Instructions

- Always give exact answers.

  Right: $2\sqrt{2}$; $\frac{2}{3}$; π

  Wrong: 2.8284; 0.67; 3.14

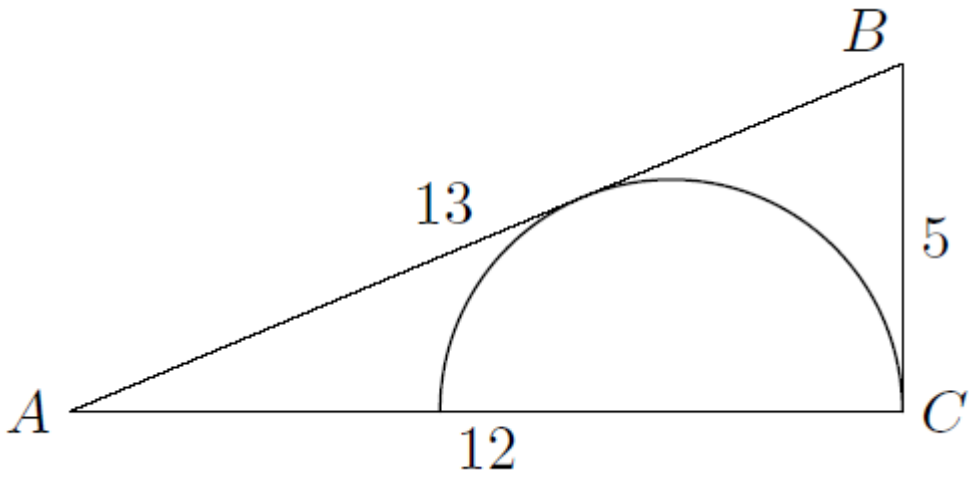
- Simplify answers. For example, 28/10 should be simplified to 14/5; $\sqrt{12}$ should be simplified to $2\sqrt{3}$; and $\frac{1}{\sqrt{5}}$ should be simplified to $\frac{\sqrt{5}}{5}$.

- Remember to include appropriate units in the answer.
- You may use a calculator.
- Diagrams are not necessarily to scale.

OABT is an isosceles trapezoid. Three vertices are *O* = (0,0), *A* = (15,0) and *B* = (12,8). What are the coordinates of the vertex *T*?

Answer: $(3, 8)$

In the right triangle ABC with legs of length 5 and 12. A semicircle is inscribed in the triangle. Find the radius of the semicircle.

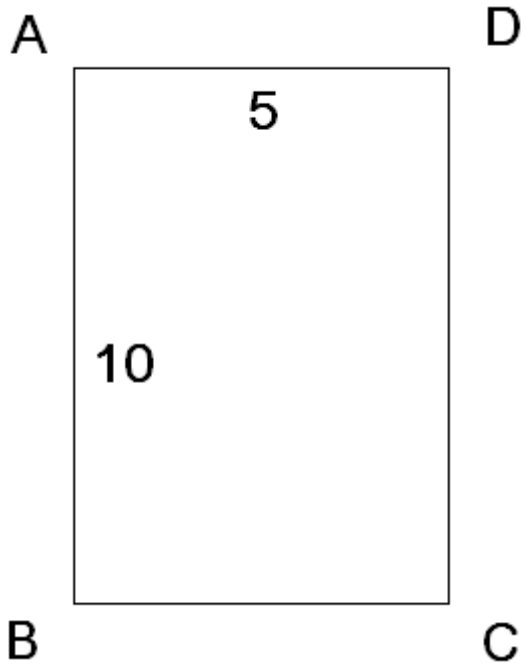


Answer: $\frac{10}{3}$

Eighteen segments of length 2.5 inches are joined at their endpoints to create a rectangle. What is the largest possible area of the rectangle?

Answer: 125 in^2

If the rectangle *ABCD* in the figure below is rotated 360° about side *AB* , what is the volume of the solid it generates?



Answer: 250π

Circle B passes through the center of circle A and is tangent to it. Circle C passes through the center of Circle B and is tangent to it. What fraction of the area of Circle A lies inside Circle B but outside C?

Answer: $\frac{3}{16}$

A 25-foot ladder is placed against a vertical wall of a building. The bottom of the ladder is 7 feet from the base of the building. If the top of the ladder slips 4 feet, find the distance that the bottom of the ladder will slide.

Answer: 8 feet

The point $A(-3, 2)$ is rotated 90° clockwise around the origin to point B. Point B is then reflected over the line $y = x$ to point C. What are the coordinates of C?

Answer: $(3, 2)$

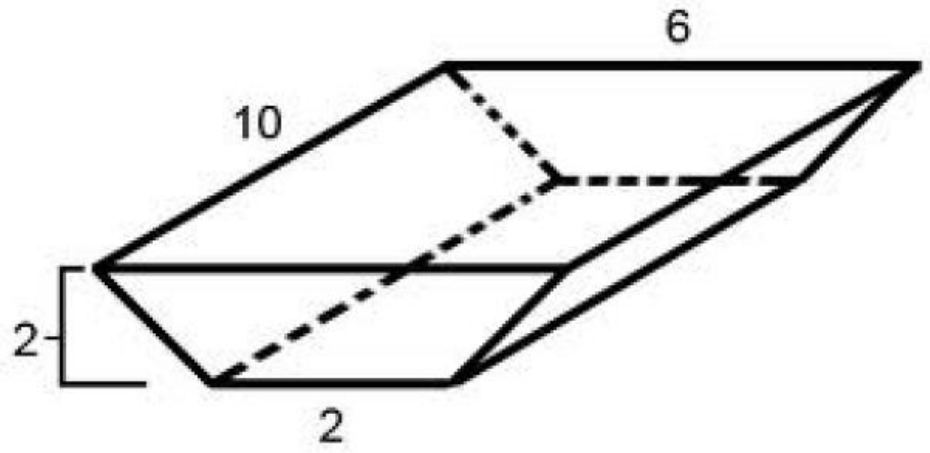
A rectangular box measures 6 x 4 x 2 feet. What is the length of the longest stick that can fit into the box?

Answer: $2\sqrt{14}$ ft

A circle is inscribed in a square of diagonal length 12 inches. What is the area of the circle?

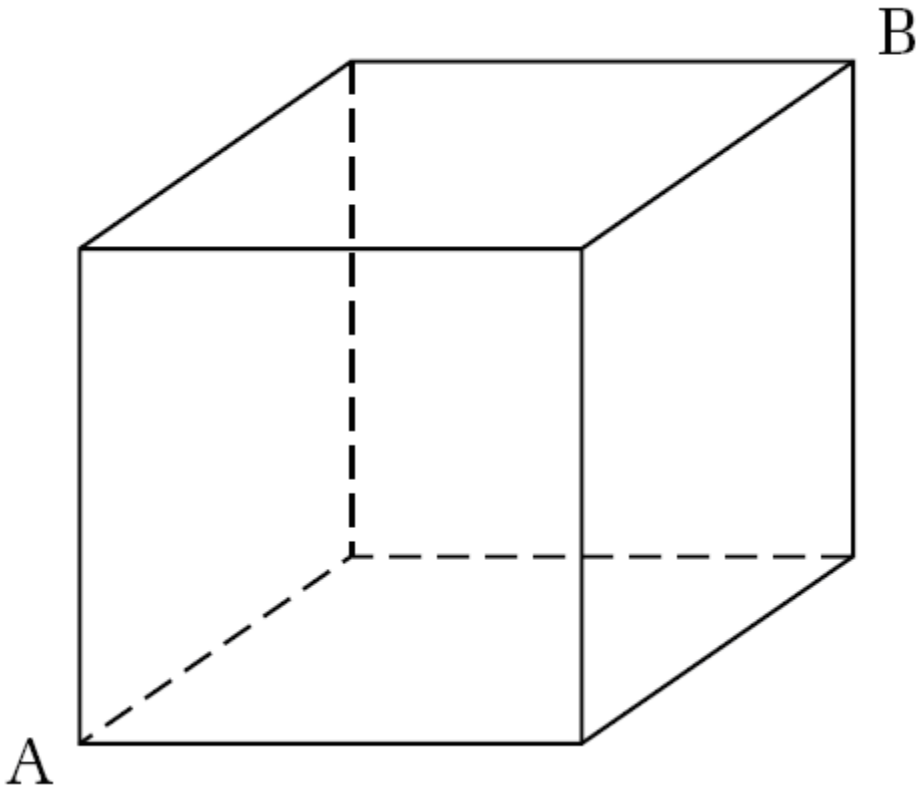
Answer: $18\pi \text{ in}^2$

A trapezoidal water trough is 10 feet long and 2 feet deep, see diagram. The lengths of each base of the isosceles trapezoid are 2 feet and 6 feet, respectively. What is the water depth when the trough is holding 12.5 cubic feet of water?



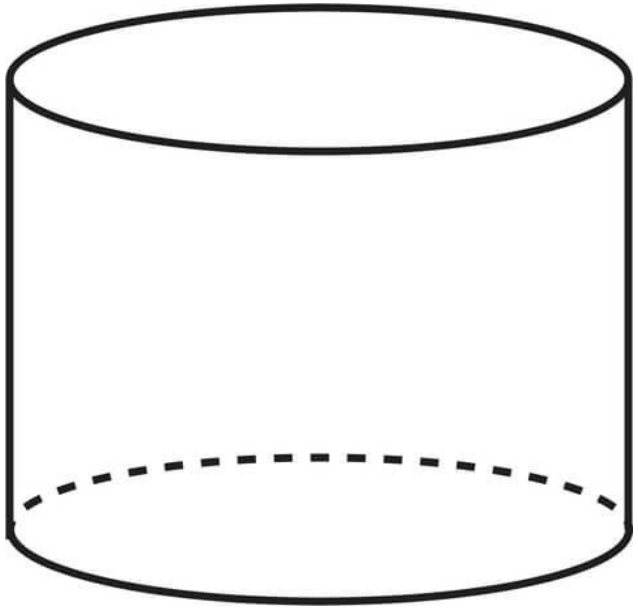
Answer: 0.5 ft

The edge of the cube in the figure below has a length of 5 cm. How many distinct paths along the edges from A to B have a length of exactly 15 cm?



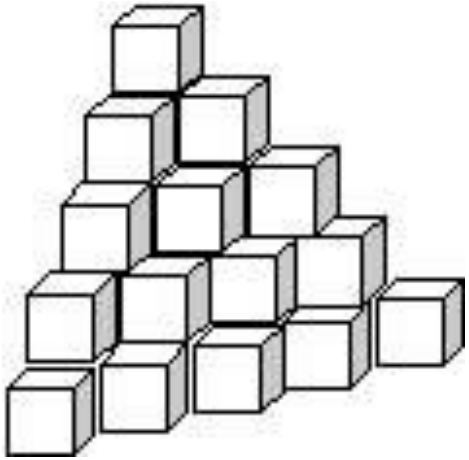
Answer: 6

Find the total surface area of a solid right circular cylinder having a radius of 10 inches and a height of 14 inches.



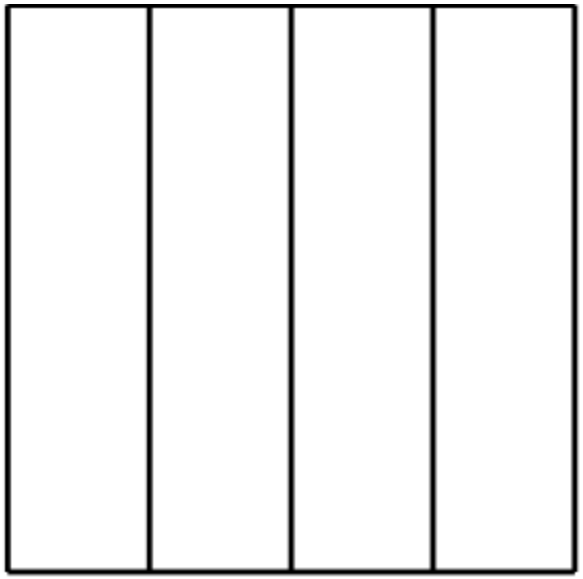
Answer: $480\pi \text{ in}^2$

The tower below is made up of five horizontal layers of cubes with no gaps. How many individual cubes are in the tower?



Answer: 35

The square below is divided into four congruent rectangles. The perimeter of each of the four congruent rectangles is 25 cm. What is the perimeter of the square?



Answer: 40 cm

Suppose that each side of a square tile is one unit in length. If the square-tile design sequence follows the pattern of the first three figures, what is the total area of the square-tile design in the 50th figure?

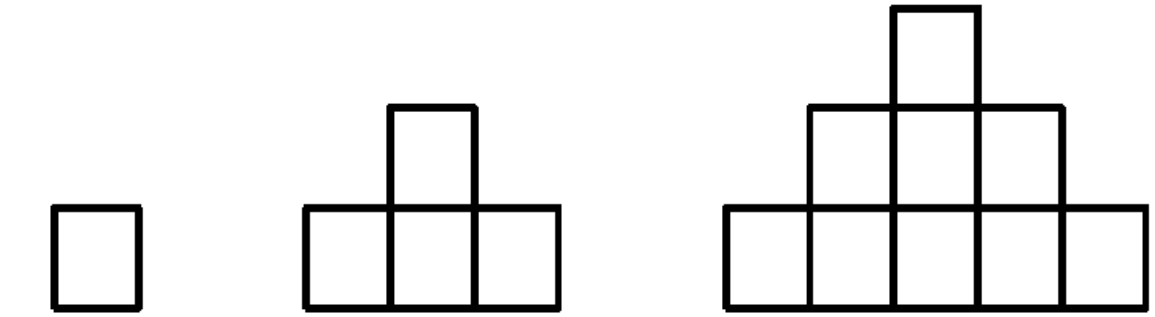
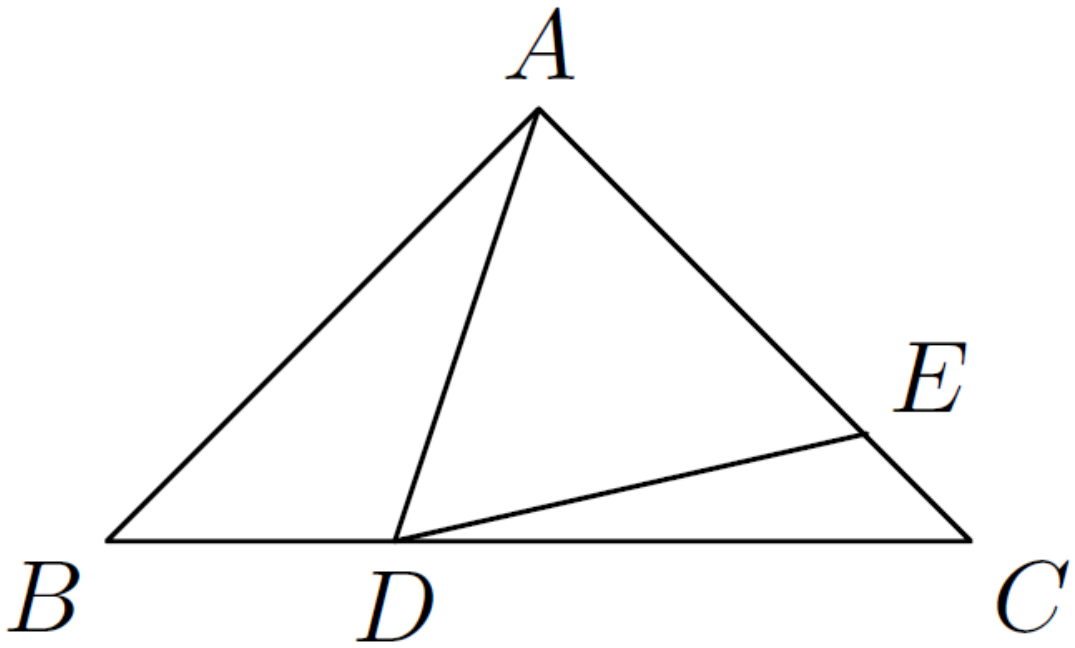


Figure 1 Figure 2 Figure 3

Answer: 2500

In the figure shown below, AB = AC, m∠BAD = 30º and AE = AD. Find m∠EDC.



Answer: 15°

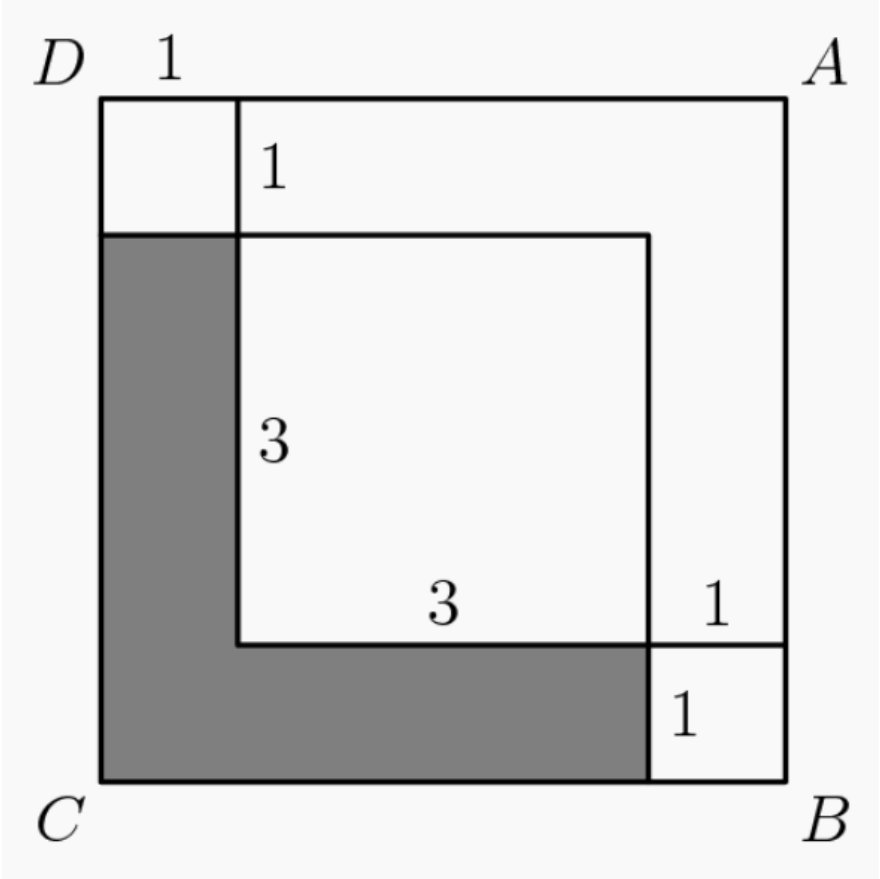
The volume of a sphere of diameter 16 cm is equal to the volume of a right circular cone whose diameter of the base is 32 cm. Determine the height of the cone.

Answer: 8 cm

A clock has a minute hand which is 10 inches long. Find the area swept out by the minute hand on any given day between 9:42 PM and 9:47 PM.

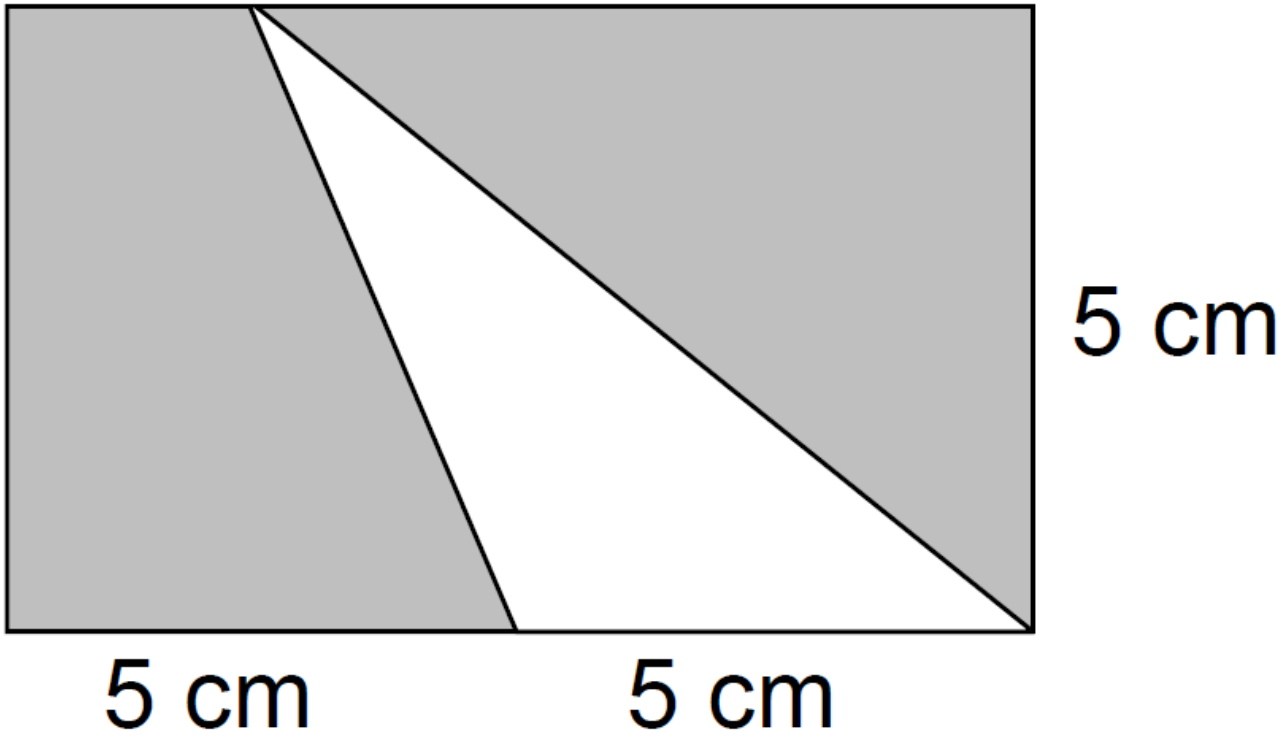
Answer: $\frac{25\pi}{3}\ \text{in}^2$

Figure *ABCD* is a square. Inside this square three smaller squares are drawn with the side lengths as labeled. Find the area of the shaded L-shaped region.



Answer: 7

Find the area of the shaded part of the figure.



Answer: $37.5\ \text{cm}^2$