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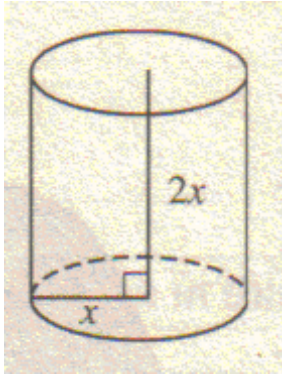
Online Homework

Focused Exercises for Math SAT

Skill Set 12: Geometry - 2D Figures and 3D Solids

Many of the problems in this exercise set came from The College Board, writers of the SAT exam.

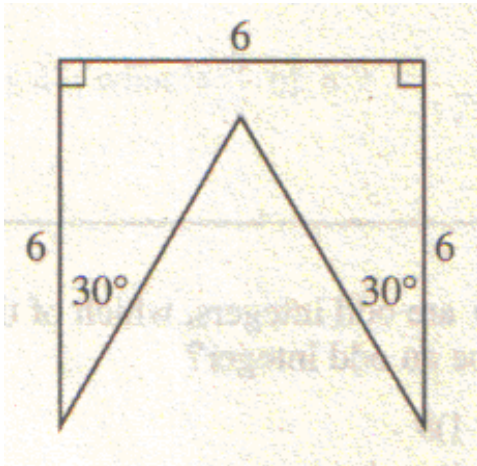
1.



Which of the following has the same volume as the cylinder shown above with radius x and height $2x$?

- (A) A cylinder with radius $2x$ and height x
- (B) A cylinder with radius $2\pi x$ and height x
- (C) A cube with edge $2x$
- (D) A cube with edge $2\pi x$
- (E) A rectangular solid with dimensions x , $2x$ and πx

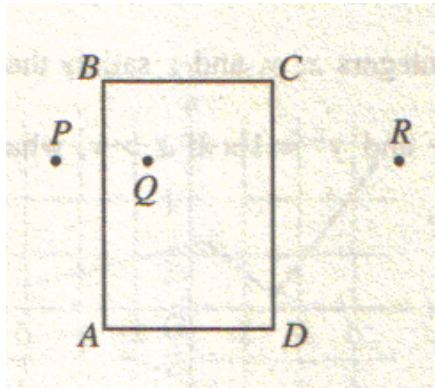
2.



What is the perimeter of the figure above?

- (A) 24
- (B) 25
- (C) 28
- (D) 30
- (E) 36

3.

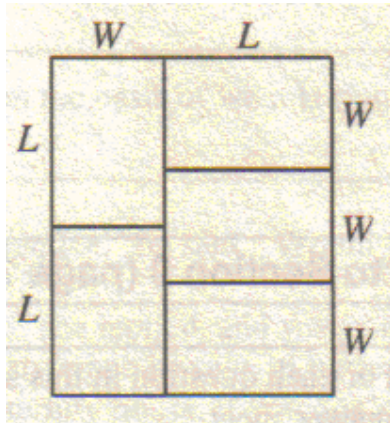


NOTE: Figure not drawn to scale.

In the figure above, $ABCD$ is a rectangle with $\overline{BC} = 4$ and $\overline{AB} = 6$. Points P , Q , and R are different points on a line (not shown) that is parallel to \overline{AD} . Points P and Q are symmetric about side \overline{AB} and points Q and R are symmetric about side \overline{CD} . What is the length of \overline{PR} ?

- (A) 6
 - (B) 8
 - (C) 10
 - (D) 12
 - (E) 20
4. If the perimeter of a rectangle is 10 times the width of the rectangle, then the length of the rectangle is how many times the width?
5. A right circular cylinder with radius 5 and height 4 has volume v . In terms of v , what is the volume of a right circular cylinder with radius 5 and height 8 ?
- (A) $v + 4$
 - (B) $2v$
 - (C) $4v$
 - (D) $6v$
 - (E) $8v$

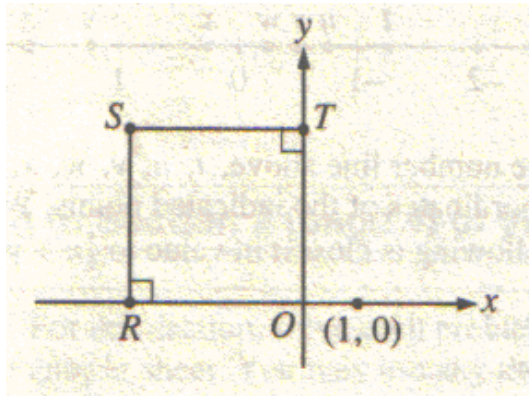
6.



The pattern shown above is composed of rectangles. This pattern is used repeatedly to completely cover a rectangular region $12L$ units long and $10L$ units wide. How many rectangles of dimension L by W are needed?

- (A) 30
- (B) 36
- (C) 100
- (D) 150
- (E) 180

7.



In the figure above, $RS = ST$ and the coordinates of S are $(k, 3)$. What is the value of k ?

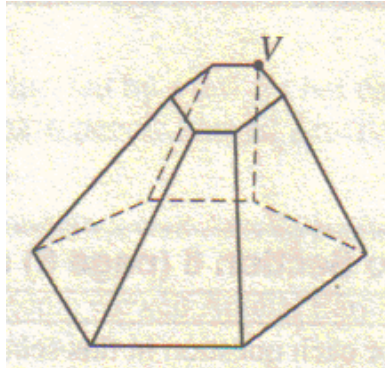
- (A) -3
- (B) $-\sqrt{3}$
- (C) 0
- (D) $\sqrt{3}$
- (E) 3

8. How many cubical blocks, each with edges of length 4 centimeters, are needed to fill a rectangular box that has inside dimensions 20 centimeters by 24 centimeters by 32 centimeters?

- (A) 38
- (B) 96
- (C) 192
- (D) 240
- (E) 384

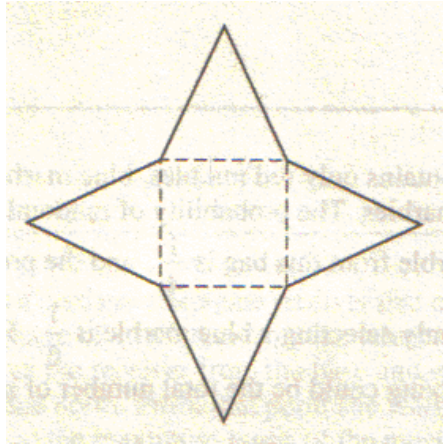
9. The perimeter of a rectangular plot of land is 250 meters. If the length of one side of the plot is 40 meters, what is the area of the plot, in square meters?

10.



The three-dimensional figure above has two parallel bases and 18 edges. Line segments are to be drawn connecting vertex V with each of the other 11 vertices in the figure. How many of these segments will not lie on an edge of the figure?

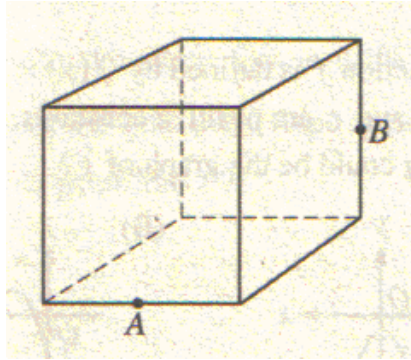
11.



If the area of the square in the figure above is 81 and the perimeter of each of the 4 triangles is 30, what is the perimeter of the figure outlined by the solid line?

- (A) 36
 - (B) 72
 - (C) 80
 - (D) 84
 - (E) 120
12. If the volume of a cube is 8, what is the shortest distance from the center of the cube to the base of the cube?
- (A) 1
 - (B) 2
 - (C) 4
 - (D) $\sqrt{2}$
 - (E) $2\sqrt{2}$

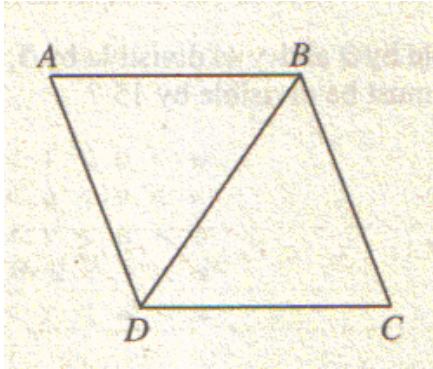
13.



The cube shown above has edges of length 2, and A and B are midpoints of two of the edges. What is the length of \overline{AB} (not shown) ?

- (A) $\sqrt{2}$
 - (B) $\sqrt{3}$
 - (C) $\sqrt{5}$
 - (D) $\sqrt{6}$
 - (E) $\sqrt{10}$
14. When each side of a given square is lengthened by 2 inches, the area is increased by 40 square inches. What is the length, in inches, of a side of the original square?
- (A) 4
 - (B) 6
 - (C) 8
 - (D) 9
 - (E) 10

15.

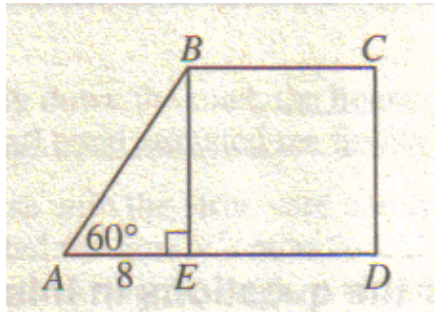


NOTE: Figure not drawn to scale.

If the five line segments in the figure above are all congruent, what is the ratio of the length of \overline{AC} (not shown) to the length of \overline{BD} ?

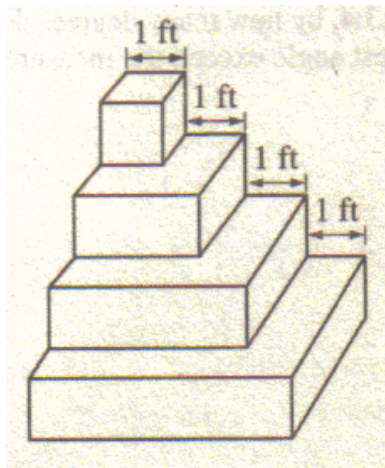
- (A) $\sqrt{2}$ to 1
 - (B) $\sqrt{3}$ to 1
 - (C) $\sqrt{2}$ to 2
 - (D) $\sqrt{3}$ to 2
 - (E) $\sqrt{3}$ to $\sqrt{2}$
16. Five balls, each of radius $2\frac{1}{2}$ inches, are placed side by side in a straight row with adjacent balls touching. What is the distance, in inches, between the center of the first ball and the center of the last ball?
- (A) 15
 - (B) $17\frac{1}{2}$
 - (C) 20
 - (D) $22\frac{1}{2}$
 - (E) 25

17.



In the figure above, $EBCD$ is a square and $AE = 8$. What is the area of $EBCD$?

18.



The figure above shows the dimensions of a pedestal constructed of 4 layers of marble. Each layer is a rectangular solid that is 1 foot high and has a square base. How many cubic feet of marble make up the pedestal?

- (A) 14
- (B) 16
- (C) 30
- (D) 36
- (E) 80

19. In rectangle $ABCD$, point E is the midpoint of side BC . If the area of quadrilateral $ABED$ is $\frac{2}{3}$, what is the area of rectangle $ABCD$?

(A) $\frac{1}{2}$

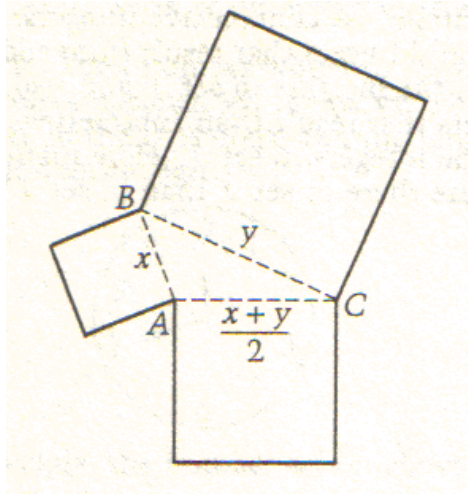
(B) $\frac{3}{4}$

(C) $\frac{8}{9}$

(D) 1

(E) $\frac{8}{3}$

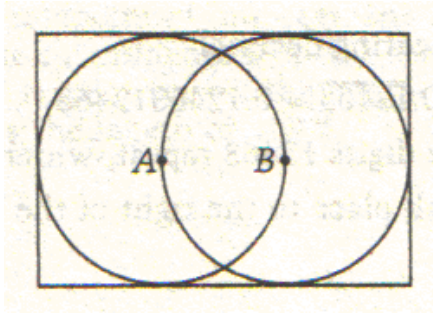
20.



In the figure above, triangle ABC has sides of length x , y , and $\frac{x+y}{2}$. On each side, a square is constructed as shown. What is the sum of the lengths of the sides of the resulting 9-sided figure, in terms of x and y ?

- (A) $\frac{9x + 9y}{2}$
- (B) $\frac{7x + 7y}{2}$
- (C) $\frac{3x + 3y}{2}$
- (D) $5x + 5y$
- (E) $4x + 4y$

21.



In the figure above, A and B are the centers of the two circles. If each circle has area 10, what is the area of the rectangle?

(A) 20

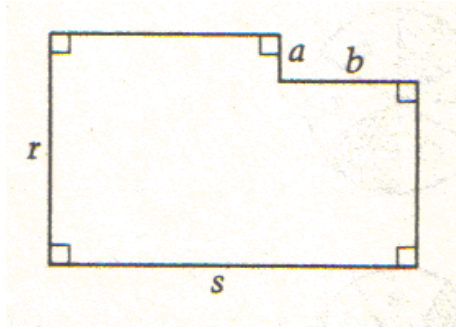
(B) $20 - \frac{10}{\pi}$

(C) $\frac{40}{\pi}$

(D) $\frac{50}{\pi}$

(E) $\frac{60}{\pi}$

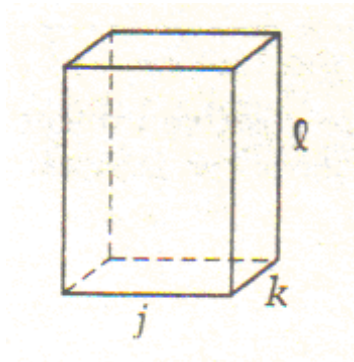
22.



Which of the following is equal to the perimeter of the figure above?

- (A) $r + s + a + b$
- (B) $2r + s + (a + b)$
- (C) $2(r + s) - (a + b)$
- (D) $2(r + s) + (a + b)$
- (E) $2(r + s)$

23.



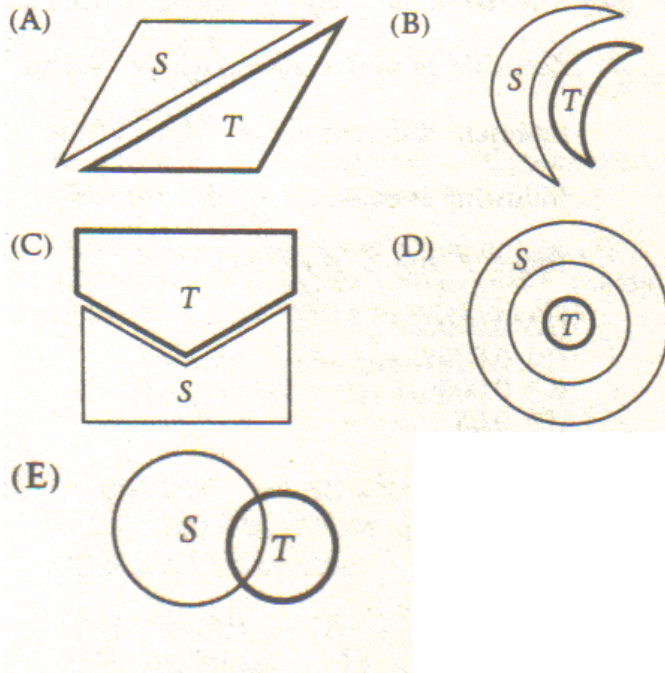
In the figure above, the area of the base of the rectangular box is 21 and the area of one of the faces is 30. Each of the dimensions j , k , and l is an integer greater than 1. What is the volume of the rectangular box?

24. In a plane, lines are drawn through a given point O so that the measure of each non-overlapping angle formed about point O is 60° . How many different lines are there?
- (A) Two
 - (B) Three
 - (C) Four
 - (D) Five
 - (E) Six

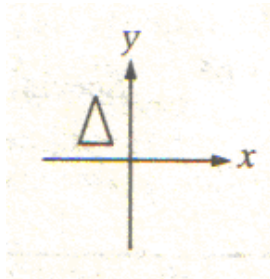
25. In a plane, two regions, S and T , are called "unlinked" if

- (1) S has no points in common with T , and
- (2) Any line segment that can be drawn with both endpoints in S has no points in common with any line segment that can be drawn with both endpoints in T .

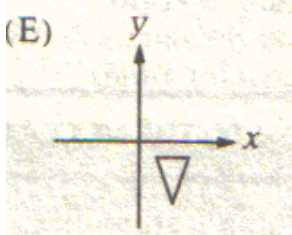
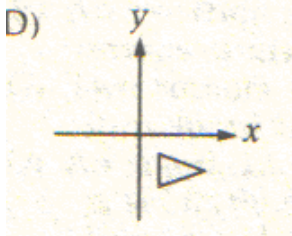
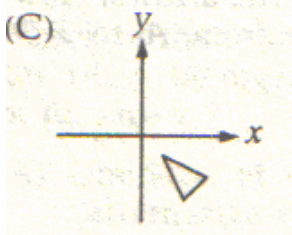
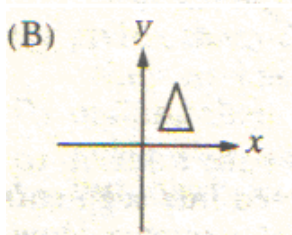
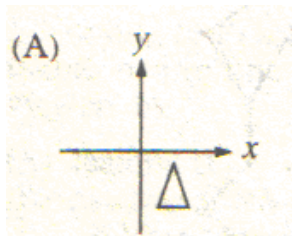
Which of the following shows a pair of regions that are unlinked?



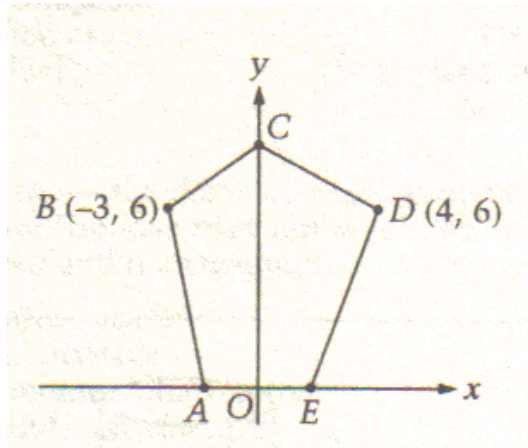
26.



The triangle in the figure above is to be reflected across the x-axis and then reflected across the y-axis. Which of the following shows the resulting position of the triangle?



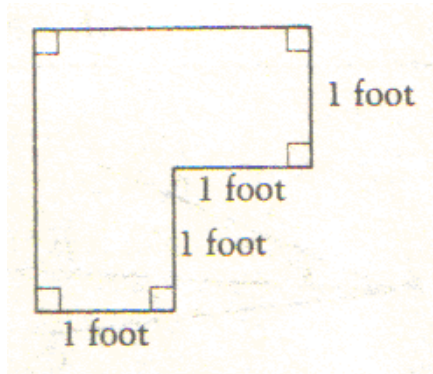
27.



In pentagon ABCDE above, how many diagonals with positive slope can be drawn?

- (A) None
- (B) One
- (C) Two
- (D) Three
- (E) Four

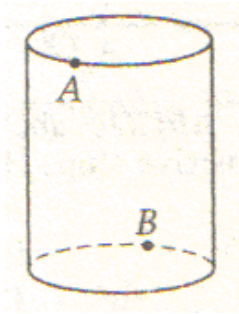
28.



How many tiles of the size and shape shown above are needed to completely cover a rectangular floor measuring 30 feet by 20 feet?

- (A) 120
- (B) 150
- (C) 200
- (D) 250
- (E) 300

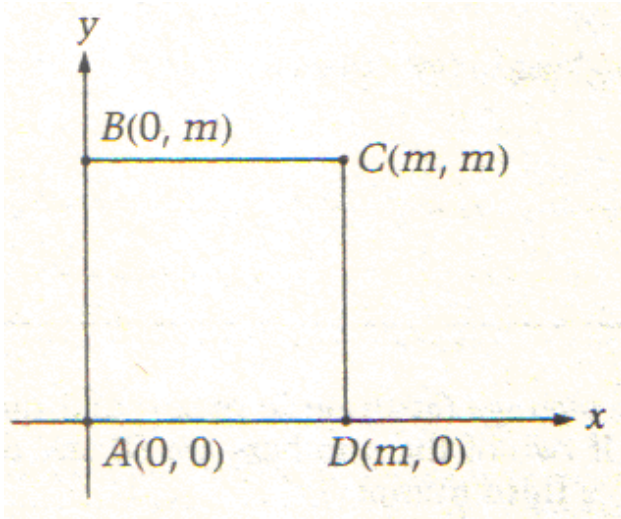
29.



The figure above shows a cylinder with radius 2 and height 5. If points A and B lie on the circumference of the top and bottom of the cylinder, respectively, what is the greatest possible straight-line distance between A and B ?

- (A) 3
- (B) 5
- (C) 7
- (D) $\sqrt{29}$
- (E) $\sqrt{41}$

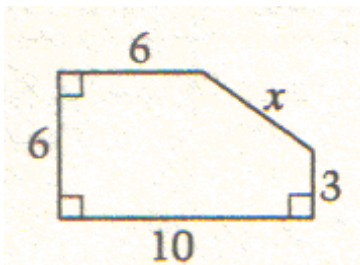
30.



In the figure above, what is the area of square $ABCD$?

- (A) m
- (B) $2m$
- (C) $4m$
- (D) $\frac{1}{2}m^2$
- (E) m^2

31.



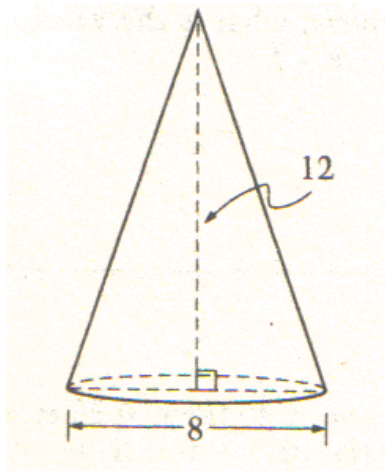
Note: Figure not drawn to scale.

What is the perimeter of the figure shown above?

32. How many solid wood cubes, each with a total surface area of 96 square centimeters, can be cut from a solid wood cube with a total surface area of 2,400 square centimeters if no wood is lost in the cutting?

- (A) 5
- (B) 25
- (C) 30
- (D) 80
- (E) 125

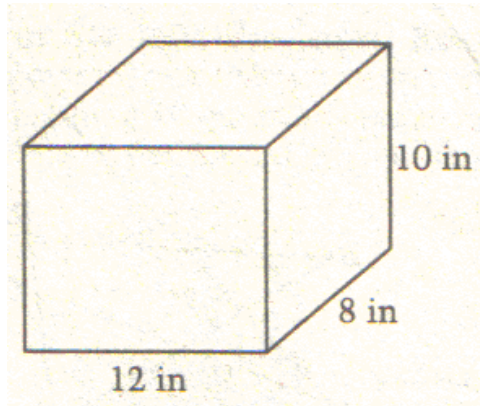
33.



The right circular cone shown above is to be cut by a plane parallel to the base to form a new, smaller cone. If the diameter of the base of the smaller cone is 3, what is its height?

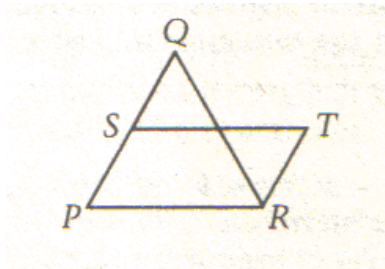
- (A) 4
- (B) 4.5
- (C) 5
- (D) 5.5
- (E) 6

34.



A solid block of wood with dimensions as shown in the figure above is to be painted on all of its faces. What is the total area (in square inches) to be painted?

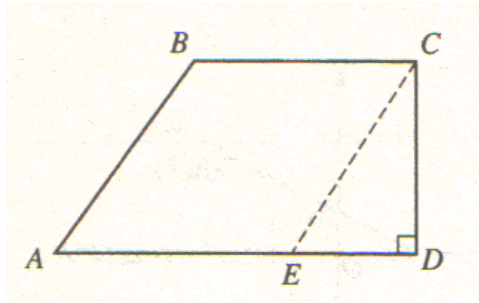
35.



In the figure above, $\triangle PQR$ is equilateral and $PSTR$ is a parallelogram. If S is the midpoint of PQ and the perimeter of $\triangle PQR$ is 6, what is the perimeter of $PSTR$?

- (A) 9
 - (B) 8
 - (C) 6
 - (D) 4
 - (E) 3
36. Circle C has radius $\sqrt{2}$. Squares with sides of length 1 are to be drawn so that, for each square, one vertex is on circle C and the rest of the square is inside circle C . What is the greatest number of such squares that can be drawn if the squares do not have overlapping areas?
- (A) None
 - (B) One
 - (C) Two
 - (D) Three
 - (E) Four

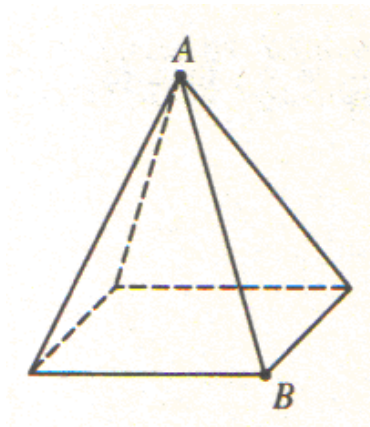
37.



In the figure above, the length of CD is 4, and the length of each side of quadrilateral $ABCE$ is 5. What is the area of quadrilateral $ABCD$?

- (A) 32
- (B) 28
- (C) 27
- (D) 26
- (E) 22

38.

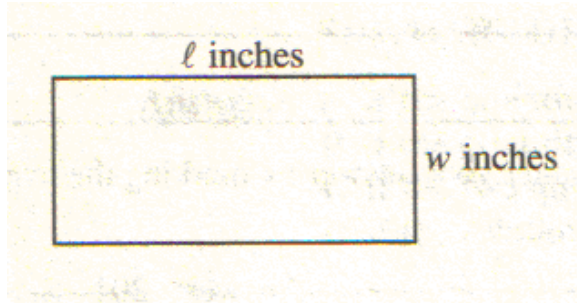


The pyramid above has a square base and four identical triangular faces. The height of the pyramid is 5 inches and each edge of the base is 4 inches long. What is the length of AB , in inches?

- (A) $\sqrt{29}$ (approximately 5.39)
- (B) $\sqrt{33}$ (approximately 5.74)
- (C) $\sqrt{39}$ (approximately 6.24)
- (D) $\sqrt{43}$ (approximately 6.56)
- (E) $\sqrt{57}$ (approximately 7.55)

39. The length and width of a rectangle have integer values. If the area of the rectangle is 75, what is one possible value for the perimeter of the rectangle?

40.



Note: Figure not drawn to scale.

The perimeter of the rectangle above is p inches and the area of the rectangle is 36 square inches. If l and w are integers, what is one possible value of p ?