AUSTIN PEAY STATE UNIVERSITY

CLARKSVILLE, TENNESSEE 37040

JUNIOR HIGH/MIDDLE SCHOOL MATHEMATICS COMPETITION

EIGHTH GRADE TEST
1988
SCORING FORMULA: 4R - W + 40

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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

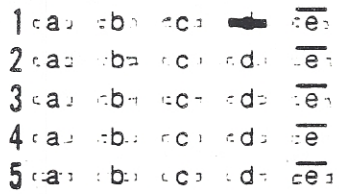
   (a) 0

   (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 proglem. 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. A restaurant sells hamburgers for 90¢ and cokes for 40¢. The total cost for 3 hamburgers and 8 cokes would be

   a. \$8.40. b. \$5.90. c. \$6.20. d. 59¢. e. \$5.10.

2. How many 6 in. by 6 in. tiles would Billy need to cover the recreation room floor which measures 9 ft. by 12 ft.?

   a. 410 b. 432 c. 108 d. 36 e. 360

3. If $x^{64} = 64$, then $x^{32} =$

   a. 8. b. 16. c. 32. d. 48. e. 64.

4. Tom has an amount of money in his pocket. His mother gives him 8¢. His father then gives him the same amount as he has at that time. Then his grandmother gives him \$2.00 and he spends 50¢ on a coke. If he has \$3.20 left, how much did he have to begin with?

   a. 25¢ b. 75¢ c. 15¢ d. 83¢ e. 77¢

5. The height of a tall, professional basketball player is closest to

   a. 2 m. b. 3.4 km. c. 4000 mm. d. 5 dm. e. 25 cm.

6. A floor tile is made from a material that weighs 5 grams per cubic centimeter. If each tile is .2 cm thick, how much is the total weight of the tile in a room which is 8 meters wide and 6 meters long?

   a. 19,200 gm b. 192 kg c. 96 kg d. 480 kg e. 48 kg

7. If $x = -2$, then $x^x =$

   a. 4. b. $-\frac{1}{4}$. c. $\frac{1}{4}$. d. -4. e. 16.

8. If $2^x = \frac{8^3 \cdot 4^2}{2^3}$, then $x =$

   a. 9. b. 10. c. 11. d. 12. e. 13.

9. Which number is greatest?

   a. $\sqrt{.4}$ b. 1 c. $\sqrt{2}$ d. $\frac{99}{100}$ e. $(\frac{7}{8})^2$

10. Which of the following is the best estimate for $\frac{7}{16} + \frac{1}{12}$?

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

11. If $3x = 8\frac{1}{2}$, then $6x - 1 =$

a. 12. b. 13. c. 14. d. 16. e. 17.

12. How many straight line segments are there whose endpoints are two vertices of a given cube?

a. 8 b. 16 c. 24 d. 28 e. 30

13. A 3 x 3 lattice consists of 9 equally spaced points, as shown. If each line segment must have its endpoints on the dots, then how many non-congruent line segments are possible?

a. 3
b. 4
c. 5
d. 6
e. 7

14. If the decimal expansions of $2 \div 15$ and $8 \div 15$ are added together, then the 15th digit of their sum is

a. 2. b. 8. c. 0. d. 6. e. 5.

15. The number $1 + \frac{1}{2} + \frac{1}{4} + \frac{1}{8} + \frac{1}{16} + \ldots + \frac{1}{2^{100}}$ is

a. less than 1.
b. between 1 and 2.
c. between 2 and 100.
d. between 100 and 1 billion.
e. over 1 billion.

16. What is the smallest positive integer that is a multiple of each of the counting numbers from 1 to 10?

a. 362880 b. 5040 c. 840 d. 1260 e. 2520

17. Find the ratio of the sum of the first n odd positive integers divided by the sum of the next n odd positive integers.

a. $\frac{1}{3}$ b. $\frac{1}{n}$ c. $\frac{1}{2n + 1}$ d. $\frac{3}{5}$ e. $\frac{1}{n^2}$

18. The lengths of the two legs and the hypotenuse of a right triangle are 15, 20 and 25 units, respectively. Find the length of the altitude to the hypotenuse.

a. 12 b. 9 c. 15 d. 10 e. 14

19. If the length of the radius of a circle is increased to 150% of its original length, the area will be increased to what percent of the original area?

a. 225% b. 75% c. 50% d. 125% e. 150%

20. A fair coin is tossed 10 times and comes up heads each time. Find the probability that the 11th toss will be a tail.

a. $\frac{1}{11}$ b. $\frac{1}{10}$ c. $\frac{1}{2}$ d. $\frac{10}{11}$ e. $\frac{1}{2^{11}}$

21. The one-hundredth digit of the decimal obtained by dividing 1 by 7 is

a. 1. b. 4. c. 2. d. 8. e. 5.

22. If $x + y = 14$ and $x^2 + y^2 = 162$, then xy equals

a. 11. b. 13. c. 15. d. 17. e. 7.

23. In the figure below, $\triangle ABC$ is an equilateral triangle. Also, AC = 3 and DB = BE = 1. Find the perimeter of quadrilateral ACED.

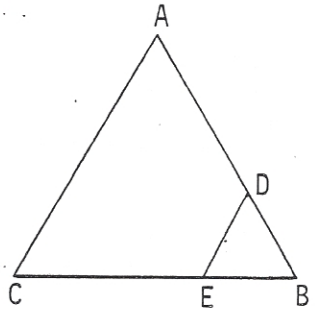
a. 6

b. $6\frac{1}{2}$

c. 7

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

e. 8



24. Which of the following is not necessarily a parallelogram?

a. square
b. rhombus
c. rectangle
d. trapezoid
e. all are not

25. Sally wants to buy a dress for $80.00 and a matching pair of shoes for $20.00. She has saved 40% of the amount needed to purchase the dress. How many more hours of babysitting at $2.00/hr. must she complete in order to buy the new dress?

a. 32 b. 30 c. 24 d. 48 e. 34

26. If the numbers represented by points C and D are multiplied together, what point best represents the product?

a. A
b. B
c. C
d. E
e. F

27. Sue and Sam's mother is pregnant. Sam says, "If it's a girl, I'll have twice as many sisters as brothers." Sue says, "If it's a boy, I'll have as many brothers as sisters." How many children does Sue and Sam's mother presently have?

a. 6 b. 8 c. 9 d. 11 e. 12

28. What is the smallest prime factor of $27^{83} + 19^{57}$?

a. 1 b. 2 c. 3 d. 5 e. 7

29. Mary and John Jones have three children. The sum of the weights of the two smallest children is 65 lbs., the sum of the weights of the two largest children is 110 lbs., and the sum of the weights of the smallest and the largest child is 95 lbs. What is the sum of the weights of all three children?

a. 120 lbs. b. 130 lbs. c. 135 lbs. d. 140 lbs. e. 150 lbs.

30. If $M = (y + 2)^3 - 3(y + 2)^2 + 3(y + 2) - 1$, then M also equals

a. y^3. b. $(y - 1)^3$. c. $(y + 1)^3$. d. $(y + 2)^3$. e. $y^3 + 2$.

31. Let p be the product of all the positive integral factors of 30. If $p = 30^k$, then k =

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

32. In the pentagon pictured below, $m(\angle B) = m(\angle C) = m(\angle D) = m(\angle E) = 120^o$. What is the area of the pentagon?

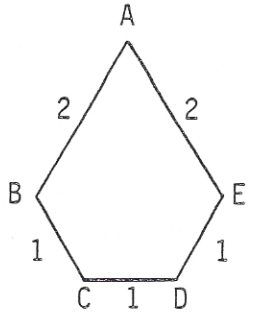
a. $\frac{7\sqrt{3}}{4}$

b. 3.4

c. $\frac{9\sqrt{2}}{5}$

d. 4

e. $\frac{3\sqrt{5}}{5}$



(Note: 7 equilateral triangles can be formed.)

33. If a man and a half can paint a house and a half in a day and a half, how long will it take 6 men to paint 4 houses?

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

34. A string 60 cm in length is cut randomly into two pieces. What is the probability that one piece is at least 10 cm longer than the other?

a. $\frac{1}{10}$ b. $\frac{1}{6}$ c. $\frac{1}{2}$ d. $\frac{3}{4}$ e. $\frac{5}{6}$

35. How many quarter-inch cubes does it take to make a 1-inch cube?

a. 4 b. 16 c. 48 d. 64 e. 128

36. The area of the shaded region in square units is

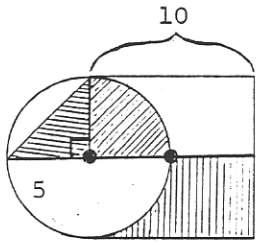
a. $50 + \frac{25\pi}{4}$.

b. 62.5.

c. 75.

d. $100 - 25\pi$.

e. 100.



37. The original price of an item A is increased by 40% to obtain a new price. This new price is then reduced by 40% to get the final selling price. The final selling price is what percent of the original price?

a. 100% b. 140% c. 116% d. 84% e. 60%

38. A family consists of a father, mother and two children. What is the probability that the family has one child of each sex if we know that at least one child is a girl?

a. $\frac{1}{3}$ b. $\frac{5}{12}$ c. $\frac{11}{24}$ d. $\frac{1}{2}$ e. $\frac{2}{3}$

39. If $\frac{7a - 5b}{b} = 7$, then $\frac{4a + 6b}{2a}$ equals

a. $\frac{15}{4}$. b. 4. c. $\frac{17}{4}$. d. 5. e. 6.

40. In a four-child family, the four children could all be of one sex (4-0), there could be three of one sex and one of the other sex (3-1), and there could be two of each sex (2-2). Concerning a four-child family, which of the following is a true sentence?

a. A family of all of one sex is most likely (4-0).
b. A family of three of one sex and one of the other sex is most likely (3-1).
c. A family of two of each sex is most likely (2-2).
d. The three types of families (4-0), (3-1), and (2-2) are equally likely to occur.
e. All of the above are false.