

# 12-3

## Sector Area and Arc Length



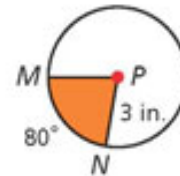
### Sector of a Circle

TERM	NAME	DIAGRAM	AREA
	sector $ACB$		

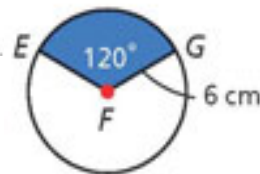
#### 1 Finding the Area of a Sector

Find the area of each sector. Give your answer in terms of  $\pi$  and rounded to the nearest hundredth.

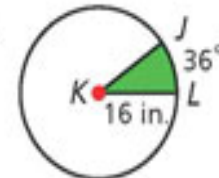
**A** sector  $MPN$



**B** sector  $EFG$



**C** sector  $JKL$

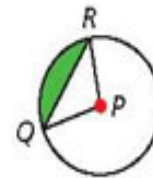


#### 2 Agriculture Application

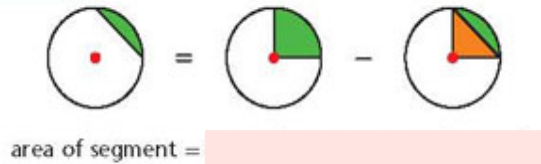
A circular plot with a 720 ft diameter is watered by a spray irrigation system. To the nearest square foot, what is the area that is watered as the sprinkler rotates through an angle of  $50^\circ$ ?



A segment is a region bounded by an arc and its chord. The shaded region in the figure is a segment.

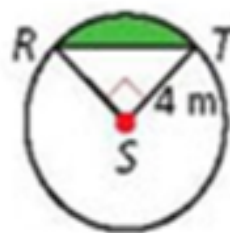
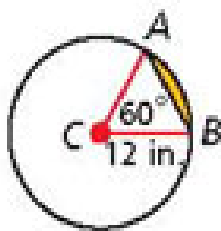


### Area of a Segment



### 3 Finding the Area of a Segment

Find the area of segment  $ACB$  to the nearest hundredth.



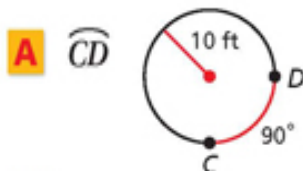
### Arc Length

Arc length is the distance along an arc measured in linear units.



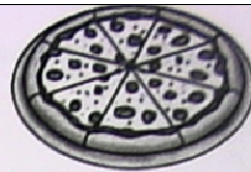
### 4 Finding Arc Length

Find each arc length. Give your answer in terms of  $\pi$  and rounded to the nearest hundredth.



**B** an arc with measure  $35^\circ$  in a circle with radius 3 in.

# 12-3 Sector Area and Arc Length



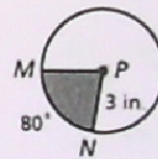
## Sector of a Circle

TERM	NAME	DIAGRAM	AREA
A sector of a circle is a region bounded by 2 radii and its intercepted arc.	sector ACB		$\frac{m^\circ}{360} \cdot \pi r^2$

### 1 Finding the Area of a Sector

Find the area of each sector. Give your answer in terms of  $\pi$  and rounded to the nearest hundredth.

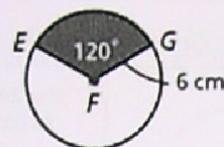
**A** sector MPN



$$\frac{80}{360} \cdot \pi (3)^2 = \frac{8}{36} \cdot \pi (9)$$

$$= 2\pi \text{ in}^2 \approx 6.28 \text{ in}^2$$

**B** sector EFG

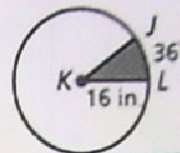


$$\frac{120}{360} \cdot \pi 36$$

$$\frac{120}{10} \pi$$

$$12\pi \approx 37.70 \text{ cm}^2$$

**C** sector JKL

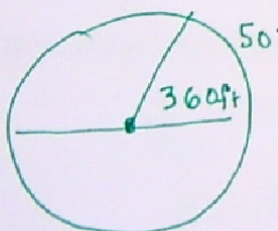


$$\frac{36}{360} \cdot \pi (16)^2$$

$$\frac{1}{10} \cdot 256\pi = 25.6\pi \text{ or } 80.42 \text{ in}^2$$

### 2 Agriculture Application

A circular plot with a 720 ft diameter is watered by a spray irrigation system. To the nearest square foot, what is the area that is watered as the sprinkler rotates through an angle of  $50^\circ$ ?

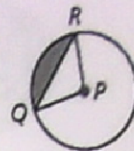


$$\frac{50}{360} \cdot \pi (360)^2$$

$$\frac{5}{36} \pi (129600)$$

$$18000\pi \approx 56,549 \text{ ft}^2$$

A segment is a region bounded by an arc and its chord. The shaded region in the figure is a segment.



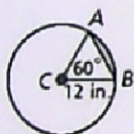
### Area of a Segment



$$\text{area of segment} = \text{area sector} - \text{area } \triangle$$

### 3 Finding the Area of a Segment

Find the area of segment  $ACB$  to the nearest hundredth.



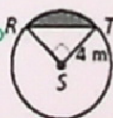
$$\frac{60}{360} \cdot \pi (12)^2 - \frac{1}{2}(12)(12)\sin 60^\circ$$

$$\frac{1}{6} \cdot 144\pi$$

$$24\pi - 62.354$$

$$75.398 - 62.354$$

$$\boxed{13.04 \text{ in}^2}$$



$$\frac{90}{360} \cdot \pi (4)^2 - \frac{4 \cdot 4}{2}$$

$$\frac{1}{4} \cdot 16\pi$$

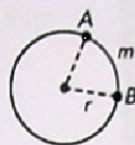
$$4\pi - 8$$

$$12.57 - 8$$

$$\boxed{4.57 \text{ m}^2}$$

### Arc Length

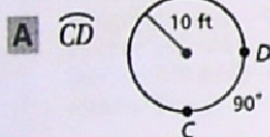
Arc length is the distance along an arc measured in linear units.



$$\widehat{AB} = \frac{m}{360} \cdot \pi d \quad \text{or} \quad \frac{m}{360} \cdot 2\pi r$$

### 4 Finding Arc Length

Find each arc length. Give your answer in terms of  $\pi$  and rounded to the nearest hundredth.



$$m \widehat{CD} = 90^\circ$$

$$l \widehat{CD} = \frac{90}{360} (2\pi(10))$$

$$\frac{1}{4} \cdot 20\pi = \boxed{5\pi \text{ ft} \approx 15.71 \text{ ft}}$$

B an arc with measure  $35^\circ$  in a circle with radius 3 in.

$$\frac{35}{360} \cdot 2\pi(3)$$

$$\frac{7}{72} \cdot 6\pi = \boxed{\frac{7\pi}{12} \approx 1.83 \text{ in}}$$