

Answer on Question #57053 – Math – Geometry

Question

1. The angle of a sector is 300 and the radius is 15 cm. Find its area and perimeter

Solution

Assume that this question deals with the angle of 300 degrees.

The perimeter of the sector is the sum of the arc length $\left(2\pi r \frac{\theta^\circ}{360}\right)$ and the length of two radii $(2r)$.

The perimeter of the sector is

$$P = 2\pi r \frac{\theta^\circ}{360} + 2r = 2\pi \cdot 15 \cdot \frac{300}{360} + 2 \cdot 15 = 25\pi + 30 \approx 108.54 \text{ (cm)}.$$

The area of the sector is

$$A = \pi r^2 \frac{\theta^\circ}{360} = \pi * 15^2 * \frac{300}{360} = 187.5\pi \approx 589.05 \text{ (cm}^2\text{)}.$$

Answer: 589.05 cm^2 , 108.54 cm .

Question

2. Obtain the area and perimeter of the segment of a circle whose radius is 11 cm and central angle of 75°

Solution

The perimeter of the segment is the sum of the arc length $\left(2\pi r \frac{\theta^\circ}{360}\right)$ and the chord length $\left(2r \sin\left(\frac{\theta^\circ}{2}\right)\right)$.

The perimeter of the segment is

$$\begin{aligned} P &= 2\pi r \frac{\theta^\circ}{360} + 2r \sin\left(\frac{\theta^\circ}{2}\right) = 2\pi \cdot 11 \cdot \frac{75}{360} + 2 \cdot 11 \sin \frac{75^\circ}{2} \\ &= \frac{55}{12} \pi + 22 \sin(37.5^\circ) \approx 27.79 \text{ cm.} \end{aligned}$$

The area of the segment is given by the area of the circular sector minus the area of the isosceles triangle.

The area of the segment is

$$\begin{aligned} A &= \pi r^2 \frac{\theta^\circ}{360} - \frac{r^2}{2} \sin(\theta^\circ) = \pi * 11^2 * \frac{75}{360} - \frac{11^2}{2} * \sin(75^\circ) = \frac{121}{2} \left(\frac{5}{12} \pi - \right. \\ &\left. - \sin(75^\circ) \right) \approx 20.76 \text{ (cm}^2\text{)}. \end{aligned}$$

Answer: 20.76 cm², 27.79 cm.

Question

3. The section of a rocket ship toy consists of a semicircle, a rectangle, and a triangle as shown at the right. The altitude of a rectangle is three times the radius of the semicircle, the altitude of the triangle is twice the same radius and the area of the triangle is 20 sq. ft. Find the area of the section.

Solution

The area of triangle is

$$\frac{1}{2} * 2r * 2r = 20 \rightarrow r = \sqrt{10} \text{ is the length of the radius of the semicircle.}$$

The area of the section is the sum of areas of the semicircle $\left(\frac{\pi r^2}{2}\right)$, the rectangle $(2r * 3r)$ and the triangle (20).

The area of the section is

$$A = \frac{\pi r^2}{2} + 2r * 3r + 20 = \left(\frac{\pi}{2} + 6\right) r^2 + 20 = \left(\frac{\pi}{2} + 6\right) 10 + 20$$
$$\approx 95.71 \text{ (ft}^2\text{)}.$$

Answer: 95.71 ft².