AUSTIN PEAY STATE UNIVERSITY
CLARKSVILLE, TENNESSEE 37044

JUNIOR HIGH/MIDDLE SCHOOL
MATHEMATICS COMPETITION

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EIGHTH GRADE TEST
1993
SCORING FORMULA: 4R - W + 40

DIRECTIONS:

This is a test of your competence in junior high school mathematics. For each problem there are 5 possible answers listed. You are to work the problems, determine the correct answer, and indicate your choice on the separate answer sheet provided.

SAMPLE:

1.   If $x + 1 = 2$, then x equals

    (a)   0

    (b)   2

    (c)   -1

    (d)   1

    (e)   none of the above

The correct answer is 1, which is answer (d), so you would answer this problem by darkening the space on the answer sheet corresponding with this choice.

If you should change your mind about an answer, be sure to erase completely. Avoid wild guessing, as wrong answers count against you. Do not mark more than one answer for any problem. Make no stray marks of any kind on your answer sheet.

When told to do so, open your test booklet and begin. When you have finished one page, go on to the next. The working time for the entire test is 80 minutes.

1. Which of the following is the smallest?

   a) $(\frac{1}{3})^2$ b) $2 \cdot \frac{1}{3}$ c) $2 + \frac{1}{3}$ d) $2 \div \frac{1}{3}$ e) $\frac{1}{3} \div 2$

2. Which of the following is less than $\frac{1}{3}$?

   a) $\frac{5}{14}$ b) $\frac{15}{46}$ c) $\frac{31}{90}$ d) $\frac{101}{300}$ e) $\frac{104}{309}$

3. $24(\frac{1}{2} + \frac{1}{3} + \frac{1}{4} + \frac{1}{6} + \frac{1}{8} + \frac{1}{24}) =$

   a) 29   b) 30   c) 31   d) 32   e) 34

4. $6^6 + 6^6 + 6^6 + 6^6 + 6^6 + 6^6 =$

   a) 6^7 b) 36^6 c) 7^6 d) 6^6 e) 6^{36}

5. $\frac{1}{2} \cdot 4^{10} =$

   a) 2^5 b) 2^{10} c) 2^{19} d) 4^5 e) 4^9

6. $\dfrac{\frac{3}{4} - \frac{1}{3}}{\frac{2}{3} + \frac{1}{4}} =$

   a) $\frac{14}{3}$ b) $\frac{5}{11}$ c) $\frac{3}{2}$ d) $\frac{2}{3}$ e) $\frac{5}{9}$

7. If n is an integer and $100 < 2^n < 200$, then n =

   a) 5   b) 6   c) 7   d) 8   e) 100

8. A girl had 20 coins, all nickels and dimes for a total of $1.40. She spent 60¢ using exactly 8 coins. How many coins did she have left?
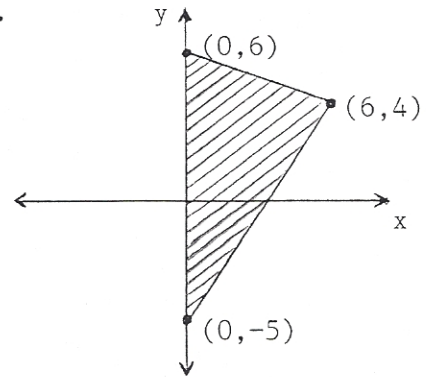
   a) 9   b) 10   c) 11   d) 12   e) 13

9. Which of the following is between $\frac{2}{3}$ and $\frac{3}{4}$?

   a) $\frac{3}{5}$ b) $\frac{5}{7}$ c) $\frac{7}{9}$ d) $\frac{9}{11}$ e) $\frac{77}{100}$

10. Find the area of the shaded triangular region.

a)   44 square units

b)   66 square units

c)   22 square units

d)   33 square units

e)   Not enough information
     is given.

y

(0,6)

(6,4)

x

(0,-5)

11. A palindromic number is a number that reads the same forward as
    backward. For example, 3443 is a four-digit palindromic number. How
    many five-digit palindromes exist?

a)   600   b)   700   c)   800   d)   900   e)   1,000

12. Possible scores on a tennis skill test are 0, 1, 2, 3, 4, and 5. This
    graph indicates the number of students making each score.
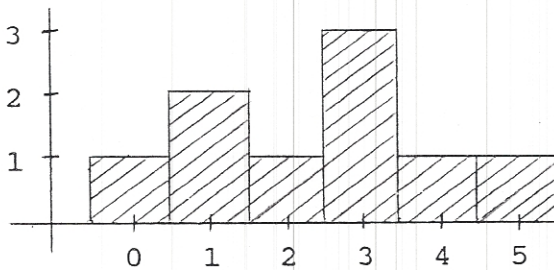
What was the average score?

a) $2\frac{4}{9}$ b) $1\frac{1}{3}$ c) $2\frac{1}{2}$ d)   3   e)   2

13. On a particular map $\frac{3}{4}$ of an inch represents 10 miles. On the map,
    Aberdeen and Frederick are 12 inches apart. What is the actual
    distance between these towns?

a)   160 miles b)   150 miles c)   100 miles d)   90 miles   e)   80 miles

14. A number is selected at random from {1, 2, 3, 4, 5, 6}. What is the
    probability that the number is prime?

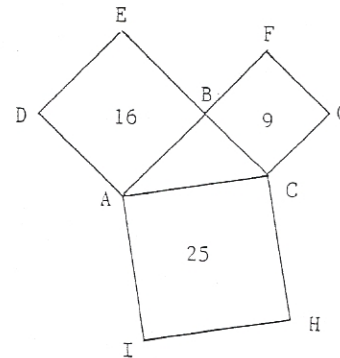a) $\frac{5}{6}$ b) $\frac{4}{6}$ c) $\frac{3}{6}$ d) $\frac{2}{6}$ e) $\frac{1}{6}$

8-2

15.

	Black	Brown	Total
Boys	4	7	11
Girls	6	5	11
Total	10	12	22

In reference to the chart, a person is selected at random. What is the probability that the person is a boy who wears brown shoes?

a) $\dfrac{11}{22}$ b) $\dfrac{6}{22}$ c) $\dfrac{4}{22}$ d) $\dfrac{5}{22}$ e) $\dfrac{7}{22}$

16. The area of square ABED is 16, the area of square BCGF is 9 and the area of square ACHI is 25. What is the area of $\triangle ABC$?

a) 6
b) 7
c) 9
d) 10
e) 12

17. The price of an item is increased by 25% and when it doesn't sell, this price is decreased by 20%. The final price is what percent of the original price?

a) 105% b) 100% c) 80% d) 75% e) 110%

18. $\dfrac{1 + 2 + 3 + \cdots + 30}{2 + 4 + 6 + \cdots + 60} =$

a) $\dfrac{1}{4}$ b) $\dfrac{1}{3}$ c) $\dfrac{1}{2}$ d) $\dfrac{5}{8}$ e) $\dfrac{3}{4}$

19. $(1 + 2 + 3 + 4 + \cdots + 9) + (91 + 92 + \cdots + 99) =$

a) 750 b) 775 c) 800 d) 850 e) 900

20. A line segment drawn from the vertex of an equilateral triangle to the opposite side forms two smaller triangles. Which one of the following is never true about the smaller triangles?

a) Both are right triangles.
b) They are similar.
c) They are congruent.
d) Both are scalene triangles.
e) The sum of their perimeters is the same as the perimeter of the equilateral triangle.

21. The sum of three different whole numbers is 101. The greatest of these three whole numbers is 35. The least of these numbers is

a) 36 b) 34 c) 33 d) 32 e) 31

8-3

22. What is the units digit of $1! + 2! + 3! + \ldots + 100!$?

    a) 1   b) 3   c) 5   d) 7   e) 9

23. Cakes are baked in 1 inch deep rectangular pans measuring 6" x 8",
    7" x 9" and 10" x 12". The cakes are cut into uniform cubes 1 inch on
    a side and a piece is selected at random. What is the probability that
    it came from the 7" x 9" pan?

    a) $\frac{1}{3}$ b) $\frac{1}{63}$ c) $\frac{1}{231}$ d) $\frac{3}{11}$ e) $\frac{7}{16}$

24. If $\frac{20}{30} = \sqrt{\frac{20}{x}}$, then x =

    a) 9   b) 30   c) 40   d) 45   e) 900

25. In a certain group of 75 students, 16 are taking algebra, biology and
    English, 24 are taking algebra and biology, 30 are taking algebra and
    English, and 22 are taking biology and English. 7 students are taking
    only algebra, 10 students are taking only biology, and 5 are taking
    only English. How many students are not taking any of the three
    subjects?

    a) 45   b) 14   c) 9   d) 0   e) 5

26. At the Woodland Heights School there are 12 men teachers and 22 women
    teachers, 308 boy students and 312 girl students. One name is selected
    from among all the teachers and students to receive a free Woodland
    Heights sweatshirt. What is the probability that the person chosen
    will be male or a teacher?

    a) $\frac{57}{109}$ b) $\frac{2}{109}$ c) $\frac{3}{4}$ d) $\frac{173}{327}$ e) $\frac{6}{17}$

27. A girl left school at 3:46 and walked $\frac{3}{4}$ of the way home in 18 minutes.
    If she continued to walk at that same rate, when would she get home?

    a) 4:08   b) 4:10   c) 4:12   d) 4:26   e) 4:46

28. Which of the following numbers is an odd number?

    a) 46^{46} b) 46^{41} c) 28^{87} d) 47^{24} e) 46^{23}

29. If the area of each small square
    is 1, find the area of the shaded
    triangle.
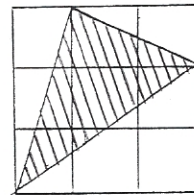
    a) 3   b) $3\frac{1}{2}$ c) 4   d) $4\frac{1}{2}$ e) 5   f) $5\frac{1}{2}$

8-4

30. A three-digit number is selected at random from the set of all three digit numbers. What is the probability that the number selected is a perfect square?

a) $\dfrac{11}{450}$ b) $\dfrac{23}{900}$ c) $\dfrac{2}{75}$ d) $\dfrac{1}{36}$ e) $\dfrac{13}{450}$

31. If x represents a whole number, b represents a digit and
    9x = 456138b21 then b =

a) 2   b) 4   c) 6   d) 8   e) 9

32. How many digits are in the standard numeral for $4^{12} \cdot 5^{20}$?

a) 12   b) 18   c) 20   d) 22   e) 24

33. Which circular pizza(s) is the best buy for $10.00?

    a)   one 20-inch diameter pizza
    b)   three 10-inch diameter pizzas
    c)   one 40-inch circumference pizza
    d)   six 8-inch diameter pizzas
    e)   forty 2-inch diameter pizzas

34. In how many ways can 47 be expressed as the sum of two prime numbers?

a) 0   b) 1   c) 2   d) 3   e) 4

35. One-third of the marbles in a first bag are red, while one fourth of the marbles in a second bag are red. The two bags are mixed together in a jar and a marble is drawn. What is the probability that it is red, if the total number of marbles in the jar is 36 and the second bag had twice as many marbles as the first bag?

a) $\dfrac{7}{12}$ b) $\dfrac{2}{7}$ c) $\dfrac{13}{18}$ d) $\dfrac{5}{12}$ e) $\dfrac{5}{18}$

36. In the figure $\triangle OAB$ is an isosceles triangle, $m \angle A = 100°$ and the area of the circle is 36π square units. What is the area of the shaded region?
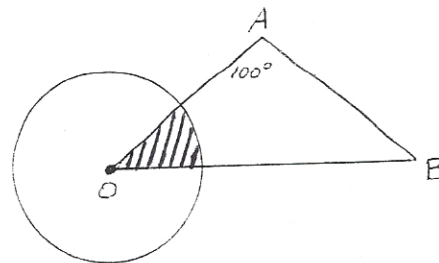
    a) 3π square units
    b) 4π square units
    c) 5π square units
    d) 6π square units
    e) 7π square units

37. How many divisors does $2^4 \cdot 3^5$ have?

a) 20   b) 22   c) 24   d) 28   e) 30

38. A woman has two quarters, two dimes and two nickels in her pocket. She wishes to purchase an item which costs 30¢. If she selects, at random, two coins from her pocket, what is the probability that she will have at least enough money to pay for the item?

a) $\frac{1}{2}$ b) $\frac{5}{9}$ c) $\frac{8}{15}$ d) $\frac{17}{30}$ e) $\frac{3}{5}$
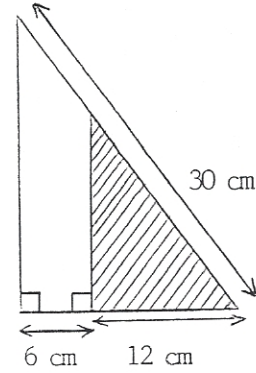
39. What is the area of the shaded triangle?

a) 90 cm^2
b) 96 cm^2
c) 120 cm^2
d) 180 cm^2
e) 192 cm^2

30 cm

6 cm   12 cm

40. Which of the following is true?

a) $2^{44} < 3^{33} < 5^{22}$

b) $2^{44} < 5^{22} < 3^{33}$

c) $3^{33} < 5^{22} < 2^{44}$

d) $3^{33} < 2^{44} < 5^{22}$

e) $5^{22} < 3^{33} < 2^{44}$