meet for the first time, they will be closest to

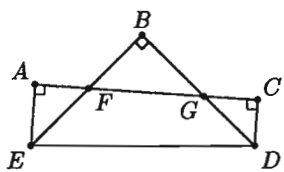


(A) A (B) B (C) C
(D) D (E) E

12. A *lucky* year is one in which at least one date, when written in the form month/day/year, has the following property: *The product of the month times the day equals the last two digits of the year.* For example, 1956 is a lucky year because it has the date 7/8/56 and $7 \times 8 = 56$. Which of the following is NOT a lucky year?

(A) 1990 (B) 1991 (C) 1992 (D) 1993 (E) 1994

13. In the figure, $\angle A$, $\angle B$ and $\angle C$ are right angles. If $\angle AEB = 40°$ and $\angle BED = \angle BDE$, then $\angle CDE =$



(A) 75° (B) 80° (C) 85°
(D) 90° (E) 95°

14. A team won 40 of its first 50 games. How many of the remaining 40 games must this team win so it will have won exactly 70% of its games for the season?

(A) 20 (B) 23 (C) 28 (D) 30 (E) 35

15. What is the 100^{th} digit to the right of the decimal point in the decimal form of 4/37?

(A) 0 (B) 1 (C) 2 (D) 7 (E) 8

16. Students from three middle schools worked on a summer project.
Seven students from Allen School worked for 3 days.
Four students from Balboa School worked for 5 days.
Five students from Carver School worked for 9 days.
The total amount paid for the students' work was \$774. Assuming each student received the same amount for a day's work, how much did the students from Balboa School earn altogether?

(A) \$9.00 (B) \$48.38 (C) \$180.00 (D) \$193.50 (E) \$258.00

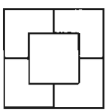
17. The table below gives the percent of students in each grade at Annville and Cleona elementary schools:

	K	1	2	3	4	5	6
Annville :	16%	15%	15%	14%	13%	16%	11%
Cleona :	12%	15%	14%	13%	15%	14%	17%

Annville has 100 students and Cleona has 200 students. In the two schools combined, what percent of the students are in grade 6?

(A) 12% (B) 13% (C) 14% (D) 15% (E) 28%

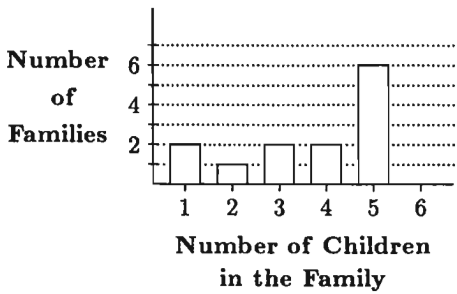
18. The area of each of the four congruent L-shaped regions of this 100-inch by 100-inch square is 3/16 of the total area. How many inches long is the side of the center square?



(A) 25 (B) 44 (C) 50 (D) 62 (E) 75

19. The graph shows the distribution of the number of children in the families of the students in Ms. Jordan's English class. The median number of children in the family for this distribution is

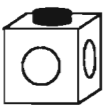
(A) 1 (B) 2 (C) 3
(D) 4 (E) 5



20. Diana and Apollo each roll a standard die obtaining a number at random from 1 to 6. What is the probability that Diana's number is larger than Apollo's number?

(A) $\frac{1}{3}$ (B) $\frac{5}{12}$ (C) $\frac{4}{9}$ (D) $\frac{17}{36}$ (E) $\frac{1}{2}$

21. A plastic snap-together cube has a protruding snap on one side and receptacle holes on the other five sides as shown. What is the smallest number of these cubes that can be snapped together so that only receptacle holes are showing?



(A) 3 (B) 4 (C) 5 (D) 6 (E) 8

22. The number 6545 can be written as a product of a pair of positive two-digit numbers. What is the sum of this pair of numbers?

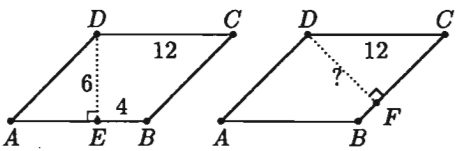
(A) 162 (B) 172 (C) 173 (D) 174 (E) 222

23. How many four-digit whole numbers are there such that the leftmost digit is odd, the second digit is even, and all four digits are different?

(A) 1120 (B) 1400 (C) 1800 (D) 2025 (E) 2500

24. In parallelogram $ABCD$, $\overline{DE}$ is the altitude to the base $\overline{AB}$ and $\overline{DF}$ is the altitude to the base $\overline{BC}$. [**Note:** *Both pictures represent the same parallelogram.*] If $DC = 12$, $EB = 4$ and $DE = 6$, then $DF =$

(A) 6.4 (B) 7 (C) 7.2 (D) 8 (E) 10



25. Buses from Dallas to Houston leave every hour on the hour. Buses from Houston to Dallas leave every hour on the half hour. The trip from one city to the other takes 5 hours. Assuming the buses travel on the same highway, how many Dallas-bound buses does a Houston-bound bus pass on the highway (not in the station)?

(A) 5 (B) 6 (C) 9 (D) 10 (E) 11

SOLUTIONS

Your School Examination Manager will be sent at least one copy of the 1995 AJHSME Solutions Pamphlet. It is meant to be loaned to students (but not duplicated).

WRITE TO US!

Correspondence about the problems and solutions for this AJHSME should be addressed to:

Mr Bruce Brombacher, AJHSME Chairman
Jones Middle School
Upper Arlington, OH 43221

Comments about administrative arrangements and orders for any publications listed below should be addressed to:

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Lincoln, NE 68588-0658; Phone: 402-472-2257; Fax: 402-472-6087

1996 AHSME

The American High School Mathematics Examination [AHSME] is a 30-question, 90-minute, multiple choice examination. Schools with high-scoring students on the AJHSME will receive a 1996 AHSME Invitation Brochure containing information about the AHSME and registration procedure. The best way to prepare for the AHSME is to study the exams from previous years. The procedure used to purchase these publications is indicated below.

PUBLICATIONS

MINIMUM ORDER: $5 (before handling fee), US FUNDS ONLY. Canada and US orders must be prepaid. Orders are mailed 4th class, unless you specify 1st class, in which case add 20% of the total order, with a minimum of $3 and a maximum of $15. **Please note that if the correct 1st class cost is not included, the order will be sent 4th class.** Make checks payable to the American Mathematics Competitions; or give Visa or MasterCard number and expiration date.

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- **AJHSME** (Junior High Exam), 1985-1995, $1 per copy per year.
- **AHSME** (High School Exam) 1980-95, $1 per copy per year.
- **AJHSME Summary** of Results and Awards, 1985-94, $5 per copy per year.
- **AHSME Summary** of Results and Awards, 1980-95, $10 per copy per year.

Books (Exams and Solutions):

- Problem Book I, AHSMEs 1950-60, $8.00
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- Problem Book III, AHSMEs 1966-72, $13.50
- Problem Book IV, AHSMEs 1973-82, $13.50
- USA Mathematical Olympiad Book 1972-86, $16.00
- International Mathematical Olympiad Book I, 1959-77, $14.00
- International Mathematical Olympiad Book II, 1978-85, $11.50

1995

American Junior High School Mathematics Examination

(AJHSME)

DO NOT OPEN UNTIL

THURSDAY, NOVEMBER 16, 1995

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

1. All information (Rules and Instructions) needed to administer the AJHSME is contained in the AJHSME TEACHERS' MANUAL, which is outside of this package. **PLEASE READ THE MANUAL BEFORE NOVEMBER 16.** Nothing is needed from inside this package until November 16.

2. Your PRINCIPAL or VICE PRINCIPAL must verify on the AJHSME CERTIFICATION Form that all rules associated with the conduct of the examination were followed.

3. The Answer Forms must be mailed by First Class Mail to Dr. Mientka no later than 48 hours following the Examination.

4. THE AJHSME IS TO BE ADMINISTERED DURING A CONVENIENT 40-MINUTE PERIOD. THE EXAMINATION MAY BE GIVEN DURING THE REGULAR MATHEMATICS CLASS PERIOD OF THE STUDENTS IF IT IS NOT POSSIBLE TO ADMINISTER THE EXAMINATION TO ALL STUDENTS DURING ONE 40-MINUTE PERIOD.