AUSTIN PEAY STATE UNIVERSITY

CLARKSVILLE, TENNESSEE 37040

JUNIOR HIGH/MIDDLE SCHOOL MATHEMATICS COMPETITION

SEVENTH GRADE TEST
1988
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

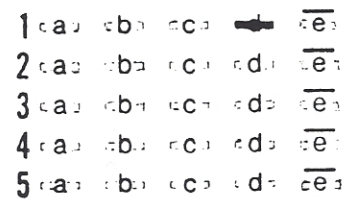
   (a) 0

   (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.

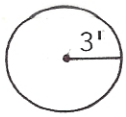
If you should change your mind about an answer, be sure to erase completely. Avoid wild guessing as wrong answers count against you. Do not mark more than one answer for any proglem. Make no stray marks of any kind on your answer sheet.

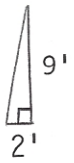
When told to do so, open your test booklet to page 2 and begin. When you have finished one page, go on to the next. The working time for the entire test is 80 minutes.

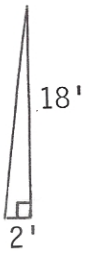
1. Which of the following is the best estimate for $\frac{7}{16} + \frac{1}{12}$?

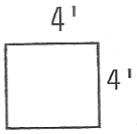
   a. about $\frac{1}{4}$ b. about $\frac{1}{2}$ c. about 1 d. about $1\frac{1}{2}$ e. 3

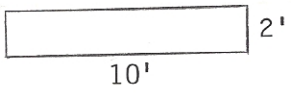
2. Which figure has the greatest area?

   a. 

   b. 

   c. 

   d. 

   e. 

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

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

4. 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. 50¢. e. $5.10.

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

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

6. There are 480 identical cubes stacked in a rectangular solid. There are 48 cubes visible on the front (or back) and 60 cubes visible on either side. How many cubes are visible from the top?

   a. 264 b. 10 c. 2880 d. 18 e. 80

7. In $\triangle ABC$, AB = 40, AC = 50 and BC = 30. Find the area of $\triangle ABC$.

   a. 600 b. 625 c. 800 d. 1000 e. 1200

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

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

9. 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. 360 c. 36 d. 108 e. 432

10. If there are 27×10^{12} grains of sand in 1 cubic meter, how many grains are in 500 cubic meters?

a. 1.35×10^{13}
b. 1.35×10^{14}
c. 1.35×10^{15}
d. 1.35×10^{16}
e. 1.35×10^{17}

11. Which number is the greatest?

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

12. Joan rides a bicycle to work 4 miles each morning. Sam rides the same route to work at a rate 5 mph faster than Joan. The total time for both trips is 40 minutes. How fast does Joan travel?

a. 14 mph b. 12 mph c. 10 mph d. 8 mph e. 6 mph

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

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

14. For which positive real numbers a and b is it true that a% of b equals b% of a? Give the most complete answer.

a. $0 < a, b < 1$
b. $1 < a, b$
c. all positive numbers a and b
d. $a = b = 1$
e. no pair of positive numbers a and b

15. 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. $\frac{1}{2^{11}}$

16. 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%

17. Which property of the real number system is illustrated by the equation $a(b + c) = a(c + b)$?

a. distributive
b. associative (addition)
c. associative (multiplication)
d. commutative (addition)
e. commutative (multiplication)

18. Which of the following is the least real number?

a. $\frac{1987^2 + 1988^2}{2}$

b. $\frac{2(1987)(1988)}{1987^2 + 1988^2}$

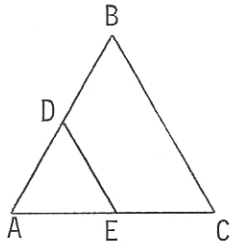
c. $\frac{1987^4 + 1988^4}{1987^2 + 1988^2}$

d. $\sqrt{\frac{1987^4 + 1988^4}{2}}$

e. $(1987)(1988)$

19. The area of $\triangle ABC$ is 16 square units. If D is the midpoint of $\overline{AB}$ and E is the midpoint of $\overline{AC}$, what is the area of $\triangle ADE$?

a. 4
b. 8
c. 2
d. 3.5
e. 4^2

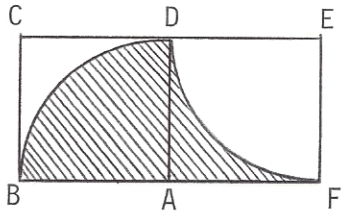


20. $\frac{1}{1 \cdot 2} + \frac{1}{2 \cdot 3} + \frac{1}{3 \cdot 4} + \cdots + \frac{1}{99 \cdot 100} =$

a. $\frac{3}{4}$ b. $\frac{100}{101}$ c. $\frac{101}{100}$ d. $\frac{99}{100}$ e. $\frac{100}{99}$

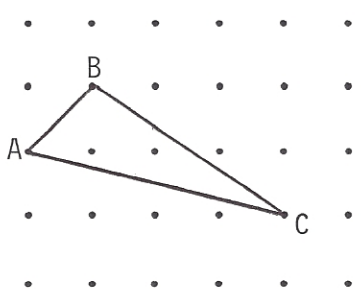
21. Quadrilaterals ABCD and AFED are squares with sides of length 10 cm. Arc BD and arc DF are quarter circles. What is the area of the shaded region?

a. 50 sq. cm
b. 100 sq. cm
c. 80 sq. cm
d. 40 sq. cm
e. 10 sq. cm



22. If the distance between two adjacent vertical or horizontal dots is 1, what is the perimeter of $\triangle ABC$?

a. 5
b. $\sqrt{3} + \sqrt{10} + \sqrt{11}$
c. 8
d. 9
e. $\sqrt{2} + \sqrt{13} + \sqrt{17}$



23. $\frac{3}{2} + \frac{5}{4} + \frac{9}{8} + \frac{17}{16} + \frac{33}{32} + \frac{65}{64} - 7 =$

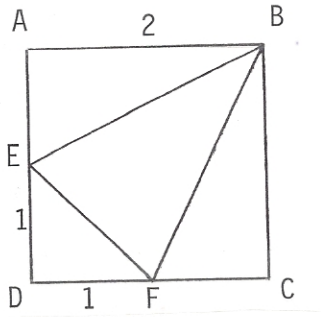
a. $-\frac{1}{64}$. b. $-\frac{1}{16}$. c. 0. d. $\frac{1}{16}$. e. $\frac{1}{64}$.

24. The first side of a triangle is 2 inches shorter than 4 times the second side. The third side is 8 inches longer than the second side. If the perimeter is 12 feet, find the length of the longest side.

a. 9 feet b. 58 inches c. 90 inches d. 5 feet e. none of these

25. Quadrilateral ABCD is a square with AB = 2, DE = 1 and DF = 1. What is the area of $\triangle BFE$?

a. 1
b. $\frac{10}{9}$
c. $\frac{11}{8}$
d. $\frac{3}{2}$
e. $\frac{7}{4}$



26. 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.

27. 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¢

28. If the decimal expansions of $1 \div 15$ and $4 \div 15$ are added together, then the 12th digit of their sum is

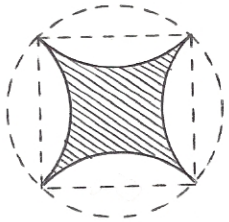
a. 2. b. 3. c. 4. d. 5. e. 6.

29. If $3^x = \frac{9^2 \cdot 27^3}{3^5}$, then x =

a. 6. b. 7. c. 8. d. 9. e. 10.

30. A square is inscribed in a circle of radius r. The four arcs of the circle "cut off" by the square are folded over to form the shaded region shown. The area of this shaded region is

a. $4r^2 - \pi r^2$
b. $\pi r^2 - 4r^2$
c. $\pi r^2 - 2r^2$
d. $2\pi r^2 - 4r^2$
e. $8r^2 - \pi r^2$



31. A man works at a job for 5 days. His pay each day is $1\frac{1}{2}$ times that of the previous day. If his total wages are \$422 for the 5 days, what was his pay for the second day?

a. \$12 b. \$36 c. \$32 d. \$48 e. \$66

32. 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

33. A man divides his \$52,000 estate among his 6 heirs in the ratio $2:3:2:\frac{3}{2}:\frac{1}{2}:4$. The heir receiving the largest share receives

a. \$13,000. b. \$4,000. c. \$16,000. d. \$1,000. e. \$3,000.

34. How many whole numbers are there between 100 and 1000 for which the units digit and the hundreds digit are the same?

a. 10 b. 100 c. 90 d. 81 e. 72

35. If $2^3 + 2^3 + 2^4 + 2^5 + 2^5 + 2^5 = 2^x$, then x =

a. 6. b. 7. c. 8. d. 9. e. 11.

36. 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. $\frac{1}{4}$ c. $\frac{1}{2}$ d. $\frac{3}{4}$ e. $\frac{5}{6}$

37. If $x = -3$, then $x^x =$

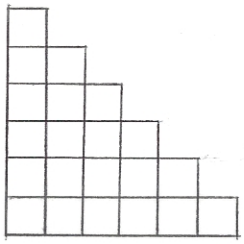
a. 27. b. $\frac{1}{27}$. c. $-\frac{1}{27}$. d. -27. e. 81.

38. $.\overline{09} \cdot .\overline{7} =$

a. $.0\overline{63}$. b. $.\overline{063}$. c. $.0\overline{630}$. d. $.0\overline{7}$. e. $.\overline{07}$.

39. How many squares of all possible sizes are in the figure at the right?

a. 21
b. 31
c. 32
d. 34
e. 36



40. 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. $\frac{2}{3}$