AUSTIN PEAY STATE UNIVERSITY
CLARKSVILLE, TENNESSEE 37040

Junior High School Mathematics Competition

EIGHTH GRADE TEST
1976
SCORING FORMULA: 4R-W

Prepared by:
The Mathematics Department

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 these

   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. Find the set of common factors of 12, 20 and 36.

   a. {1, 2, 3, 4, 6, 12}   d. {3, 5, 9}
   b. {1, 2, 4}   e. none of these
   c. {6, 10, 18}

2. The first five prime numbers are

   a. 2, 4, 6, 8, and 10.   d. 2, 3, 5, 7, and 11.
   b. 1, 3, 5, 7, and 9.   e. 0, 1, 2, 3, and 4.
   c. 1, 2, 3, 4, and 5.

3. $\frac{47}{8}$ =

   a. $4\frac{7}{8}$ b. $5\frac{7}{8}$ c. $6\frac{6}{7}$ d. 5.9   e. $\frac{8}{47}$

4. 8 + 4 ÷ 6 x 2 - 3 =

   a. 1   b. $5\frac{2}{3}$ c. $6\frac{1}{3}$ d. 4   e. 7

5. Of the 875 students enrolled in Central High School last year, 0.8% had perfect attendance. How many students had perfect attendance?

   a. 7   b. 70   c. 700   d. 8   e. 87

6. The Johnsons saved $1,050 during 1975. This was 7% of the family income. The family income was

   a. $10,500   b. $7,350   c. $15,000   d. $8400   e. none of these

7. In a school of 616, there are 6 girls for every 5 boys. How many boys are there?

   a. 280   b. 336   c. 56   d. 140   e. 168

8. Jack's shadow is four-fifths as long as that of his father. If Jack is 4 feet 8 inches tall, how tall is his father?

   a. 5 feet 10 inches   d. 5 feet 4 inches
   b. 6 feet 2 inches   e. 6 feet 4 inches
   c. 5 feet 8 inches

9. 342_{five} =

   a. 342_{ten} b. 145_{ten} c. 87_{ten} d. 97_{ten} e. 2332_{ten}

10. The reciprocal of $^-9$ is

    a. $^+9$ b. $\frac{^+1}{9}$ c. $^-9$ d. $\frac{^-1}{9}$ e. does not have one

11. A fair coin is tossed 3 times. What is the probability that, of the 3 tosses, two are heads and one is a tail?

    a. 2/3   b. 3/8   c. 1/2   d. 3/4   e. 1/3

12. The small fruit fly found around ripe fruit is often used in experiments. If two thirds of all fruit flies have red eyes, what is the probability that if two are selected at random, both have red eyes?

    a. 2/3   b. 4/3   c. 4/9   d. 1   e. none of these

13. A bag contains 6 red, 10 blue and 4 white marbles. Two different marbles are drawn from the bag. What is the probability that both marbles are red?

    a. $\frac{3}{40}$ b. $\frac{3}{38}$ c. $\frac{3}{5}$ d. $\frac{3}{10}$ e. $\frac{2}{20}$

14. $.5\overline{90}$ =

    a. $\frac{5311}{9000}$ b. $\frac{12}{21}$ c. $\frac{13}{22}$ d. $\frac{14}{22}$ e. none of these

15. The operation $*$ is defined as follows:

    $$x * y = x^y$$

    then $8 * 2$ =

    a. 4   b. 16   c. 64   d. 256   e. 1/4

16. The statement $(y + 4)(y + 2) = (y + 4)y + (y + 4)2$ is an instance of which property?

    a. The Associative Property of Multiplication
    b. The Associative Property of Addition
    c. The Commutative Property of Multiplication
    d. The Commutative Property of Addition
    e. The Distributive Property

17. Five numbers have an arithmetic mean of 11. If four of the numbers are 1, 7, 15, and 22, the other number is

    a. 8   b. 12   c. 9   d. 15   e. 10

18. If n is an odd integer, which of the following is true?

    a. n is a prime.
    b. n is always divisible by 3.
    c. $n^2 + 2$ is always an even integer.

    d. $n^2 - n + 41$ is a prime.
    e. $n^2 - 1$ is always divisible by 8.

19. Find the solution set for $\frac{2}{3} + n = \frac{1}{4} + \frac{1}{2}$.

    a. $\left\{\frac{1}{12}\right\}$ b. $\left\{\frac{1}{6}\right\}$ c. $\left\{\frac{1}{2}\right\}$ d. $\left\{\frac{2}{3}\right\}$ e. $\left\{\frac{17}{12}\right\}$

20. Let x and y be elements of the set of all positive integers. Then the solution set
    for $\frac{1}{2} = \frac{1}{x} + \frac{1}{y}$ is

    a. $\{(3,6)\}$
    b. $\{(4,4)\}$
    c. $\{(3,6), (4,4)\}$

    d. $\left\{(\frac{1}{3},\frac{1}{6}), (\frac{1}{4},\frac{1}{4})\right\}$
    e. $\{(3,6), (4,4), (6,3)\}$

21. $\frac{1}{x} + \frac{1}{x + 1} =$

    a. $\frac{1}{2x + 1}$ b. $\frac{1}{x(x + 1)}$ c. $\frac{2x + 1}{x(x + 1)}$ d. $\frac{2}{x}$ e. none of these

22. $41\frac{1}{4}$ is $\frac{5}{8}$ of _____

    a. $\frac{165}{4}$ b. $\frac{825}{32}$ c. $\frac{32}{825}$ d. 66   e. $\frac{33}{2}$

23. A pattern is established in the following group of numbers:
    2, 2, 4, 6, 10, 16, 26, 42, $\cdots$. The next three numbers in the pattern are

    a. 68, 94, 120
    b. 58, 100, 142
    c. 64, 92, 126

    d. 58, 100, 158
    e. 68, 110, 178

24. Which of the following sentences is true?

    a. 214 x 9 + 214 x 11 > 5,000
    b. 214 x 3 + 214 x 17 > 5,000
    c. 25 x 46 + 25 x 53 > 2500

    d. 25 x 14 + 25 x 84 > 2500
    e. 214 x 39 - 214 x 9 > 5,000

25. Let $n = .\overline{9}$. Which of the following is a true sentence?

    a. n = .9   b. $n = \frac{1}{9}$ c. n = .99   d. n = 1   e. All of these
                                                                     sentences are
                                                                     false

26. Here is a table for a mathematical system

0	V	□	X	△
V	X	V	△	□
□	V	□	X	△
X	△	X	□	V
△	□	△	V	X

Which one of the following is true?

a. The identity element is V.
b. The system is not commutative.
c. The system is not closed.

d. The inverse of X is X.
e. The inverse of △ is □.

27. If the square region labeled A is assigned an area 1 sq. unit, find the area of the region labeled B.

a. $7\frac{1}{2}$

b. 8

c. $8\frac{1}{2}$

d. 9

e. 12
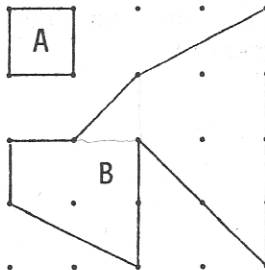
28. In $\triangle ABC$, $\angle BAC$ is a right angle, and $m\angle ABC = 50^0$. Then $m\angle BCA =$

a. 30^0 b. 40^0 c. 50^0 d. 45^0 e. 35^0

29. Suppose $\triangle ABC$ is a right triangle where $\angle C$ is the right angle, $AB = 10$ and $BC = 6$. Then $AC =$

a. 10   b. 6   c. 8   d. 12   e. $\sqrt{136}$

30. In an isosceles triangle the two congruent sides are each $5\frac{6}{7}$ inches long. If the perimeter of the triangle is 15 inches how long is the third side?

a. $3\frac{2}{7}$ inches   b. $9\frac{1}{7}$ inches   c. $11\frac{5}{7}$ inches   d. $6\frac{4}{7}$ inches   e. $5\frac{6}{7}$ inches

31. If a first circle has radius r_1, a second circle has radius r_2 where $r_2 = 3r_1$, then the area of the region of the first circle is divided by the area of the region of the second circle is

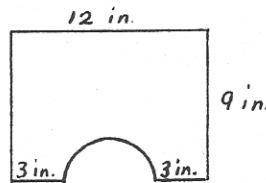a. 3   b. $\frac{1}{3}$ c. 9   d. $\frac{1}{9}$ e. $\frac{1}{6}$

32. The perimeter of the figure below is
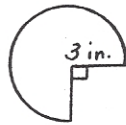
a. 6π in.   b. (6π – 3)in.   c. 6(π + 1) in.   d. 6(π – 3) in.   e. none of
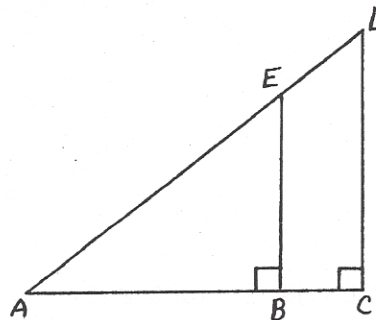   these

33. The area of the interior of the figure below is

a. (108 – 9π) sq. in.

b. $(108 - \frac{9}{2}\pi)$ sq. in.

c. (54 – 9π) sq. in.

d. (108 – 3π) sq. in.

e. none of these

34. In the figure below, AB = 24, AC = 32 and the area of the region of △ACD is 640 square units. Identify the true statement.

a. BE = 40

b. DE = 8

c. The area of the region of
     △ABE is 480 square units.

d. CD = 30

e. The area of the region of
     trapezoid BCDE is 280 square units.

35. Identify the false statement.

a. A mile is shorter than 2 kilometers.
b. A quart of liquid is less than a liter of the same liquid.
c. Steak costing $1.50 per pound costs less than $3 per kilogram.
d. A six inch long pencil is more than 12 centimeters long.
e. The temperature on a very warm summer day would most likely be no higher
     than 40° Celsius.

36. A shelf 2.5 m long is used for storing some textbooks. Each book is 3.2 cm thick.
    How many books can be stored on the shelf.

    a. 78   b. 781   c. 12   d. 120   e. 39.5

37. A man walked 5 km per hour doing 96 paces per minute. Find (to the nearest cm) the average length of each pace.

    a. 87 cm   b. 19 cm   c. 52 cm   d. 132 cm   e. none of these

38. How long will it take a train 150 yds. long traveling at 60 m.p.h. to pass through a tunnel 70 yds. long?

    a. 7.5 sec.   b. 3.9 sec.   c. .79 sec.   d. 3.6 sec.   e. 7.2 sec.

39. A grasshopper is hopping towards a weed which is 4 ft. away. On the first hop he goes 2 ft. and after that on each hop he only goes half as far as on the previous hop. What is the distance from the grasshopper to the weed after the 30th hop.

    a. $\frac{1}{28}$ ft.   b. $\frac{1}{2^{28}}$ ft.   c. 0 ft.   d. $\frac{1}{2^{30}}$ ft.   e. $\frac{1}{30}$ ft.

40. Let n(A) denote the number of members in the set A. If A and B are sets such that n(A) = 8, n(B) = 6, and n(A ∪ B) = 12, then n(A ∩ B) =

    a. 1   b. 8   c. 2   d. 12   e. 6