1997 SEVENTH GRADE MATHEMATICS COMPETITION

AUSTIN PEAY STATE UNIVERSITY
CLARKSVILLE, TENNESSEE

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Seventh Grade Test
1997
Scoring Formula: 4R - W + 40

DIRECTIONS:

This is a test of your competence in middle 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.

SAMPLE:

1. If $x + 1 = 2$, then x equals

   a) 0
   b) 2
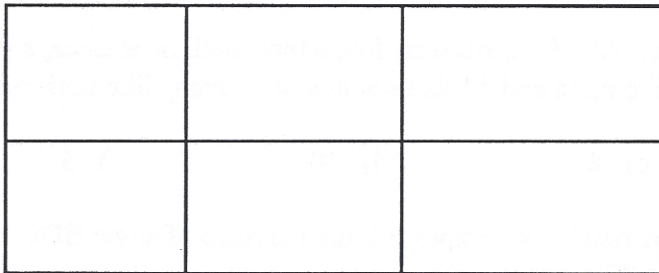   c) -1
   d) 1
   e) none of the above

The correct answer is 1, which is d); so you would answer this problem by darkening the space on the answer sheet corresponding with this choice.

If you change your mind about your 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 and begin. When you have finished one page, go on to the next. The working time for the entire test is 60 minutes.
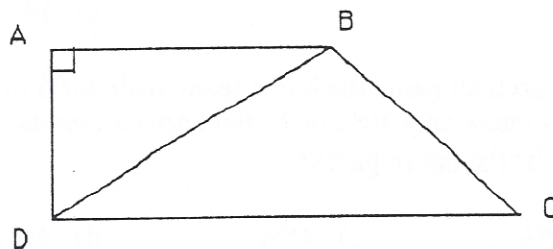
1. If the two lines whose equations are $y = ax + b$ and $y = cx + d$ are distinct and parallel, then

   a) $a = c$ and $b = d$
   b) $a \cdot c = -1$
   c) $a \neq c$ and $b = d$
   d) $a = c$ and $b \neq d$
   e) $a/c = b/d$

2. A box contains 80 marbles. Five of them are blue. What percent of the marbles are blue?

   a) 6.25%   b) 5%   c) 8%   d) 0.0625%   e) 62.5%

3. In a certain population a marriage is the union of one man and one woman. In this population, 2/3 of the men are married and 1/2 of the women are married. What fractional part of the population is single?

   a) 3/7   b) 1/2   c) 1/6   d) 1/3   e) Not enough information given.

4. How many rectangles are there in the picture below?
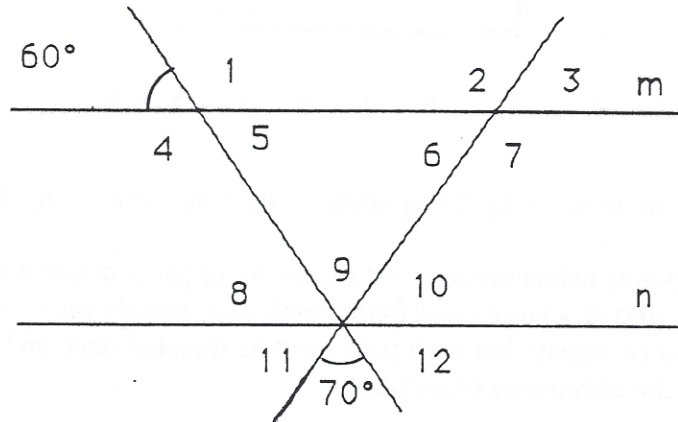

   a) 6   b) 1   c) 7   d) 18   e) 15

5. During the first half of a basketball game the home team made 60% of their 40 field goal attempts. During the second half they made only 30% of 30 field goal attempts. To the nearest 1%, what was their field goal percentage for the entire game?

   a) 35%   b) 42%   c) 45%   d) 47%   e) 50%

6. A bowl contains 15 red marbles, 20 white marbles and 30 green marbles. If a marble is drawn at random from the bowl, what is the probability that the marble is not red?

   a) 3/13   b) 6/13   c) 10/13   d) 7/13   e) 1

7. On September 1, 1995, the mean (average) age of the 33 teachers at Carr Middle School was 47 years. On September 1, 1996, three teachers aged 65, 58, and 62 retired and were replaced by four teachers aged 24, 31, 26, and 28. To the nearest whole year, what was the mean age of the teachers on September 1, 1996?

a) 47 years   b) 46 years   c) 45 years   d) 44 years   e) 43 years

8. A farmer needs to fence a rectangular piece of land. He wants the length of the field to be 80 feet longer than the width. If he has 1080 feet of fencing material, what should the length and width of the field be?

a) 1080 ft. by 1000 ft.
b) 580 ft. by 500 ft.
c) 530 ft. by 450 ft.
d) 570 ft. by 490 ft.
e) 310 ft. by 230 ft.

9. If no digit may be used more than once and if the left most digit (thousands place) must be odd, how many 4-digit whole numbers can be formed using the digits 1, 2, 3, 4, and 5?

a) 625   b) 120   c) 60   d) 72   e) 3010

10. How many other four-digit numbers have the same digits as 1996? Do not count 1996.

a) 12   b) 24   c) 23   d) 10   e) 11

11. There are 26 students in Mrs. Jones' class. All of the students like either math or science, and some like both subjects. If 18 of the students like math and 14 like science, how many like both subjects?

a) 4   b) 6   c) 8   d) 10   e) 5

12. Find the measure of angle CBD given that ABCD is a trapezoid, the measure of angle BDC is 30 degrees, and the measure of angle BCD is 40 degrees.
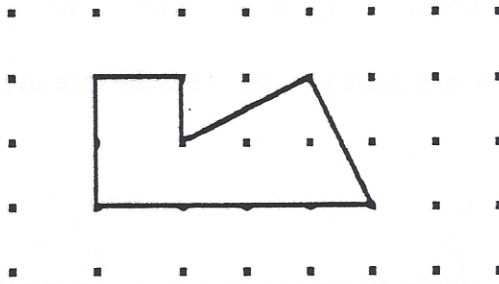

a) 30°   b) 110°   c) 40°   d) 70°   e) 120°

13. Five black balls numbered 1, 2, 3, 4, and 5 and seven white balls numbered 1, 2, 3, 4, 5, 6, and 7 are placed in a bowl. If one ball is drawn at random, what is the probability that it is numbered 1 or 2?

a) 1/6   b) 1/12   c) 1/3   d) 1/5   e) 1/7

14. On a map 1/4 inch represents 10 miles. If the distance between two cities is 85 miles, how far apart are they on the map?

a) 2 inches   b) 2 1/4 inches   c) 8 1/2 inches   d) 2 1/8 inches   e) 4 1/8 inches

15. In the following picture lines m and n are parallel. Find the measure of the angle identified with the number 3.

$60°$ 1   2 / 3   m
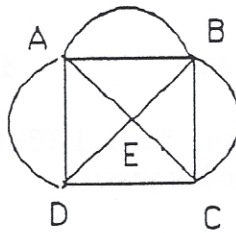4   5   6 / 7
9
8   10   n
11   12
$70°$

a) 60°   b) 70°   c) 40°   d) 50°   e) 35°

16. A carpenter's wage this year is $19.80 per hour. This is 110% more than his wage was last year. To the nearest cent, what was his hourly wage last year?

a) $21.78   b) $9.43   c) $18.00   d) $12.50   e) $15.75

17. How many lines are determined by 5 points in a plane, no three of which lie on the same line?

a) 20   b) 5   c) 15   d) 25   e) 10

18. The letter "A" represents the units digit in the five-digit number 15,72A. What is the value of A if nine exactly divides the number?

a) 3   b) 4   c) 6   d) 9   e) 7

19. Given the statement: "If the economy remained strong, then Bill Clinton was reelected." Of the following statements, which is logically equivalent to the given statement?

a) "If Bill Clinton was reelected president, then the economy remained strong."
b) "If the economy did not remain strong, then Bill Clinton was not reelected."
c) "If Bill Clinton was reelected, then the economy did not remain strong."
d) "If the economy remained strong, then Bill Clinton was not reelected."
e) "If Bill Clinton was not reelected, then the economy did not remain strong."

20. In the picture below, the horizontal and vertical distance between two dots is one unit. Find the area of the figure drawn.
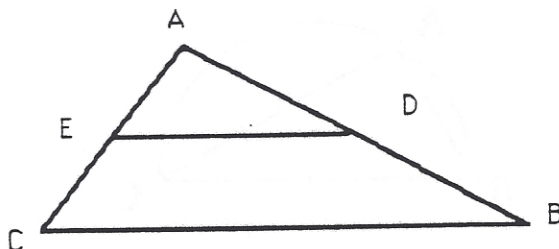

a) 6 sq. units   b) 10 sq. units   c) 12 sq. units   d) 5 sq. units   e) 8 sq. units

21. A net is a collection of points called vertices and one or more paths connecting some of the vertices. To trace a net means to start at a vertex and follow each path exactly once. A vertex may be crossed as many times as necessary, but each path must be traveled once and only once! For the net shown below, which of the statements is/are true?
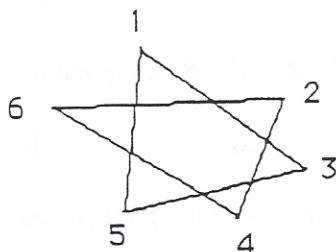

a) To trace this net, if you start at A, you must end at B.
b) To trace this net, if you start at B, you must end at A.
c) It is not possible to trace this net if you start at C, D, or E.
d) If you start at A or B it is possible to trace this net.
e) All of the above statements are true.

22. The greatest common divisor of 108 and 72 is

a) 2   b) 36   c) 12   d) 4   e) 216

23. Acme Auto Rental has three red Fords, four white Fords, and two black Fords. Acme also has six red Hondas, two white Hondas, and five black Hondas. If a car is selected at random for rental to a customer, what is the probability that it is a white Ford?

a) 3/11   b) 4/9   c) 2/11   d) 3/11   e) 9/22
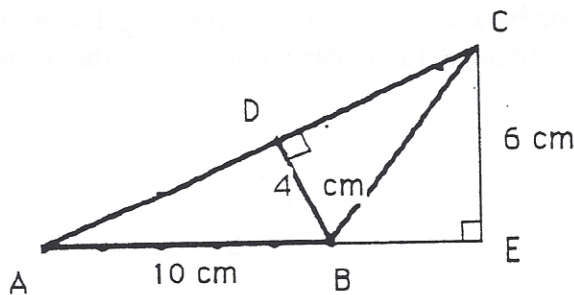
24. In the following figure the two triangles are similar. Segment DB is 8 inches long, segment AE is 3 inches long and segment EC is 4 inches long. What is the length of segment AD?

a) 4 inches   b) 5 inches   c) 6 inches   d) 7 inches   e) 8 inches

25. In the following six pointed star, the sum of the measures of the interior angles of the star located at 1, 2, 3, 4, 5, and 6 is
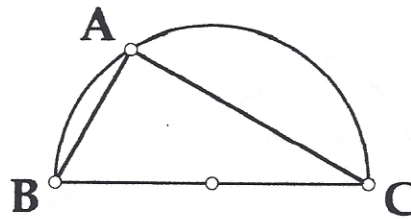

a) 180°   b) 90°   c) 270°   d) 360°
e) Since the star is irregular it is not possible to determine the sum of the measures of the interior angles.

26. In the following figure, segment AB is 10 cm long, segment BD is 4 cm long, and segment CE is 6 cm long. What is the area of triangle ABC?

a) 40 cm²   b) 20 cm²   c) 30 cm²   d) 60 cm²   e) 24 cm²

27. How many terms are in the arithmetic sequence 3, 7, 11, 15, 19, · · ·, 403?

a) 403   b) 100   c) 101   d) 102   e) 99

28. The following picture shows angle A inscribed in a semicircle. If the measure of angle B is 63°, what is the measure of angle C where C is the angle included in triangle ABC?
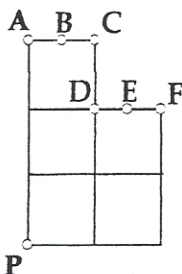

   a) 23°   b) 24°   c) 30°   d) 25°   e) 27°

29. Old MacDonald had a total of 37 chickens and pigs on his farm. All together they had 98 feet. How many chickens were there on his farm?

   a) 12   b) 25   c) 30   d) 20   e) 17

30. How many divisors does the number $2^3 \cdot 3^4 \cdot 5^3 = 81{,}000$ have?

   a) 3   b) 36   c) 20   d) 1080   e) 80

31. Find the sum indicated by $1 + 2 + 3 + 4 + \ldots + 500$. That is, find the sum of the first 500 positive integers.

   a) 501   b) 200,500   c) 250,500   d) 125,250   e) 510

32. How many numbers between 100 and 200 contain the digit 3?

   a) 9   b) 10   c) 19   d) 25   e) 18

33. The sequence of triangular numbers can be formed by arranging dots into triangles. Below is a figure showing how the first 3 triangular numbers are formed. What is the tenth triangular number?

   a) 10   b) 25   c) 50   d) 55   e) 100

34. If $3x - 4y = 5$, then $9x - 12y - 25 =$

   a) −10   b) 15   c) −5   d) −20   e) 25

35. West School has teams only in volleyball, swimming, soccer, and basketball. Erica, Justin, Molly and Dave each play a different sport. Justin's sport does not use a ball. Molly is older than the volleyball player. Neither Molly nor Dave plays soccer. Who plays soccer?

   a) Erica   b) Justin   c) Molly   d) Dave   e) cannot be determined

36. The cost for mailing a first class letter is 32 cents for the first ounce and 23 cents for each additional ounce. What is the cost of mailing a 7 ounce letter?

   a) $2.24   b) $1.61   c) $1.93   d) $1.70   e) $2.15

37. The front wheel of a tricycle has a circumference of 54 inches and the back wheel has a circumference of 36 inches. Before Sarah starts riding her trike she ties one ribbon on the bottom spoke of the front wheel and another ribbon on the bottom spoke of one of the back wheels. If she rides in a straight line, how far will she have traveled when both the ribbons return to the bottom for the first time?

   a) 9 feet   b) 162 feet   c) 1.5 feet   d) 162 inches
   e) Because π is an irrational number, they will, technically, never be on the bottom at the same time, but they will be close sometime.

38. Which of the following sets has a 2:3 ratio of even numbers to odd numbers?

   a) {1, 2, 3, 4}
   b) {1, 2, 3, 4, 5, 6, 7, 8, 9, 11}
   c) {2, 3, 4, 5, 6, 7, 8, 9, 10}
   d) {5, 6, 7, 8, 9, 10, 11, 12, 13}
   e) {1, 2, 3, 4, 5, 6, 7}

39. In the figure below B is the mid-point of segment AC and E is the mid-point of segment DF. If the line segment PX divides the area into polygons of equal area then X =

   a) C   b) F   c) E   d) B   e) D

40. Looking out into the yard one day, I saw an assortment of girls and cats. Counting heads I got 22. Counting feet I got 68. How many girls were in the yard?

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