

# 11 6 arc lengths and areas of sectors

## answers

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Calculating Arc Length and Sector Area\*\*

#### Area of a Sector

The area of a sector, the region bounded by an arc and two radii, is given by:

$$\text{Area} = \left(\frac{\theta}{360}\right) * \pi r^2$$

where:

- $\theta$  is the central angle of the sector in degrees
- $r$  is the radius of the circle

#### Arc Length

The arc length, the distance along the circumference of a circle between two points, is given by:

$$\text{Arc Length} = \left(\frac{\theta}{360}\right) * 2\pi r$$

where:

- $\theta$  is the central angle of the arc in degrees
- $r$  is the radius of the circle

#### Perimeter of a Sector

The perimeter of a sector is the sum of the arc length and the length of the two radii:

$$\text{Perimeter} = \text{Arc Length} + 2r$$

## Formulas for Arcs and Sectors

### Arc Length:

$$\text{Arc Length} = \left(\frac{\theta}{360}\right) * 2\pi r$$

### Area of a Sector:

$$\text{Area} = \left(\frac{\theta}{360}\right) * \pi r^2$$

### Arc Measure

The arc measure of a sector is the angle formed by the two radii that define the sector:

$$\text{Arc Measure} = \theta$$

## Finding Arc Length and Area Without Radius

If the radius is not provided, you can use the following formula to find the arc length and area:

$$\text{Arc Length} = \text{Perimeter} - 2r$$

$$\text{Area} = \text{Perimeter} * r / 2$$

## Example Calculations

### Area of a Sector:

- Sector with central angle  $\theta = 60^\circ$  and radius  $r = 10$  cm
- $\text{Area} = \left(\frac{60}{360}\right) * \pi(10)^2 = 16.67 \text{ cm}^2$

### Arc Length:

- Arc with central angle  $\theta = 120^\circ$  and radius  $r = 5$  cm
- $\text{Arc Length} = \left(\frac{120}{360}\right) * 2\pi(5) = 10.47 \text{ cm}$

### Perimeter of a Sector:

- Sector with arc length of 12 cm and radius  $r = 6$  cm
- Perimeter =  $12 + 2(6) = 24$  cm

## Conclusion

By understanding the formulas and concepts presented, you can effectively calculate the arc length and area of sectors, which is an important concept in geometry.

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