AUSTIN PEAY STATE UNIVERSITY
CLARKSVILLE, TENNESSEE 37040

Junior High School
Mathematics Competition

EIGHTH GRADE TEST

1987

SCORING FORMULA: $4R - W + 40$

Prepared by:

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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 you.

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 to page 2 and begin. When you have finished one page, go on to the next. The working time for the entire test is 80 minutes.

1. What is the greatest common divisor of 48, 72 and 216?

    a. 8   b. 16   c. 12   d. 18   e. 24

2. 5 + 2 · 6 - 3 =

    a. 39   b. 11   c. 14   d. 21   e. -126

3. A piece of wire 5.8 meters long is cut into 20 equal pieces. How long is
    each piece?

    a. 2.9 mm   b. 29 mm   c. 290 mm   d. 2900 mm   e. none of these

4. Widgets sell for $1.40 for one-half pound. What is the cost of 20 ounces of
    widgets?

    a. $3.50   b. $1.75   c. $7.00   d. $5.60   e. $4.20

5. $5 \frac{3}{8} \cdot 4 \frac{3}{10} =$

    a. $20 \frac{9}{80}$ b. $23 \frac{9}{80}$ c. 23   d. $20 \frac{24}{80}$ e. $9 \frac{54}{80}$

6. Mary Lou lost 10 pounds over the summer and this was an 8% decrease in her
    weight. What was her original weight?

    a. 80 lbs.   b. 160 lbs.   c. 120 lbs.   d. 125 lbs.   e. none of these

7. Mr. Scott tells 3 jokes each semester. He only knows 4 jokes and his policy
    is to never repeat exactly the same 3 jokes in any of the semesters. How
    many semesters will these 4 jokes last him?

    a. 12   b. 3   c. 4   d. 2   e. 6

8. If I spend $4.65, which includes 25 cents tax, for soft drinks which cost 40
    cents each, how many soft drinks did I buy?

    a. 9   b. 10   c. 15   d. 11   e. none of these

9. The hypotenuse of a right triangle is 5 inches long. The lengths of the
    legs could be

    a. 1 in. and 2 in.   d. 2.5 in. and 2.5 in.

    b. 2 in. and 3 in.   e. none of these

    c. 3 in. and 4 in.

10. At the beginning of a club meeting each member of the club shakes hands with all other members exactly once. If six members attend a meeting, how many hand-shakes are made?

   a. 36   b. 15   c. 30   d. 25   e. 120

11. The area of the shaded region is:

   a. 25 sq. units

   b. 36 sq. units

   c. 49 sq. units

   d. 100 sq. units

   e. not given
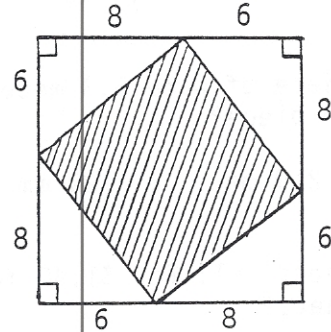
12. I have sold two-thirds of my pencils for 15 cents each. If I have 8 pencils left, how much money did I collect for the pencils sold?

   a. $1.20   b. $0.60   c. $1.80   d. $2.40   e. $3.00

13. John says that he got a 150% salary increase and is now earning $60.00 a week. What was his original weekly salary?

   a. $40.00   b. $30.00   c. $20.00   d. $24.00   e. $90.00
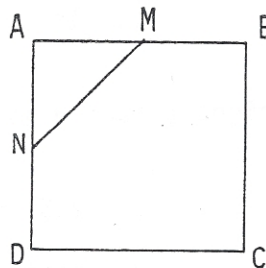
14. Given: A circle with a diameter of 13 cm with a triangle inscribed so that the diameter is one side of the triangle. If one of the other sides has length 5 cm, then the length of the third side is

   a. 5 cm   b. 9 cm   c. 10 cm   d. 12 cm   e. 13 cm

15. M and N are the midpoints of two sides of the square ABCD as shown.

   Then $\dfrac{\text{area of } \triangle AMN}{\text{area of square ABCD}}$ =

   a. $\dfrac{1}{8}$

   b. $\dfrac{1}{4}$

   c. $\dfrac{1}{6}$

   d. $\dfrac{1}{9}$

   e. $\dfrac{1}{12}$

16. The solution set for $|\frac{2}{3} - 4n| = |-6|$ is

    a. $\left\{ -\frac{4}{3} \right\}$ b. $\left\{ \frac{10}{3}, \frac{5}{3} \right\}$ c. $\left\{ \frac{4}{3}, -\frac{10}{3} \right\}$ d. $\left\{ \frac{5}{3}, -\frac{4}{3} \right\}$ e. $\left\{ \frac{10}{3}, -\frac{4}{3} \right\}$

17. A can of soup that is 10 cm high and 6.4 cm in diameter has a paper label exactly covering its curved surface. What is the surface area of the label?

    a. 64 cm^2 b. 640 cm^2 c. 64π cm^2 d. 102.4π cm^2 e. 102.4 cm^2

18. How many five digit numbers are there that do not contain the digit 3?

    a. 5^3 b. $9 \cdot 8 \cdot 7 \cdot 6$ c. $10 \cdot 9 \cdot 8 \cdot 7$ d. $8 \cdot 9^4$ e. 9^5

19. How much time is left on the parking meter pictured below?

    a. 8 minutes   d. 12 minutes

    b. 9 minutes   e. 15 minutes

    c. 10 minutes
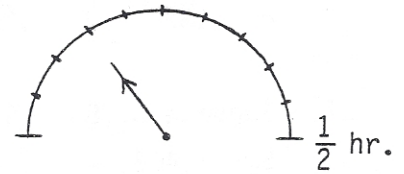
20. Find the next number in the sequence: 1, 3, 6, 11, 18, 29, . . .

    a. 47   b. 32   c. 44   d. 42   e. 39

21. A runner can run 440 yards in 2.4 minutes. What is the runner's speed?

    a. .15 mph   b. 576 mph   c. 6.25 mph   d. 62.5 mph   e. 1.5 mph

22. If $n = -2$, $x = -n^2 - 2n + 2$, and $y = -2n^3 - 2n^2 + 2n - 2$, then the value of x^y is

    a. 1   b. 2   c. 36   d. 4   e. 8

23. If an item is sold for x dollars there is a 15% loss and if the same item is sold for y dollars there is a profit of 15%. Then $\frac{y}{x} =$
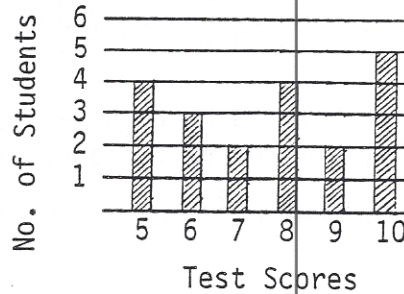
    a. $\frac{20}{17}$ b. $\frac{23}{17}$ c. $\frac{6}{5}$ d. $\frac{29}{25}$ e. $\frac{16}{9}$

24. What is the smallest prime number which is a divisor of $3^{11} + 5^{13}$?

    a. 1   b. 2   c. 3   d. 5   e. $3^{11} + 5^{13}$

25. What is the average of all test scores described in the graph below?

a. 7

b. 7.6

c. 7.8

d. 7.9

e. 8.1

No. of Students: 6 5 4 3 2 1

Test Scores: 5 6 7 8 9 10

26. Which of the following is a true sentence?

a. $\frac{6}{7} < .8\overline{571} < .\overline{857}$

b. $.\overline{8571} < \frac{6}{7} < .\overline{857}$

c. $.\overline{857} < \frac{6}{7} < .\overline{8571}$

d. $.\overline{857} < \frac{6}{7} < .\overline{8671}$

e. $\frac{6}{7} < .\overline{857} < .\overline{8571}$

27. Suppose $S_4(8) = 8 + 9 + 10 + 11$ and $S_3(5) = 5 + 6 + 7$. Then
$S_5(21,408) - S_5(21,406) =$

a. 21, 402   b. 21,440   c. 21,450   d. 90   e. 10

28. How many factors of 4,000 are perfect squares?

a. 6   b. 8   c. 9   d. 10   e. 12

29. If $\sqrt{x + 3} = 3$ then $(x + 3)^2 =$

a. $\sqrt{3}$ b. 3   c. 9   d. 27   e. 81

30. If $a > 0$, $b < 0$ and $c < 0$, which of the following must be negative?

a. $a + b + c$ b. $a(b + c)$ c. $a - b + c$ d. abc e. $-(b + c)$
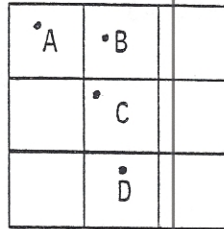
31. If a year has two consecutive months with a Friday the thirteenth day, what
are the months?

a. January and February   d. April and May

b. February and March   e. July and August

c. March and April

32. If each of a and b represents a nonzero real number and $x = \frac{a}{|a|} + \frac{b}{|b|} + \frac{ab}{|ab|}$, then a complete list of all possible values for x is

a. 3, 2, 1, -1, -2, -3   d. 3, -1, -2

b. 3, -1   e. 3, -1, -3

c. 3, 1, -1

33. The measure of the complement of the supplement of the vertex angle of an isosceles triangle is 30^0. What is the measure of one of the base angles of the triangle?

a. 20^0 b. 30^0 c. 45^0 d. 60^0 e. 75^0

34. At a certain restaurant the cost of 3 sandwiches, 7 cups of coffee and 4 pieces of pie is $10.20, while the cost of 4 sandwiches, 8 cups of coffee and 5 pieces of pie is $12.25. What is the cost of a luncheon consisting of one sandwich, one cup of coffee and one piece of pie?

a. $2.00   b. $2.05   c. $2.10   d. $2.15   e. $2.25

35. The probability that a man will win his tennis match is 0.3 and the probability that his wife will win her match is 0.6. What is the probability that exactly one of these two people will win his or her match?

a. 0.54   b. 0.9   c. 0.09   d. 0.28   e. 0.18

36. The missing term in the sequence $1, 1, \frac{3}{4}, \frac{1}{2}, \underline{\quad}, \frac{3}{16}, \frac{7}{64}, \frac{1}{16}$ is

a. $\frac{3}{8}$ b. $\frac{1}{2}$ c. $\frac{5}{16}$ d. $\frac{3}{4}$ e. 1

37. Two "corners" of an isosceles trapezoid are cut off leaving a regular hexagon. If the area of the trapezoid is 48 sq. in., then what is the area of the hexagon?

a. 45 sq. in.

b. 42 sq. in.

c. 36 sq. in.

d. 30 sq. in.

e. 24 sq. in.

$2^0 \quad 2 \quad 2^2 \quad 2^3 \quad 2^4$

$\frac{1}{2^0} \quad \frac{2}{2} \quad \frac{3}{4} \quad \frac{4}{8} \quad \frac{25}{16} \quad \frac{2\cdot3}{32} \quad \frac{7}{64}$

8-5

38. From the points named in the figure below (A, B, C or D), one point is picked at random. What is the probability that the point selected is in exactly 4 of all possible squares pictured?

a. $\frac{4}{9}$

b. 1

c. $\frac{1}{4}$

d. $\frac{1}{2}$

e. $\frac{3}{4}$

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|    |    |    |
| °A | •B |    |
|____|____|____|
|    | °  |    |
|    | C  |    |
|____|____|____|
|    | •  |    |
|    | D  |    |
|____|____|____|
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39. Two poles each 20 meters in height are 36 meters apart. A wire 36 meters long is connected to the top of the poles. If the wire breaks at a random point, what is the probability that one of the broken ends will touch the ground?

a. $\frac{3}{4}$ b. $\frac{5}{6}$ c. $\frac{7}{8}$ d. $\frac{8}{9}$ e. $\frac{9}{10}$

40. If m = (154)(155)(156) . . . (299)(300), how many times does the factor 2 appear in the prime factorization of m?

a. 140   b. 147   c. 150   d. 200   e. 300