

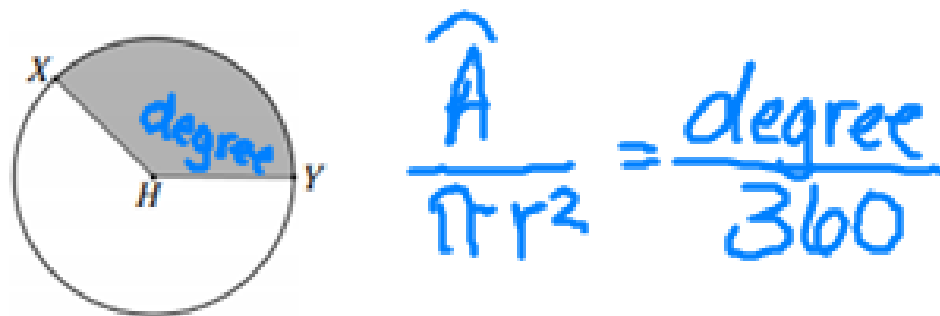
Let us consider the Shade region in the figure below.



A Sector is the region bounded by two radii of a circle and their intercepted arc.

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The ratio of the area,  $A$ , of a sector to the area of the circle is equal to the ratio of the measure of the intercepted arc to  $360^\circ$ .



**Practice:**

A circle has a 6 centimeter radius and a shaded sector with a central angle of  $60^\circ$ . Determine the area of the shaded sector.

$$\frac{x}{\pi(6)^2} = \frac{60}{360}$$

$$36x = 6(36)(\pi)$$

$$\frac{36x}{36} = \frac{678.5840}{36}$$

$$x = 18.8496$$

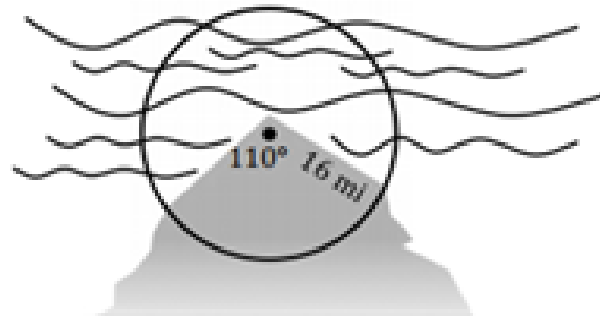
The area of a sector with radius of 8 inches is 74.84 square inches. Calculate the approximate angle of the sector.

$$\frac{74.84}{\pi(8)^2} = \frac{X}{360}$$

$$\frac{26942.4}{201.0619} = \frac{201.0619X}{201.0619}$$
$$134^\circ = X$$

**Your turn:**

A lighthouse is situated on the northern tip of an island. Determine the area of water that the light of the lighthouse can cover.



$$\frac{x}{\pi(16)^2} = \frac{110}{360}$$

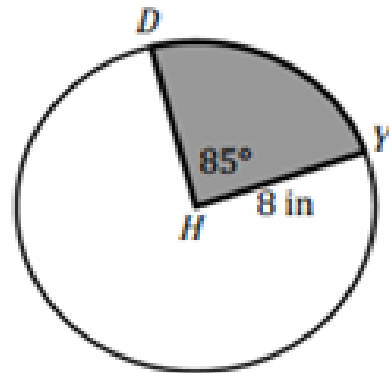
$$36x = 11(256)(\pi)$$

$$\frac{36x}{36} = \frac{8,846.7249}{36}$$

$$x = 245.72424$$

**Informal Assessment:**

In Sarah's family, the birthday person always gets to cut the first piece of cake. Sarah is celebrating her birthday with both of her parents, her two brothers, and her best friend. She cuts her piece of birthday cake as shown by the sector below.



If the rest of the party equally shares the remaining portion of the cake, what is approximate area each one receives?

- 30.718 in<sup>2</sup>
- 47.473 in<sup>2</sup>
- 153.589 in<sup>2</sup>
- 201.062 in<sup>2</sup>

$$360 - 85$$
$$\frac{\pi x^2}{360} = \frac{275}{360}$$
$$360x = 55292.0307$$
$$x = 153.5899742$$
$$\frac{x}{5} = 30.71779494$$
$$x \approx 30.7170$$



For one complete revolution of a circle, we have the circumference,  $C = d\pi$  or  $2\pi r$

Radius is the size of the circle and determines the arc measure

Radians represent the number of times the radius goes around a circle - fixed point

A radian is define by an arc of a circle.

A radian represents the  $360^\circ$  needed to complete one revolution.

Therefore, in radians, the angle around the circle is

$$\frac{2\pi}{360} = \frac{\pi}{180}$$

To convert from Degrees to Radians, multiply the angle by

$$\frac{\pi}{180}$$

To convert from Radians to Degrees multiply the angle by

$$\left(\frac{180}{\pi}\right)$$

Practice:

Perform the following conversions.

1. Convert  $160^\circ$  to radians.

$$\frac{160^\circ \left( \frac{\pi}{180} \right)}{1} = \frac{8\pi}{9}$$

2. Convert  $\frac{11\pi}{6}$  radians to degrees.

$$\frac{11\pi}{6} \left( \frac{180}{\pi} \right) = 330^\circ$$

What is the length of an arc with a measure of  $60^\circ$  in a circle with a 10-centimeter radius?  $d = 20$

$$\frac{x}{20\pi} = \frac{60}{360}$$

$$\frac{x}{20\pi} = \frac{1}{6}$$
$$\frac{x}{6} = \frac{20\pi}{6} = \frac{10\pi}{3}$$