AUSTIN PEAY STATE UNIVERSITY
CLARKSVILLE, TENNESSEE 37040

Junior High School Mathematics Competition

EIGHTH GRADE TEST
1977
SCORING FORMULA: 4R-W

Prepared by:

The Mathematics Departments of
Austin Peay State University
and
Middle Tennessee State University

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

1 a b c ■ e
2 a b c d e
3 a b c d e
4 a b c d e
5 a b c d e

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. Evaluate:

$$-2 + 7 \times 4 - 2 \div \sqrt{4} - 6$$

a. 18 b. -19 c. 19 d. 3 e. -5

2. The product of 75^3 and 75^7 is

a. $(75)^{10}$ b. $(150)^{10}$ c. $(75)^{21}$ d. $(5625)^{10}$ e. $(75)^4$

3. Write 4568.320 in scientific notation.

a. 45.68320×10^2 c. $.456832 \times 10^{-2}$ e. none of these

b. 4.568320×10^3 d. $.456832 \times 10^2$

4. Stock market quotations are given in eights. The price of Stock A is quoted as $12\frac{7}{8}$ per share. How much must one pay for 5 shares?

a. \$64.38 b. \$63.51 c. \$53.51 d. \$54.38 e. none of these

5. A possible way to multiply $6 \times 12\frac{1}{2}$ is

a. add 72 and 6

b. multiply 6 by 100 and divide by 4.

c. multiply 6 by 13 and subtract 3.

d. divide 6 by 2 and multiply results by 13.

e. none of these

6. Mr. Sams is paid an annual salary of \$10,000 plus 20% commission of all sales above \$20,000. If Mr. Sams sells \$34,000 a year for two years in a row, what is his total income for both years?

a. \$25,600 b. \$15,600 c. \$22,800 d. \$12,800 e. none of these

7. If an airplane climbs at the rate of 680 feet per minute, how long will it take it to reach an altitude of 12,000 feet.

a. 17 minutes c. 18.5 minutes e. 18 minutes

b. 17 minutes, 39 seconds d. 17.5 minutes

8. 1 angstrom equals $\frac{1}{10^8}$ centimeter. How many angstroms are there in one centimeter?

a. 10,000,000 c. 100,000,000 e. 108

b. .00000001 d. 1,000,000

9. Which of the following is an irrational number?

a. $\sqrt{2}$ b. $\frac{3}{4}$ c. $0.787878\cdots$ d. $\sqrt{4}$ e. $2\frac{1}{5}$

10. The expression $\frac{1}{x} + \frac{1}{y}$ is equal to

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

11. Which of the following is a true sentence?

a. $0 \div 4 = 0$, $0 \div 0 = 0$ and $4 \div 0$ is undefined.

b. $0 \div 4$ is undefined, $0 \div 0 = 0$ and $4 \div 0$ is undefined.

c. $0 \div 4$ is undefined, $0 \div 0$ is undefined and $4 \div 0$ is undefined.

d. $0 \div 4 = 0$, $0 \div 0$ is undefined and $4 \div 0$ is undefined.

e. $0 \div 4 = 0$, $0 \div 0 = 0$ and $4 \div 0 = 0$.

12. Which of the following is a correct statement?

a. $|6| < |-8|$ c. $|6| \neq |-6|$ e. $|3| < -3$

b. $|6| > |-8|$ d. $|7 - 4| > |4 - 7|$

13. If $\overrightarrow{BA}$ bisects right angle EBD and $\overrightarrow{BC}$ bisects $\angle ABD$, then the measure of $\angle ABC$ in degrees is

a. 45^o b. 90^o c. 30^o d. 11.25^o e. 22.5^o

14. The three numbers 3, 6, 8 are written on separate slips of paper and the slips are placed in a hat. We are going to draw out one slip. What is the probability that we will draw a slip with an even number on it?

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

15. The length of each side of a square is $\frac{2x}{3} + 1$. The perimeter of the square is

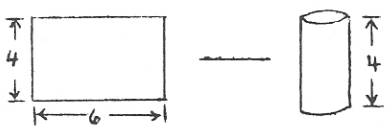
a. $\frac{8x + 4}{3}$ b. $\frac{8x + 12}{3}$ c. $\frac{2x}{3} + 4$ d. $\frac{2x}{3} + 16$ e. $\frac{4x}{3} + 2$

16. If the rectangle at the right is made into a cylinder, what will be its radius?

a. $\frac{1}{2}$ d. $\frac{3}{2}$

b. $\frac{3}{4}$ e. none of these

c. 1



17. Given that $\triangle PQR$ is similar to $\triangle P'Q'R'$, in the figure, the length of side PQ is:

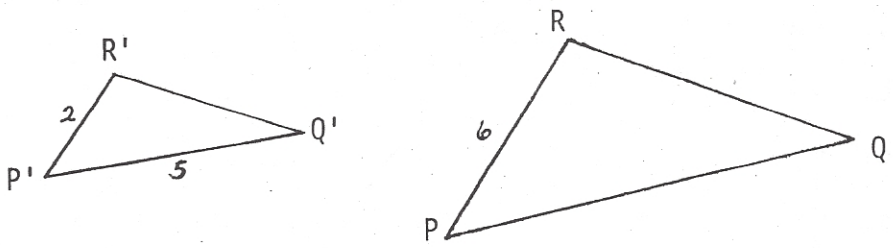
a. 5

b. 9

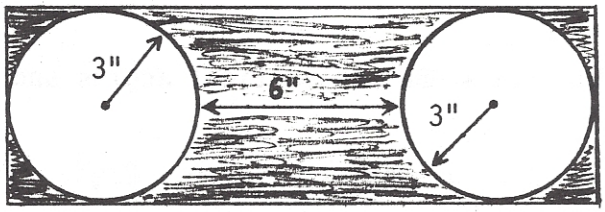
c. 15

d. 12

e. none of these



18.



What is the area of the shaded region?

a. $18\pi + 108$ square inches

b. $9\pi + 108$ square inches

c. $108 - 18\pi$ square inches

d. $108 - 12\pi$ square inches

e. none of these

19. The point of the second hand of a certain clock travels $12\frac{1}{2}$ inches per minute. How many feet does the point of this hand travel in one day?

a. 18,000 b. 1275 c. 1200 d. 1500 e. 1550

20. How many ways can 6 different books be arranged on a shelf using all 6 of them?

a. 720 b. 6^6 c. 36 d. 2^6 e. 6

21. Barry Plump went on a crash diet. He lost one-twelfth of his weight the first week. During the second week he lost one-eleventh of what he weighed at the end of the first week. During the third week he lost one-tenth of what he weighed at the end of the second week. If he then weighed 135 pounds, how much did he weigh at the beginning of the first week.

a. $147\frac{3}{11}$ lbs.

b. 150 lbs.

c. $148\frac{1}{2}$ lbs.

d. 180 lbs.

e. none of these

22. A basketball player hits, on the average, $\frac{1}{3}$ of his shots. What is the probability that he will hit the next 2 shots?

a. $\frac{2}{3}$ b. $\frac{1}{9}$ c. $\frac{1}{3}$ d. $\frac{1}{6}$ e. none of these

23. For the following square array of dots, assume that the distance between two adjacent vertical or horizontal dots is 1. What is the length of $\overline{AB}$?

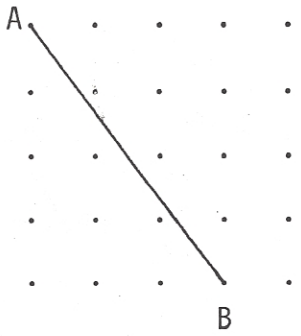
a. $\sqrt{10}$

b. 4

c. 5

d. 6

e. $5\frac{1}{4}$



24. Find the degree measure of $\angle ABC$ if $\angle ABC$ and $\angle GBH$ are vertical angles and are complementary.

a. 30^0 b. 90^0 c. 50^0 d. 45^0 e. $22\frac{1}{2}^0$

25. In an election 20% of the voters voted for candidate A, 40% for candidate B, 20% for candidate C, and 250 persons voted for candidate D. How many votes were cast in all.

a. 2500 votes c. 12,500 votes e. 3125 votes

b. 1250 votes d. 25000 votes

26. A boy 5 feet tall casts a shadow 4 feet long, and at the same time a tree casts a shadow 16 feet long. Find the height of the tree.

a. 20 feet b. $12\frac{4}{5}$ feet c. $22\frac{1}{2}$ feet d. 21 feet e. none of these

27. A snapshot measures $2\frac{1}{2}$ inches by $1\frac{7}{8}$ inches. It is to be enlarged so that the longer dimension will be 4 inches. The length of the enlarged shorter dimension will be:

a. $2\frac{1}{2}$ inches b. 3 inches c. $3\frac{3}{8}$ inches d. $2\frac{5}{8}$ inches e. none of these

28. The geometric mean of 9 and 36 is:

a. $22\frac{1}{2}$ b. 27 c. 45 d. 18 e. 30

29. If 3 honest coins are tossed, what is the probability that 2 will land one way and the third one opposite?

a. $\frac{3}{4}$ b. $\frac{3}{8}$ c. $\frac{2}{3}$ d. $\frac{1}{2}$ e. $\frac{7}{8}$

30. The numbers 1, 2, 3, ..., 25 are painted on 25 marbles so-that each number appears on exactly one marble. If the marbles are placed in a bag and one is selected at random, what is the probability that the number on the marble is prime?

a. $\frac{1}{25}$ b. $\frac{2}{5}$ c. 25 d. 10 e. $\frac{9}{25}$

31. Each team in an eight team league plays every other team in the league twice during the regular season. What is the total number of regular season games played in the league?

a. 14 b. 16 c. 56 d. 36 e. 7!

32. Which of the following fractions is represented by the repeating decimal $.363\overline{636}$?

a. $\frac{36}{100}$ b. $\frac{4}{11}$ c. $\frac{1}{3}$ d. $\frac{363636}{1000000}$ e. none of these

33. The solution set for the equation $|x| = |x - 2|$ is:

a. $\emptyset$ b. $\{1, -1\}$ c. $\{-2, 1\}$ d. $\{1\}$ e. $\{1, -1, -2\}$

34. In how many ways can you spell the word "math", starting from the top and working down through the array shown below?

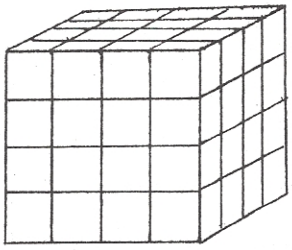
```
      M
    A   A
  T   T   T
H   H   H   H
```

a. 10 b. 4 c. 12 d. 6 e. 24

35. Tom, the farmer's son, is at the house but his dog, Flip, is at the barn. Tom and Flip walk directly towards each other but Flip walks twice as fast as Tom. If the distance from the house to the barn is 120 m, how far from the house do they meet?

a. 30 m b. 40 m c. 50 m d. 60 m e. 80 m

36. A wodden cube measuring 4 cm on each edge is painted black and then sliced into 64 smaller cubes, each measuring 1 cm on each edge. Of the 64 smaller cubes, how many have no black faces?



a. 16

b. 4

c. 10

d. 12

e. 8

37. A bag contains four green balls and six red balls. A first ball is drawn at random from the bag. Then without replacing the first ball, a second ball is drawn. What is the probability that the first ball is green and the second ball is red?

a. $\frac{4}{6}$ b. $\frac{24}{90}$ c. $\frac{6}{10}$ d. $\frac{10}{20}$ e. $\frac{6}{4}$

38. In Clock Arithmetic (modulo 12) the reciprocal of 5 is:

a. 7 b. 8 c. 5 d. 1 e. 5 doesn't have a reciprocal.

39. If a natural number n has an odd number of divisors, then:

a. n is a perfect square c. n is prime e. none of these

b. n is even d. n is odd

40. A sequence of numbers in base five is given by {.03, .0303, .030303, ...}. What decimal fraction is suggested?

a. $\frac{1}{8}$ b. $\frac{3}{10}$ c. $\frac{3}{5}$ d. $\frac{3}{8}$ e. none of these