

# 1997 EIGHTH GRADE MATHEMATICS COMPETITION

AUSTIN PEAY STATE UNIVERSITY  
CLARKSVILLE, TENNESSEE

MIDDLE TENNESSEE STATE UNIVERSITY  
MURFREESBORO, TENNESSEE

UNIVERSITY OF TENNESSEE AT MARTIN  
MARTIN, TENNESSEE

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

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## 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

	A	B	C	D	E
1	①	②	③	●	⑤
	A	B	C	D	E
2	①	②	③	④	⑤
	A	B	C	D	E
3	①	②	③	④	⑤

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.



EIGHTH GRADE TEST  
JUNIOR HIGH/MIDDLE SCHOOL  
MATH CONTEST

1. Which of the following could not be the measures of the four angles of a quadrilateral?
  - a)  $38^\circ, 42^\circ, 130^\circ, 150^\circ$
  - b)  $95^\circ, 85^\circ, 45^\circ, 140^\circ$
  - c)  $75^\circ, 100^\circ, 95^\circ, 90^\circ$
  - d)  $90^\circ, 90^\circ, 90^\circ, 90^\circ$
  - e)  $75^\circ, 85^\circ, 107^\circ, 93^\circ$
  
2. If the two lines whose equations are  $y = ax + b$  and  $y = cx + d$  are perpendicular, then
  - a)  $a \cdot c = -1$
  - b)  $a \neq c$  and  $b = d$
  - c)  $a = c$  and  $b \neq d$
  - d)  $a = c$  and  $b = d$
  - e)  $a \neq c$  and  $b \neq d$
  
3. In right triangle ABC, with angle C being the right angle, the measure of angle A is 53 degrees. What is the measure of angle B?
  - a)  $90^\circ$
  - b)  $53^\circ$
  - c)  $45^\circ$
  - d)  $97^\circ$
  - e)  $37^\circ$
  
4. In a certain population, a marriage is the union of one man and one woman. In this population, 40% of the men are married and 30% of the women are married. Approximately what percent of the population is married?
  - a) 70%
  - b) 10%
  - c) 66%
  - d) 34%
  - e) 45%
  
5. A square corner section that measures 12 inches by 12 inches is cut from a square piece of carpet that measures 6 feet by 6 feet. What fractional part of the carpet has been removed?
  - a)  $1/36$
  - b)  $1/6$
  - c)  $24/36$
  - d)  $1/8$
  - e)  $1/18$
  
6. During the first half of a basketball game Ace missed all 5 of his field goal attempts. During the second half he made 75% of his 16 shots. To the nearest 1%, what was his field goal percentage for the entire game?
  - a) 75%
  - b) 38%
  - c) 57%
  - d) 25%
  - e) None of these is correct.
  
7. There are 21 students seated at their desks in a classroom and there are 4 vacant desks. What percent of the desks in the classroom are vacant?
  - a) 4%
  - b) 16%
  - c) 84%
  - d) 8%
  - e) about 19%

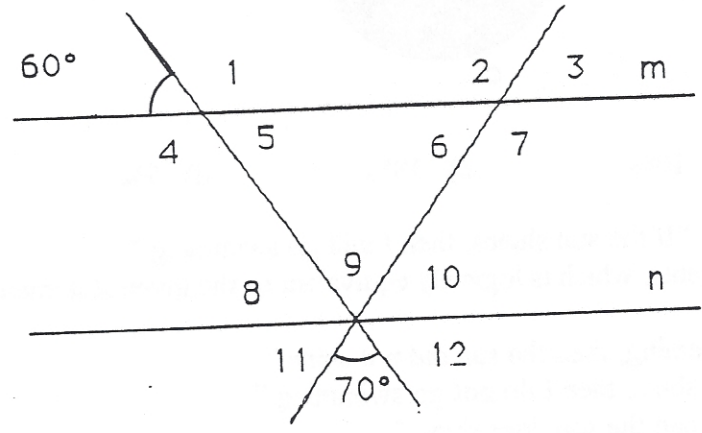
8. Suppose that Mary made scores of 77%, 79%, and 72% on her first 3 math tests. What must her total score be on the fourth and fifth tests in order to average at least 80% on all five tests?
- a) 172                      b) 92                      c) 163                      d) 86                      e) 185
9. Mark has exactly \$1.50 in change in his pocket. He remembers that he has only quarters, dimes, nickels and pennies and that he has at least one of each. What is the least number of coins that he could have?
- a) 13                      b) 8                      c) 17                      d. 18                      e. 6
10. If no letter may be used more than once and if the first letter cannot be a or e, how many four-letter combinations can be formed using the letters a, b, c, d, and e?
- a) 625                      b) 120                      c) 60                      d) 72                      e) 30
11. Two houses on the same street are separated by a large field. The first house is numbered 29, and the last is numbered 224. A developer plans to build 14 more houses between the two existing houses. What should the common difference be if all of the house numbers must form an arithmetic sequence?
- a) 12                      b) 10                      c) 14                      d) 13                      e) 5
12. 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 math but not science?
- a) 4                      b) 6                      c) 8                      d) 10                      e) 12
13. In the product below, A represents a digit. Find the value of A that makes the product correct.
- $$\begin{array}{r} A2 \\ \times 4A \\ \hline 3384 \end{array}$$
- a) 8                      b) 9                      c) 4                      d) 6                      e) 7
14. 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 5 or it is white?
- a) 1/6                      b) 1/12                      c) 1/3                      d) 1/5                      e) 2/3



15. Prior to starting a trip, when the mileage odometer read 42,800 miles, Joann needed 8 gallons of gas to fill her car's gas tank. When the odometer read 43,030 she filled the tank with 12 gallons of gas. At the end of her trip she filled the tank with 18 gallons of gas and the odometer read 43,390 miles. To the nearest 0.1 mpg, how many miles per gallon (mpg) did she get on the trip?

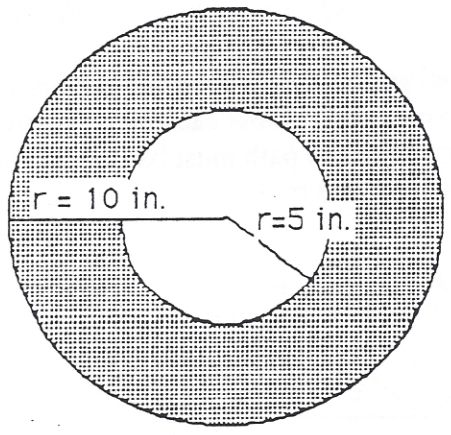
- a) 15.5 mpg      b) 19.7 mpg      c) 19.2 mpg      d) 20.0 mpg      e) 29.5 mpg

16. In the following picture lines  $m$  and  $n$  are parallel. What is the measure of the angle identified with the number 6?



- a)  $60^\circ$       b)  $70^\circ$       c)  $40^\circ$       d)  $50^\circ$       e)  $35^\circ$

17. The area of the shaded region is what fractional part of the area of the larger circle?

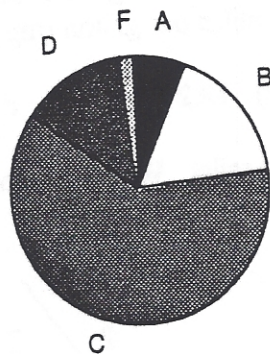


- a)  $1/2$       b)  $2/3$       c)  $1/\pi$       d)  $\pi/2$       e)  $3/4$

18. How many lines are determined by 6 points in a plane, no three of which lie on the same line?

- a) 20      b) 6      c) 15      d) 25      e) 30

19. The pie chart given below shows the grade distribution for Mrs. Bell's class. The approximate percentage of students getting a grade of B is best given by



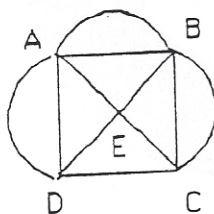
- a) 25%                      b) 10%                      c) 18%                      d) 5%                      e) 30%
20. Given the statement: "If the sun shines, then I will go swimming."  
Of the following statements, which is logically equivalent to the given statement?

- a) "If I did not go swimming, then the sun did not shine."  
b) "If the sun does not shine, then I do not go swimming."  
c) "If I go swimming, then the sun does shine."  
d) "If I go swimming, then the sun does not shine."  
e) "If the sun shines, then I do not go swimming."

21. Some of the divisors of a locker number are known to be 2, 5, and 9. If there are exactly nine additional divisors, what is the locker number?

- a) 180                      b) 278                      c) 360                      d) 90                      e) 45

22. 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.

23. The least common multiple of 108 and 72 is

- a) 216                      b) 36                      c) 12                      d) 4                      e) 7776

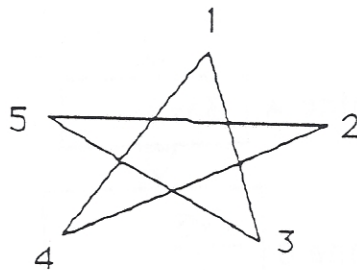
24. Acme Auto Rental has three red Fords, four white Fords, and two black Fords. Acme also has six red Hondas, two white Hondas, and five black Hondas. If a car is selected at random for rental to a customer, what is the probability that it is a Ford?

- a)  $\frac{3}{11}$                       b)  $\frac{4}{9}$                       c)  $\frac{2}{11}$                       d)  $\frac{3}{11}$                       e)  $\frac{9}{22}$

25. A 15-ft ladder is leaning against a wall. The base of the ladder is 5 feet from the wall. Which of the following is the best approximation of the height of the ladder above the ground?

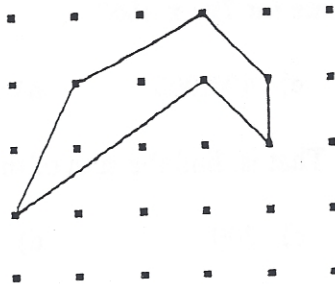
- a) 15 feet                      b) 14 feet                      c) 13 feet                      d) 12 feet                      e) 11 feet

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



- a)  $180^\circ$                       b)  $90^\circ$                       c)  $270^\circ$                       d)  $360^\circ$   
e) Since the star is irregular it is not possible to determine the sum of the interior angles.

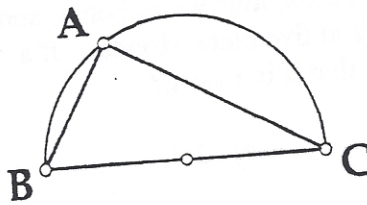
27. In the picture below, the horizontal and vertical distance between two dots is one unit. Find the area of the figure drawn.



- a) 4 sq. units                      b) 5 sq. units                      c) 3 sq. units                      d) 2 sq. units                      e) 6 sq. units

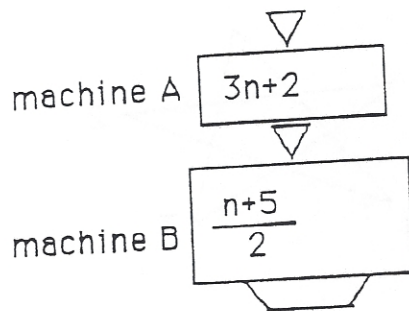


28. The following picture shows angle A inscribed in a semicircle. If the circle has radius one, and the length of segment AB is one, what is the length of segment AC?



- a)  $\sqrt{3}$       b)  $\sqrt{2}$       c) 2      d)  $\sqrt{5}$       e)  $\sqrt{6}$

29. The picture below shows two "function machines" that are connected. The number that comes out of machine A goes directly into machine B, and then machine B outputs a number. When 5 goes into machine A, 11 comes out of machine B. What number must be put into machine A to get an output of 14 from machine B?



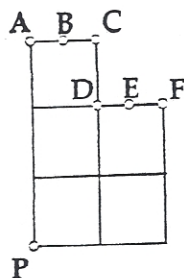
- a) 14      b) 7      c) 11      d) 23      e) 71
30. Sam's Hardware store has a number of bicycles and tricycles for sale. There are 27 seats and 60 wheels in all. How many bicycles does he have for sale?
- a) 21      b) 17      c) 6      d) 14      e) 20
31. Which of the following is the best estimate for  $792 \times 486$ ?
- a) 40,000      b) 280,000      c) 400,000      d) 320,000      e) 32,000
32. Find the sum  $1 + 3 + 5 + 7 + \dots + 199$ . That is, find the sum of the first 100 odd positive integers.
- a) 10,000      b) 20,000      c) 200      d) 500      e) 39,800
33. What is the measure of the angle between the hour hand and the minute hand of a clock at 3:30?
- a)  $45^\circ$       b)  $90^\circ$       c)  $35^\circ$       d)  $75^\circ$       e)  $85^\circ$



34. 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 15th triangular number?



- a) 15                      b) 75                      c) 200                      d) 120                      e) 500
35. Which of the following cannot be the lengths of the sides of a right triangle?  
 a) 5, 12, 13              b) 10, 24, 26              c) 5, 6, 7                      d) 3, 4, 5                      e) 6, 8, 10
36. Four couples are going steady. The girls' names are Kitty, Sarah, Josie and Anne. The boys' names (in some order) are David, Will, Gus and Floyd. Will is Josie's brother. Josie and Floyd dated some, but then Floyd met his present steady. Kitty and Gus are going steady. Anne has two brothers. Anne's boy friend is an only child. With whom is Will going steady?  
 a) Kitty              b) Sarah              c) Josie              d) Anne              e) cannot be determined
37. If the radius of a circle is 4 cm, then the best estimate for the circumference of the circle is  
 a) 13 cm              b) 20 cm              c) 50 cm              d) 30 cm              e) 25 cm
38. Sarah and Joe are driving race cars around a track. Sarah completes a lap around the track every 72 seconds and Joe every 68 seconds. If they are beside each other now, how long will it be before they are beside each other again the next time?  
 a) 81.6 minutes              b) 72 seconds              c) 4 seconds              d) 20.4 minutes              e) none of these
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

