

AUSTIN PEAY STATE UNIVERSITY
CLARKSVILLE, TENNESSEE 37040

Junior High School Mathematics Competition

EIGHTH GRADE TEST
1978
SCORING FORMULA: $4R - W + 40$

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. Which of the measurements given has three significant digits?
- (a) 127.0 meters (b) 250 pounds
(b) 5010 yards (c) .015 grams
(e) 1085 miles
2. Which of these numbers is its own reciprocal?
- (a) a number can't be its own reciprocal.
(b) $\frac{1}{2}$ (c) 0
(d) -1 (e) the correct answer is not given.
3. If x and y are real numbers then $x > y$ if and only if:
- (a) $x - y > 0$ (b) $x - y < 0$
(c) $x = y$ (d) $x - y = 0$
(e) none of the above
4. ABCD is a parallelogram. If E begins at midpoint of \overline{DC} , then as E moves along \overline{DC} toward C, the area of triangle ABE:
- (a) increases (b) decreases
(c) changes in a way that cannot be determined
(d) is the area of ABCD (e) remains unchanged
5. The surface area of a cube 3 cm on a side is:
- (a) 9 cm² (b) 36 cm²
(c) 54 cm² (d) 27 cm²
(e) none of the above
6. In how many ways can four books be arranged on a shelf?
- (a) 256 (b) 4
(c) 24 (d) 12
(e) 36
7. In 1970 there were 170,000 file clerks in the United States. It was estimated that three-fourths of these worked in the area of business and industry. How many did not work in these areas?
- (a) 42,500 (b) 127,500
(c) 7,500 (d) 85,000
(e) 1,275

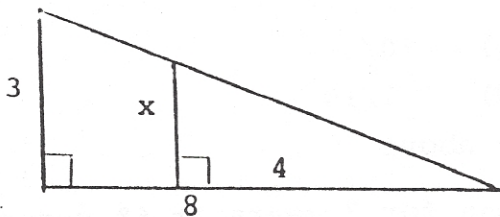
8. A car and a motorcycle stop at a rest stop on the highway. The car travels north at 55 mph. and the motorcycle goes south at 50 mph. If the two vehicles leave the rest stop at the same time, how long will it take them to be 210 miles apart?

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

9. Choose the false statement.

- (a) The sum of any two even numbers is even.
 (b) Every rational number can be written as a decimal fraction which either terminates or repeats a sequence of digits.
 (c) For all integers x , $x \cdot 0 = 0 \cdot x = 0$.
 (d) For all integers x , $x/x = 1$.
 (e) x and y are reciprocals of each other if $xy = 1$.

10.



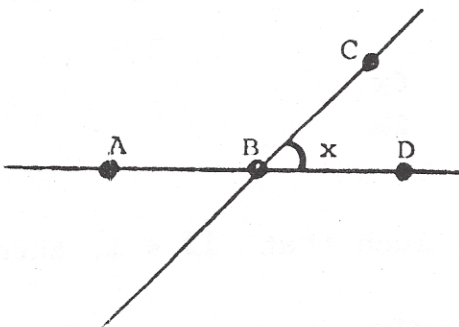
What is the length of the segment labeled x in the given figure?

- (a) 1 (b) 1.5
 (c) 2 (c) 2.5
 (e) none of the above

11. a and b are two integers such that $ab < 0$. Which of the following must be true?

- (a) $a > 0$ and $b < 0$ (b) $a < 0$ and $b > 0$
 (c) $a < 0$ and $b < 0$ (d) $a \neq 0$ and $b \neq 0$
 (e) none of the above

12.



Given the drawing when measure $\angle CBD = x$, what is the measure of $\angle CBA$?

- (a) $90 + x$ (b) $90 - x$
 (c) $180 + x$ (d) $180 - x$
 (e) can't be determined from given data

13. A man borrowing \$800 finds that he must pay a monthly installment of \$52. How much would he have to pay each month if he had borrowed \$1100 at the same terms?

- (a) \$71.50 (b) \$37.80
(c) \$75.00 (d) \$61.50
(e) \$58.80

14. What is the value of $\sqrt[3]{\sqrt{64}}$?

- (a) 2 (b) 4
(c) 8 (d) 16
(e) 32

15. $1 + \frac{1}{2 + \frac{1}{3}} =$

- (a) $7/3$ (b) $10/3$
(c) $10/7$ (d) $7/10$
(e) none of the above

16. Find the interest on a \$250 loan for 3 years at 6% compounded annually.

- (a) \$45 (b) \$295
(c) \$15 (d) \$297.75
(e) \$47.75

17. If w is the width of a rectangle such that the length of the rectangle is twice the width, then what is the perimeter of the rectangle?

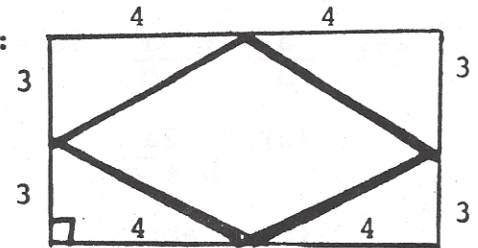
- (a) w (b) $6w$
(c) $4w$ (d) $2w$
(e) $8w$

18. If \square represents any real number such that $\square < 1$, then which of the following is false?

- (a) $-\square > -1$ (b) $\square - 1 < 0$
(c) $\square + 1 < 2$ (d) $\square^2 < 1$
(e) $\square/2 < 1/2$

19. The perimeter of the rhombus given is:

- (a) 12 (b) 14
 (c) 16 (d) 28
 (e) 20



20. Three fair coins are tossed at the same time. What is the probability that at least two of the coins will be heads?

- (a) 3/8 (b) 5/8
 (c) 7/8 (d) 1/2
 (e) none of the above

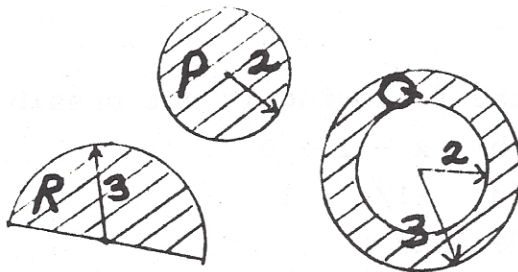
21. If the perimeter of a rectangle is 60 inches and one side is 5 inches longer than another, what is the area of the rectangle?

- (a) 218.75 sq. in. (b) 100 sq. in.
 (c) 156.25 sq. in. (d) 210 sq. in.
 (e) none of these

22. Which of the following is true for all values of s and t ?

- (a) $|s + t| \geq s + t$ (b) $|s - t| \leq |s| - |t|$
 (c) $|s + t| \geq |s| + |t|$ (d) $|s \cdot t| = s \cdot t$
 (e) none of the above

23.



Arrange the areas, P , Q and R , of the shaded regions in increasing order.

- (a) $P < Q < R$ (b) $Q < R < P$
 (c) $P < R < Q$ (d) $R < P < Q$
 (e) $Q < P < R$

24. $\frac{a}{b} + \frac{a}{c}$ is equivalent to:

(a) $\frac{2a}{b+c}$

(b) $\frac{a}{b+c}$

(c) $\frac{abc}{b+c}$

(d) $\frac{2a}{bc}$

(e) $\frac{a(b+c)}{bc}$

25. Find x in the given figure assuming the triangles are similar:

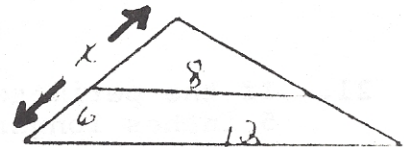
(a) 12

(b) 8

(c) 18

(d) 14

(e) 20



26. How many diagonals does an octagon have?

(a) 8

(b) 20

(c) 10

(d) 16

(e) 40

27. Given the numbers: 2, 6, 8, x , 4, where the arithmetic mean is 5. The value of x is:

(a) 3

(b) 5

(c) 7

(d) 9

(e) 10

28. If $x + 1 > 0$, then which of the following is not possible?

(a) $x \cdot 1 = 0$

(b) $x - 1 > 0$

(c) $x^2 < 1$

(d) $-1/x = 1$

(e) $1/x$ is undefined

29. A number is drawn at random from $\{2, 3, 4, 5, 6, 7, 8, 9, 10\}$. What is the probability that the number is prime?

(a) $1/2$

(b) $5/9$

(c) $1/9$

(d) $3/9$

(e) $4/9$

30. When the repeating decimal, $.135135\dots$ is written as a common fraction in lowest terms, the denominator is:

(a) 999

(b) 37

(c) 200

(d) 111

(e) none of these

31. What is the measure of the angle that the small hand makes with the large hand of a clock when it is 5 o'clock?

- (a) 75° (b) 120°
(c) 135° (d) 150°
(e) 165°

32. Exactly one of the following sentences is false. Identify the false one.

- (a) The prime factors of 60 are 2, 3, and 5.
(b) A number is divisible by 60 if and only if it is divisible by 5 and by 12.
(c) A number is divisible by 60 if and only if it is divisible by 6 and by 10.
(d) A number is divisible by 60 if and only if it is divisible by 4 and 15.
(e) A number is divisible by 60 if and only if it is divisible by 3 and by 20.

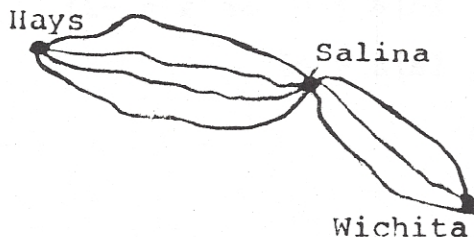
33. A coin is tossed and a die is rolled. What is the probability of tossing heads and rolling a 5?

- (a) $1/2$ (b) $1/12$
(c) $1/3$ (d) $2/3$
(e) none of these

34. A man was given the task of unloading 1500 boxes from a truck. He completed $2/3$ of the work and was replaced by another man who was told to finish the job. If the second man has now finished $6/10$ of his work, how many boxes remain on the truck?

- (a) 500 (b) 250
(c) 300 (d) 200
(e) none of the above

35.



If there are four roads connecting Hays and Salina and three roads from Salina to Wichita, how many routes could you take on a round trip from Hays to Wichita and back, through Salina, without using any of the seven roads twice?

- (a) 12 (b) 144
(c) 14 (d) 18
(e) 72

36. Given that 1 pound of uncooked rice makes 14 servings, 1 serving is $\frac{1}{2}$ cup of cooked rice and 1 cup of uncooked rice makes 3 cups of cooked rice; how many cups of uncooked rice are there in $\frac{1}{2}$ pound of uncooked rice?
- (a) $1\frac{1}{2}$ (b) $1\frac{1}{7}$
(c) $1\frac{1}{6}$ (d) 1
(e) $1\frac{1}{3}$
37. The region inside square ABCD has area 10. If a side of square EFGH is twice as long as a side of square ABCD, what is the area of the region inside square EFGH?
- (a) 10 (b) 20
(c) 40 (d) 80
(e) 100
38. If we assume that 1 kg is 220% of 1 pound, what percent of 1 kg is 1 pound?
- (a) $55\frac{1}{2}\%$ (b) $45\frac{2}{5}\%$
(c) $75\frac{7}{22}\%$ (d) 55%
(e) $45\frac{5}{11}\%$
39. A square and an equilateral triangle have equal perimeters. If a side of the triangle is 3 inches longer than a side of the square, how long is each side of the square?
- (a) 4 (b) 6
(c) 12 (d) 8
(e) 9
40. For what values of a will the equation $2ax - 7 = 5 + 4a$ have a positive solution for x?
- (a) $\{a \mid -3 < a < 0\}$ (b) $\{a \mid a > 0 \text{ or } a < -3\}$
(c) $\{a \mid a > -3\}$ (d) $\{a \mid a < 0\}$
(e) none of these