

AUSTIN PEAY STATE UNIVERSITY
CLARKSVILLE, TENNESSEE 37040

Junior High School
Mathematics Competition

Prepared by:

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from Questions Submitted by
the Mathematics Departments of
Austin Peay State University
and
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EIGHTH GRADE TEST
1979

SCORING FORMULA: 4R - W + 40

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

- 1 (a) (b) (c) ~~(d)~~ (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. $14 + 8 \div 2 - 3 \times 2 =$
- (a) 16
 - (b) 5
 - (c) 31
 - (d) 12
 - (e) none of the above
2. The statement, $(4 \cdot 6)7 = 4(6 \cdot 7)$, is an instance of which property?
- (a) distributive
 - (b) commutative property of multiplication
 - (c) associative property of multiplication
 - (d) identity property of multiplication
 - (e) inverse property of multiplication
3. $\left(-\frac{20}{21}\right)\left(-\frac{4}{15}\right)\left(-\frac{27}{28}\right) =$
- (a) $\frac{12}{49}$
 - (b) $-\frac{51}{64}$
 - (c) $-\frac{1}{4}$
 - (d) $-\frac{12}{49}$
 - (e) none of the above
4. Let "a" represent an odd number and "b" represent an even number. Then "a + b" must represent
- (a) an even number
 - (b) an odd number
 - (c) a prime number
 - (d) a composite number
 - (e) a perfect number

5. $1 + \frac{4}{5 + \frac{2}{5}} =$

(a) $\frac{47}{27}$

(b) $\frac{27}{7}$

(c) $\frac{47}{20}$

(d) $\frac{40}{27}$

(e) none of the above

6. $5.\overline{12} =$

(a) $\frac{169}{33}$

(b) $\frac{46}{9}$

(c) $\frac{128}{25}$

(d) $5 \frac{12}{100}$

(e) $5 \frac{9}{46}$

7. Which one of the following does not represent a rational number?

(a) 0.13131313...

(b) π

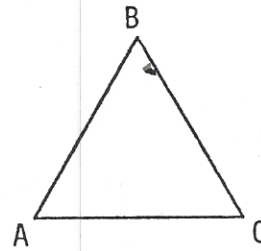
(c) $\frac{3}{1 + \frac{1}{2}}$

(d) -4

(e) 0

8. In $\triangle ABC$, $m \angle ABC = 58^\circ$, $AB = 8$, and $AC = 8$. Find $m \angle CAB$.

- (a) 58°
- (b) 32°
- (c) 122°
- (d) 61°
- (e) 64°



9. How many edges does a cube have?

- (a) 6
- (b) 8
- (c) 10
- (d) 12
- (e) 16

10. Which one of the following is not a set of measures of sides of a right triangle?

- (a) $\{3, 4, 5\}$
- (b) $\{\frac{3}{2}, 2, \frac{5}{2}\}$
- (c) $\{7, 9, 12\}$
- (d) $\{\sqrt{2}, \sqrt{3}, \sqrt{5}\}$
- (e) $\{5, 12, 13\}$

11. In a given right triangle, the measures of the hypotenuse and one of the legs are 13 inches and 12 inches, respectively. The measure of the other leg is

- (a) $4\frac{1}{2}$ inches
- (b) $\sqrt{313}$ inches
- (c) 4 inches
- (d) 5 inches
- (e) none of the above

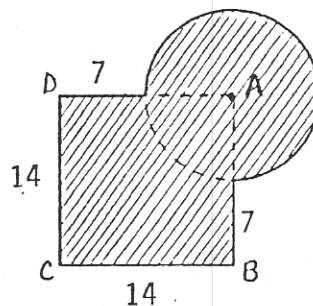
12. The greatest whole number whose base-two numeral has five digits is
- (a) 63
 - (b) 15
 - (c) 127
 - (d) 31
 - (e) none of the above
13. Which of the following is the scientific notation form for 3862.48?
- (a) $.386248 \times 10^4$
 - (b) 3.86248×10^4
 - (c) 3.86248×10^{-3}
 - (d) 386248×10^{-2}
 - (e) none of the above
14. In the Metric system, the most reasonable mass (weight) of an adult man is
- (a) 4540000 mg
 - (b) 16 kg
 - (c) 81 kg
 - (d) 500 kg
 - (e) 180 g
15. How many centimeters are there in x kilometers?
- (a) $\frac{x}{100}$
 - (b) $100x$
 - (c) $10,000x$
 - (d) $100,000x$
 - (e) none of the above

16. Find the volume of a rectangular solid whose dimensions are 1.5 cm, 4.5 cm and 2.6 cm.
- (a) 17.55 cm^3
 - (b) 175.5 cm^3
 - (c) $.1755 \text{ cm}^3$
 - (d) 175.5 cm
 - (e) none of the above
17. The U.S. government recommends a daily intake of 17 milligrams of niacin for males from 10 to 12 years of age. If 1 oz. of a certain cereal contains .34 mg of niacin, what percent of the daily requirement does a 3 oz. serving represent?
- (a) 6 percent
 - (b) 2 percent
 - (c) .02 percent
 - (d) 5.78 percent
 - (e) none of the above
18. A coat is on sale for \$54.60, which is 30% off the regular price. What was the regular price?
- (a) \$182.00
 - (b) \$78.00
 - (c) \$81.90
 - (d) \$70.98
 - (e) \$92.82
19. Of 200 students in the eighth grade, 27 got A's in mathematics, 38 got A's in English, while 7 students got A's in both courses. How many students did not get an A in either subject?
- (a) 142
 - (b) 128
 - (c) 149
 - (d) 135
 - (e) none of the above

20. Which of the numerals below represents the greatest number?
- (a) 1011_{two}
 - (b) 211_{three}
 - (c) 43_{five}
 - (d) 21_{nine}
 - (e) 17_{ten}
21. At 1:30 P.M. a time bomb is set to explode 253 hours later. At what time of day will the bomb explode?
- (a) 2:30 A.M.
 - (b) 2:30 P.M.
 - (c) 1:30 A.M.
 - (d) 1:30 P.M.
 - (e) 3:30 A.M.
22. A marble is selected at random from a bag containing 12 marbles of which 5 are red, 4 are green, and 3 are blue. What is the probability that the marble selected is blue?
- (a) $\frac{5}{12}$
 - (b) $\frac{1}{3}$
 - (c) $\frac{2}{3}$
 - (d) $\frac{1}{4}$
 - (e) $\frac{3}{4}$

23. Quadrilateral ABCD is a square and A is the center of the circle. Using $\frac{22}{7}$ as an approximation for π , the area of the shaded region is approximately

- (a) 240 sq. units
- (b) 208.5 sq. units
- (c) 350 sq. units
- (d) 311.5 sq. units
- (e) none of the above

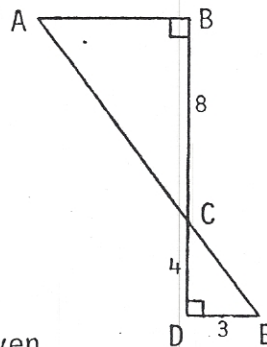


24. If the radius of a first circle is 1 unit greater than the radius of a second circle, how much greater is the circumference of the first circle than the circumference of the second circle?

- (a) 2π units
- (b) π^2 units
- (c) π units
- (d) 1 units
- (e) An unknown amount since the radius of the first circle is unknown

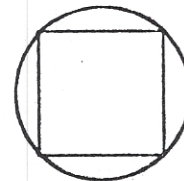
25. In the figure on the right, $AB =$

- (a) 5
- (b) 6
- (c) 7
- (d) 10
- (e) can not be determined from what is given



26. A square of area 36 square inches is inscribed in a circle of radius r as indicated by the figure. What is the radius r ?

- (a) $6\sqrt{2}$ inches
- (b) $3\sqrt{2}$ inches
- (c) 12 inches
- (d) 4 inches
- (e) $\frac{6}{\sqrt{\pi}}$ inches



27. Given $2^y = 4^x$ where x and y are natural numbers. Which of the following must be true?

- (a) y is even
- (b) y is odd
- (c) y is prime
- (d) y is composite
- (e) both (a) and (d) are correct

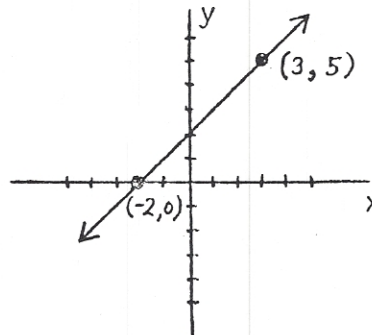
28. At a school picnic there were 240 people present. There were 20 more children than adults and 20 more boys than girls. How many boys were at the picnic?
- (a) 50
 - (b) 80
 - (c) 75
 - (d) 100
 - (e) 60

29. What is the solution set for the equation $5 \cdot x + x = 6$?

- (a) $\left\{\frac{3}{5}\right\}$
- (b) $\{2\}$
- (c) $\left\{\frac{1}{2}\right\}$
- (d) $\left\{\frac{11}{2}\right\}$
- (e) $\{1\}$

30. The line drawn on the coordinate system at the right is the graph of which of the following equations?

- (a) $x + y = -2$
- (b) $-2x + 3y = 5$
- (c) $x - 2 = y$
- (d) $y = x + 2$
- (e) none of the above



31. What is the solution set for the equation $|x - 3| = 5$?

- (a) $\{8\}$
- (b) $\{2\}$
- (c) $\{8, -2\}$
- (d) $\{-8, 2\}$
- (e) $\{-8, -2\}$

32. What is the solution set for the following system of equations?

$$2x + y = 4$$

$$8x - y = 1$$

- (a) $\{(0, 4)\}$
- (b) $\{(\frac{1}{2}, 7)\}$
- (c) $\{(\frac{1}{4}, 3\frac{1}{2})\}$
- (d) $\{(0, -1)\}$
- (e) $\{(\frac{1}{2}, 3)\}$

33. The operation $*$ is defined as follows: $x * y = 6^x + y^2 - x^y$. Then $2 * 4$ is

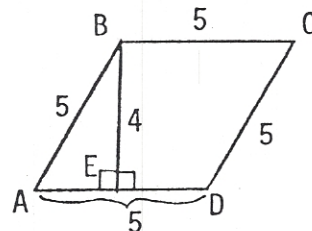
- (a) 24
- (b) 84
- (c) 64
- (d) 36
- (e) 16

34. In a sack containing 24 apples and pears, $\frac{2}{3}$ of the number of apples is equal to $\frac{2}{5}$ of the number of pears. How many pears are in the sack?

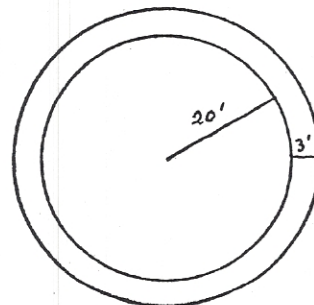
- (a) 6
- (b) 15
- (c) 9
- (d) 12
- (e) 5

35. Find the area of quadrilateral BCDE.

- (a) 15 sq. units
- (b) 25 sq. units
- (c) 20 sq. units
- (d) 16 sq. units
- (e) 14 sq. units



36. If two numbers (not necessarily different) are selected at random from the set $\{1, 2, 3, \dots, 10\}$, what is the probability that the product of these numbers is even?
- (a) 0
(b) .25
(c) .5
(d) .75
(e) 1
37. If a and b are two integers such that $ab = 1$, then which one of the following must be true?
- (a) $a > 0$ and $b > 0$
(b) $a > 1$ and $b < 1$
(c) $a \neq 0$ and $b \neq 0$
(d) $a < 1$ and $b > 1$
(e) $a < 0$ and $b < 0$
38. If $a > b$ and a and b are integers, which one of the following must be true?
- (a) $a > b + 1$
(b) $a - b \geq 1$
(c) $a^2 > b^2$
(d) $ac > bc$ for every integer c
(e) $b < a - 1$
39. A walk 3 feet wide is built around a circular rose garden of radius 20 feet as indicated by the figure. What is the area of the walk?
- (a) 129π square feet
(b) 23π square feet
(c) 3π square feet
(d) 405π square feet
(e) 810π square feet



40. If $A = \{x | -1 \leq x < 5\}$ and $B = \{x | 1 < x \leq 6\}$, then $A \cap B =$

(a) $\{x | -1 \leq x \leq 6\}$

(b) $\{x | -1 < x < 6\}$

(c) $\{x | 1 \leq x \leq 5\}$

(d) $\{x | 1 < x < 5\}$

(e) $\{x | 1 \leq x \leq 6\}$