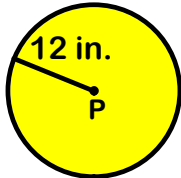


11.1 Circumference & Arc Length

Circumference of a Circle: $C = 2\pi r$

Example 1

Find the circumference of $\odot P$.



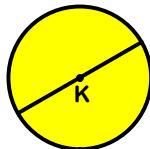
$$C = 2\pi \cdot 12$$

$$C = 24\pi \text{ in}$$

$$C \approx 75.4 \text{ in}$$

Example 2

Find the radius of $\odot K$.



Circumference of $\odot K$ is 52 cm

$$C = 2\pi r$$

$$52 = \frac{2\pi r}{2\pi}$$

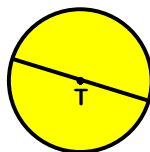
$$8.3 \text{ cm} \approx r$$

$$C = 2\pi r$$

$$C = \pi d$$

Example 3

Find the diameter of $\odot T$.



Circumference of $\odot T$ is 275 ft

$$C = 2\pi r$$

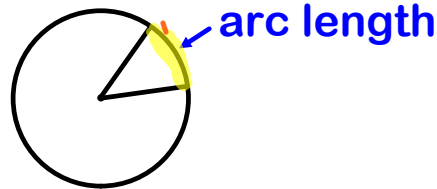
$$275 = \frac{2\pi r}{2\pi}$$

$$43.8 \approx r$$

$$2 \cdot r = \text{diameter}$$

$$d \approx 87.5 \text{ ft}$$

The **arc length of a circle** is a portion of the circumference of a circle.



Arc Length Corollary

The ratio of the length of an arc to the circumference of the circle is equal to the ratio of the measure of the arc to 360° .

$$\frac{\text{length of } \widehat{AB}}{2\pi r} = \frac{m\widehat{AB}}{360^\circ}$$

part of circumference / *whole circumference* = *arc* / *part of circle* / *whole circle*

Example 4

Find the length of the arc shown below.



$$\frac{S}{2\pi \cdot 4} = \frac{45 \div 45}{360 \div 45}$$

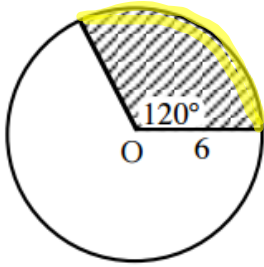
$$\frac{S}{8\pi} = \frac{1}{8}$$

$$\frac{8S}{8} = \frac{8\pi}{8}$$

$$S = \pi \text{ units}$$

Example 5

Find the length of the arc shown below.



$$\frac{S}{2\pi \cdot 6} = \frac{120 \div 120}{360 \div 120}$$

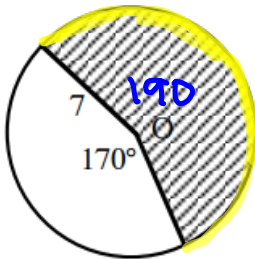
$$\frac{S}{12\pi} = \frac{1}{3}$$

$$\frac{3S}{3} = \frac{12\pi}{3}$$

$$S = 4\pi \text{ units}$$

Example 6

Find the length of the arc shown below.



$$\frac{S}{2\pi \cdot 7} = \frac{190}{360}$$

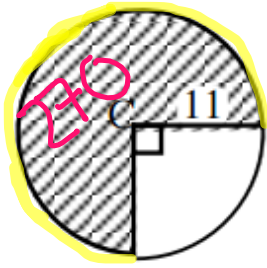
$$\frac{S}{14\pi} = \frac{19}{36}$$

$$\frac{36S}{36} = \frac{266\pi}{36 \cdot 2}$$

$$S = \frac{133\pi}{18} \text{ units}$$

Example 7

Find the area of the sector shown below.



$$\frac{S}{2\pi \cdot 11} = \frac{270}{360}$$

$$\frac{S}{22\pi} = \frac{3}{4}$$

$$\frac{4S}{4} = \frac{66\pi}{4}$$

$$S = \frac{33\pi}{2} \text{ units}$$

EQUATIONS OF CIRCLES: $x^2 + y^2 = r^2$ **Example 8**

The equations of circles are given below.

Find their circumference in terms of π . *← leave π in answer*

a) $x^2 + y^2 = 49$

$$x^2 + y^2 = (\underset{\downarrow}{7})^2$$

$$C = 2\pi \cdot 7$$

$$C = 14\pi \text{ units}$$

b) $x^2 + y^2 = 18$

$$r = \sqrt{18} \quad \begin{array}{r} 2 \overline{) 18} \\ \underline{4} \\ 14 \\ \underline{14} \\ 0 \end{array}$$

$$r = 3\sqrt{2} \quad \begin{array}{r} 3 \overline{) 9} \\ \underline{9} \\ 0 \end{array}$$

$$C = 2\pi \cdot 3\sqrt{2}$$

$$C = 6\pi\sqrt{2} \text{ units}$$