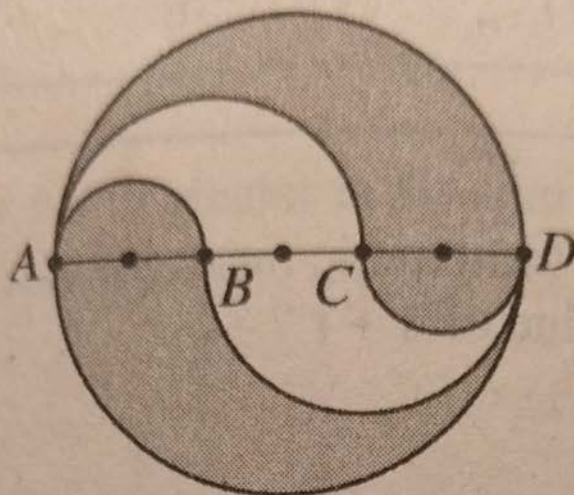


x	$f(x)$
2	-1
3	0
4	2
5	-3
6	4
7	-5
8	6

16. Several values of the function f are shown above.

The function g is defined by $g(x) = f(3x + 1)$. What is the value of $g(2)$?

- (A) -5
- (B) -1
- (C) 0
- (D) 2
- (E) 4



17. Semicircular arcs \widehat{AB} , \widehat{AC} , \widehat{BD} , and \widehat{CD} divide the circle above into regions. The points shown along the diameter \overline{AD} divide it into 6 equal parts. If $AD = 6$, what is the total area of the shaded regions?

- (A) 4π
- (B) 5π
- (C) 6π
- (D) 12π
- (E) 24π

18. Any 2 points determine a line. If there are 6 points in a plane, no 3 of which lie on the same line, how many lines are determined by pairs of these 6 points?

- (A) 15
- (B) 18
- (C) 20
- (D) 30
- (E) 36

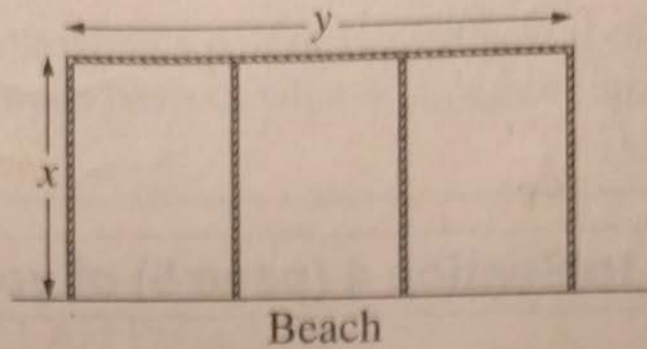
19. A certain function f has the property that $f(x + y) = f(x) + f(y)$ for all values of x and y . Which of the following statements must be true when $a = b$?

I. $f(a + b) = 2f(a)$

II. $f(a + b) = [f(a)]^2$

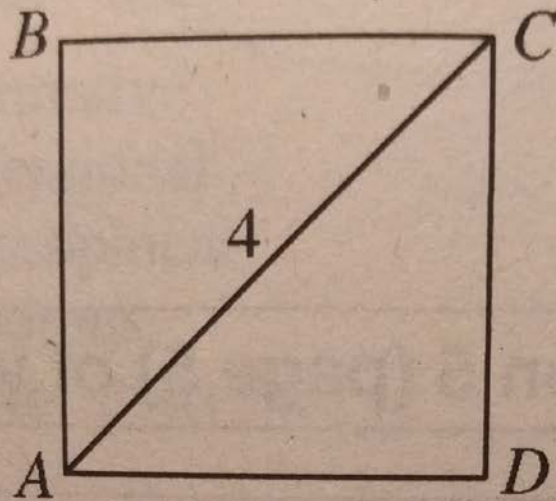
III. $f(b) + f(b) = f(2a)$

- (A) None
- (B) I only
- (C) I and III only
- (D) II and III only
- (E) I, II, and III



20. At a beach, a rectangular swimming area with dimensions x and y meters and a total area of 4,000 square meters is marked off on three sides with rope, as shown above, and bounded on the fourth side by the beach. Additionally, rope is used to divide the area into three smaller rectangular sections. In terms of y , what is the total length, in meters, of the rope that is needed both to bound the three sides of the area and to divide it into sections?

- (A) $y + \frac{4,000}{y}$
- (B) $y + \frac{16,000}{y}$
- (C) $y + \frac{16,000}{3y}$
- (D) $3y + \frac{8,000}{3y}$
- (E) $3y + \frac{16,000}{3y}$



5. What is the area of square $ABCD$ above?

- (A) 8
- (B) 12
- (C) 16
- (D) 20
- (E) 24

7. Point A is a vertex of an 8-sided polygon. The polygon has 8 sides of equal length and 8 angles of equal measure. When all possible diagonals are drawn from point A in the polygon, how many triangles are formed?

- (A) Four
- (B) Five
- (C) Six
- (D) Seven
- (E) Eight

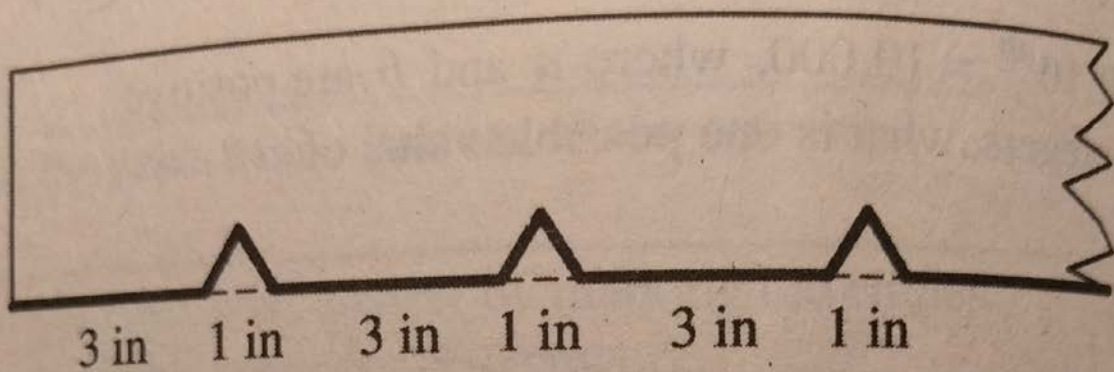
$$(x - 8)(x - k) = x^2 - 5kx + m$$

8. In the equation above, k and m are constants. If the equation is true for all values of x , what is the value of m ?

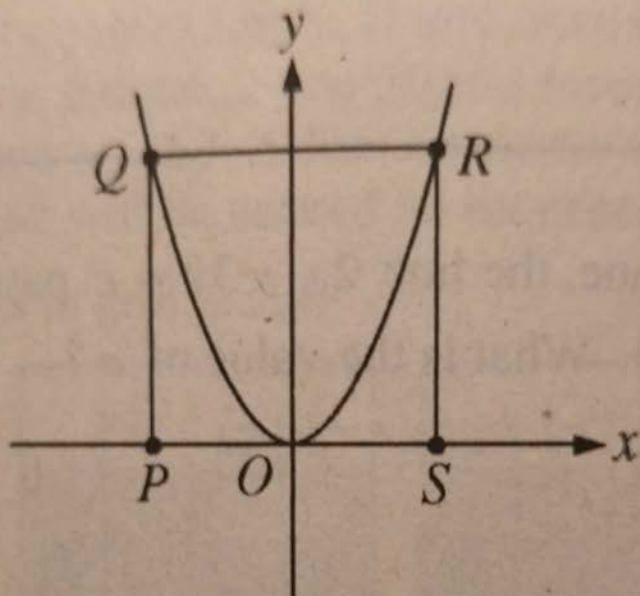
- (A) 8
- (B) 16
- (C) 24
- (D) 32
- (E) 40

1, 2, 2, 3, 3, 3, 4, 4, 4, 4, . . .

16. All positive integers appear in the sequence above, and each positive integer k appears in the sequence k times. In the sequence, each term after the first is greater than or equal to each of the terms before it. If the integer 12 first appears in the sequence as the n th term, what is the value of n ?



17. One end of an 80-inch-long paper strip is shown in the figure above. The notched edge, shown in bold, was formed by removing an equilateral triangle from the end of each 4-inch length on one edge of the paper strip. What is the total length, in inches, of the bold notched edge on the 80-inch paper strip?



18. In the figure above, $PQRS$ is a square and points Q , R , and O lie on the graph of $y = ax^2$, where a is a constant. If the area of the square is 64, what is the value of a ?

13. In a certain game, each token has one of three possible values: 1 point, 5 points, or 10 points. How many different combinations of these token values are worth a total of 17 points?

- (A) Two
- (B) Three
- (C) Four
- (D) Five
- (E) Six

2, -4, 8, ...

15. The first term of the sequence above is 2, and every term after the first term is -2 times the preceding term. How many of the first 50 terms of this sequence are less than 100 ?

- (A) 22
- (B) 25
- (C) 28
- (D) 30
- (E) 37

16. A cube with volume 8 cubic centimeters is inscribed in a sphere so that each vertex of the cube touches the sphere. What is the length of the diameter, in centimeters, of the sphere?

(A) 2

(B) $\sqrt{6}$ (approximately 2.45)

(C) 2.5

(D) $2\sqrt{3}$ (approximately 3.46)

(E) 4