~~2000~~ 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
~~2000~~
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
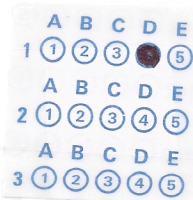
The correct answer is 1, which is d); so you would answer this problem by darkening the space on the answer sheet corresponding with this choice.

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.
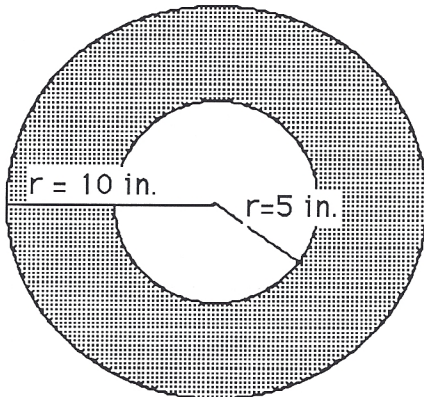
EIGHTH GRADE

1. The following geometric arrays suggest a sequence of numbers:

The next number in the sequence is:

a) 27
b) 48
c) 28
d) 24
e) 45

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

a) $\dfrac{1}{2}$

b) $\dfrac{2}{3}$

c) $\dfrac{1}{\pi}$

d) $\dfrac{\pi}{2}$

e) $\dfrac{3}{4}$

3. Mr. Peanut wants to mix peanuts that cost $1.50 per pound with fancy nuts that cost $3.00 per pound to produce a 50-pound mixture of nuts that costs $1.89 per pound. How many pounds of each should he use?

a) 37 pounds of peanuts, 13 pounds of fancy nuts
b) 25 pounds of peanuts, 25 pounds of fancy nuts
c) 20 pounds of peanuts, 30 pounds of fancy nuts
d) 40 pounds of peanuts, 10 pounds of fancy nuts
e) 35 pounds of peanuts, 15 pounds of fancy nuts

4. If the fraction $\frac{a}{b}$ is in simplest form with $0<a<b$ and $b = 2^5 \cdot 5^7$, how many digits appear to the right of the decimal point in its decimal expansion before it terminates?

a) 2
b) 5
c) 35
d) 7
e) 10

5. All of the arcs in the figure are semicircles. What fractional part of the larger semicircular region is shaded?

a) 12π
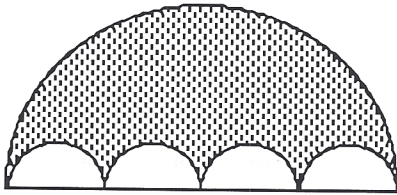
b) $\dfrac{1}{4}$

c) $\dfrac{1}{2}$

d) $\dfrac{2}{3}$

e) $\dfrac{3}{4}$

6. One of the tallest candles ever constructed was exhibited at the 1897 Stockholm Exhibition. If it cast a shadow 5 feet long at the same time that a pole 32 feet high cast a shadow 2 feet long, how tall was the candle?

a)   32 ft.
b)   100 ft.
c)   75 ft.
d)   80 ft.
e)   95 ft.

7. The letter "A" represents the units digit in the five digit number 15,71A.   If A is greater than zero and 6 divides the number, what is the value of A?

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

8. My car cost $13,500. It is now valued at $7,500.   To the nearest 1% what is the percent of depreciation?

a) 56%
b) 80%
c) 44%
d) 225%
e) 33%

9. If the two lines whose equations are $y = ex + f$ and $y = gx + h$ are perpendicular then:

a) $e = g$ and $f = h$
b) $e = g$ and $f \neq h$
c) $e \cdot g = 0$
d) $e \cdot g = -1$
e) $e \cdot g = 1$

10. One third of a herd of wild horses is sickly. The probability of a sickly horse dying during the winter is one half and the probability of a well horse dying is one fifth. What is the probability of a horse, selected at random, dying during the winter?

a) $\dfrac{3}{10}$

b) $\dfrac{7}{10}$

c) $\dfrac{1}{6}$

d) $\dfrac{2}{15}$

e) $\dfrac{2}{3}$

11. During the first half of a basketball game a team made 70% of their 30 field goal attempts. During the second half they made 30% of 50 attempts. To the nearest 1%, what was their field goal percentage for the entire game?

a) 50%
b) 45%
c) 40%
d) 35%
e) 55%

12. A box contains 5 blue cards and 4 white cards. If two cards are drawn, one at a time, find the probability that both cards are blue if the draws are made without replacement.

a) $\dfrac{5}{9}$

b) $\dfrac{5}{8}$

c) $\dfrac{8}{9}$

d) $\dfrac{25}{81}$

e) $\dfrac{5}{18}$

13. How many four digit numbers can be formed using the digits 2, 4, 6 and 8 if the ones digit must be a power of 2? No digit may be used more than once.

a) 24
b) 9
c) 12
d) 18
e) 6

14. Determine the number of diagonals in a 20-sided convex polygon.

a) 170
b) 400
c) 240
d) 190
e) 380

15. On September 1, 1998, the mean (average) age of the 35 teachers at Fry Middle school was 44 years. On September 1, 1999, three teachers ages 65, 62 and 54 retired and were replaced by 2 teachers ages 25 and 32. To the nearest whole year, what was the mean age of the teachers on September 1, 1999?

a) 37 years
b) 39 years
c) 40 years
d) 42 years
e) 43 years

16. Determine the sum of the measures of the interior angles in the pentagon ABCDE.
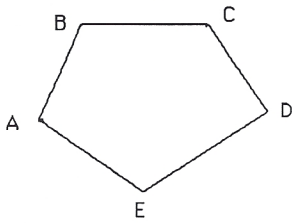
a) 180°
b) 360°
c) 540°
d) 720°
e) 300°

17. Seven red balls numbered 1 through 7 and five blue balls numbered 1 through 5 are placed in a bowl. If one ball is drawn at random, what is the probability that it is numbered 4 or is blue?

a) $\dfrac{5}{12}$

b) $\dfrac{1}{2}$

c) $\dfrac{7}{12}$

d) $\dfrac{3}{4}$

e) $\dfrac{1}{3}$

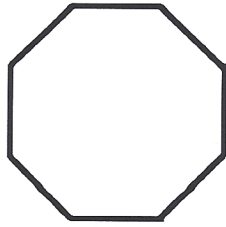18. Triangle ABC is similar to triangle EDC. What is the value of x?
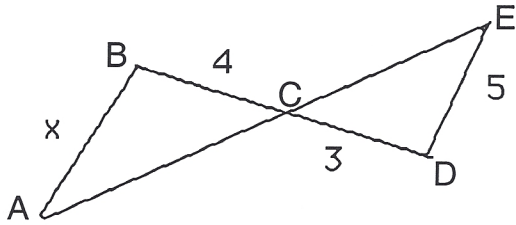
a) 5

b) $\dfrac{15}{4}$

c) 12

d) $\dfrac{20}{3}$

e) 60

19. In the following picture lines m and n are parallel. Find the measure of the angle identified with the number 7.
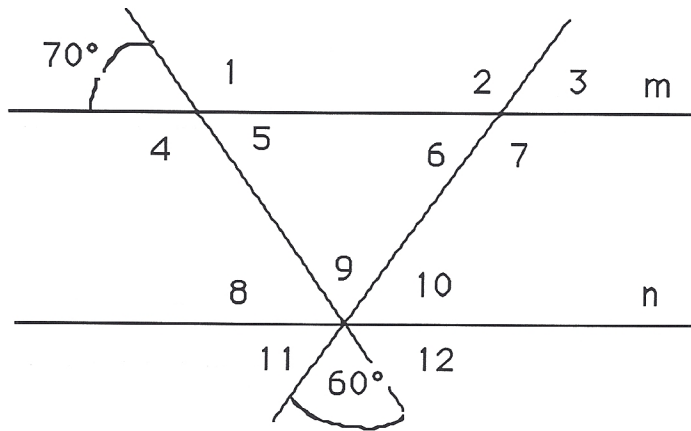
a) 120°
b) 125°
c) 130°
d) 135°
e) 140°

20. The number of lines of symmetry for the regular octagon pictured is:

a) 4
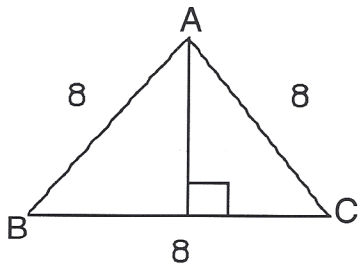b) 6
c) 8
d) 10
e) 12

21. How many lines are determined by 7 points in a plane, no three of which lie on the same line?

a) 7
b) 49
c) 42
d) 21
e) 18

22. What is the area of the equilateral triangle ABC?

a) $16\sqrt{3}$
b) $32\sqrt{3}$
c) 32
d) 64
e) 24

23. We want to trace the figure shown below without lifting the pencil in such a way that each edge of the figure is traced exactly once. (There are two edges connecting vertices A and B; one is straight and the other is curved.) It is permissible to visit a vertex more than once. Which of the statements is false?
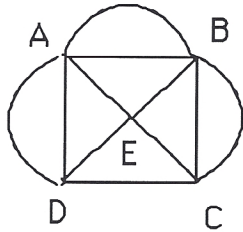
a) To trace this figure, if you start at A, you must end at B.
b) If you start at B, you must end at A.
c) It is not possible to trace this figure if you start at C, D or E.
d) If you start at A or B, it is possible to trace this figure.
e) It is possible to start at E and end at E.


24. Find the area of the polygon pictured.
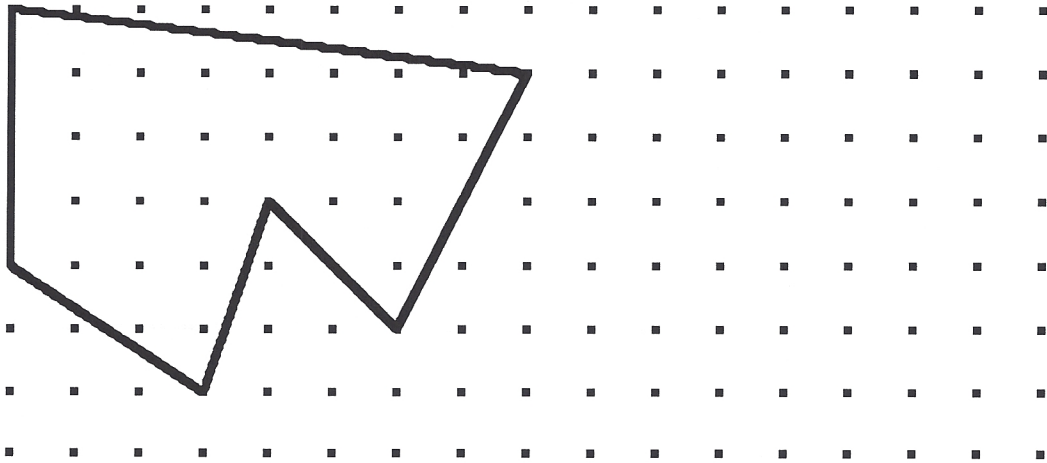
a) 27.5 sq. units
b) 28.5 sq. units
c) 29.5 sq. units
d) 30.5 sq. units
e) cannot be determined

25. 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 white?
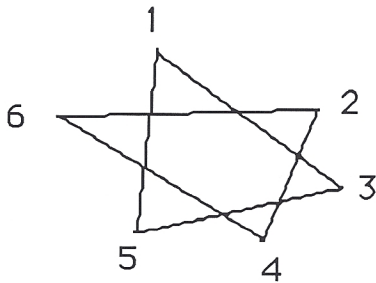
a) $\dfrac{5}{11}$

b) $\dfrac{4}{9}$

c) $\dfrac{2}{11}$

d) $\dfrac{3}{11}$

e) $\dfrac{9}{22}$

26. Find the area of the sector of the circle shown.

r=2cm

250^0

a) 4π sq. cm
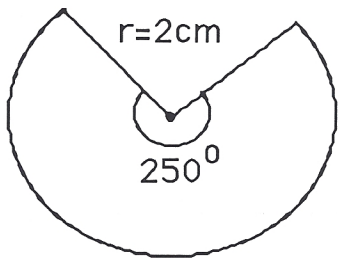
b) 8π sq. cm

c) $\dfrac{50\pi}{9}$ sq. cm

d) $\dfrac{25\pi}{9}$ sq. cm

e) 6π sq. cm

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

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

28. How many terms are in this arithmetic sequence?
$$5, 12, 19, 26, 33, 40, \ldots, 355$$

a) 50
b) 51
c) 7
d) 355
e) 49

29. The following picture (not necessarily drawn to scale) shows angle A inscribed in a semicircle. If the circle has radius of two, and the length of segment AB is two, what is the length of segment AC?
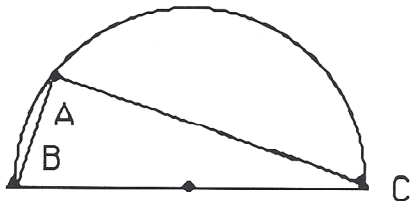
a) $2\sqrt{3}$
b) $2\sqrt{2}$

c) 2

d) $2\sqrt{5}$

e) 4

30. What is this sum?   6 + 9 + 12 + . . . + 303

a) 330
b) 30,531
c) 30,900
d) 15,295.5
e) 15,450

31. Sam's Hardware store has a number of bicycles and tricycles for sale. There are 25 seats and 60 wheels in all. How many bicycles does he have for sale?

a) 25
b) 10
c) 7
d) 15
e) 20

32. How many positive divisors does 462 have?

a) 2
b) 4
c) 6
d) 20
e) 16

33. What is the sum of the first 50 odd positive integers (1+3+5+7+ . . . +99)?

a) 2500
b) 5000
c) 100
d) 250
e) 225

34. Find the least number divisible by 7, 8, 9, 10, 11, and 12.

a) 27,720
b) 83,160
c) 166,320
d) 9240
e) 13,860

35. There are 108 Star Bangs in a jumbo bag. There are 72 Choco Yums in their largest size bag. You are giving candy away at the Pep Rally. You want to have the same number of Star Bangs as Choco Yums, but you do not want any leftover candy. What is the least number of bags of each kind of candy you should buy?

a) 1 bag of each
b) 2 bags of Star Bangs and 3 bags of Choco Yums
c) 3 bags of Star Bangs and 2 bags of Choco Yums
d) 3 bags of Star Bangs and 4 bags of Choco Yums
e) 2 bags of Star Bangs and 4 bags of Choco Yums

36. Ace Real Estate Company receives a 6% commission on property that they sell. If they received a commission of $4530 from the sale of a house, what was the selling price of the house?

a) $75,000
b) $75,500
c) $80,000
d) $80,500
e) $90,000

37. The sequence of triangular numbers can be illustrated by arranging dots into triangular arrays. Below is a figure showing how the first 4 triangular arrays are formed. What is the eleventh triangular number?

1   3   6   10

a) 11
b) 25
c) 33
d) 55
e) 66

8-13

38. How many different five-letter "words" can be formed using the letters in "APPLE"? (For our purposes, PPLEA is a "word.")

a) 60
b) 30
c) 120
d) 20
e) 40

39. Four students are walking down the hall at school in this order: Beth, Tim, Mike, and Sue. The distance from Beth to Sue is 74 feet. Mike is 2 feet closer to Sue than he is to Tim. It is twice as far from Beth to Tim as it is from Mike to Sue. Mike is 56 feet behind Beth. How far is Tim from Mike?

a) 2 feet
b) 18 feet
c) 20 feet
d) 27 feet
e) 36 feet

40. According to Farmer Brown's statistics, "a hen and a half will lay an egg and a half in a day and a half." If his chickens continue to produce at this rate, how many eggs will 12 hens lay in 12 days? (From Readers Digest circa. 1948)

a) 12
b) 36
c) 72
d) 96
e) 144