

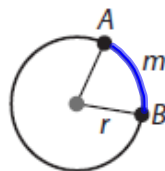
16.2 Arc Length and Radian Measure

How do you find the length of an arc?

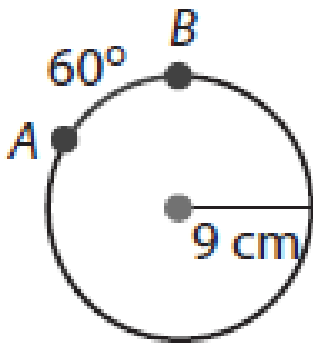
Arc Length- understood to be the distance along a circular arc measured in linear units (such as feet or centimeters)

Arc Length

The arc length, s , of an arc with measure m° and radius r is given by the formula $s = \frac{m}{360} \cdot 2\pi r$.



Find the arc length of \widehat{AB} . Express your answer in terms of π and rounded to the nearest tenth.



π is in answer

(decimal)

$$AB = \frac{m}{360} \cdot 2\pi r$$

$$AB = \frac{60}{360} \cdot 2\pi(9)$$

$$AB = 3\pi$$

$$AB = 9.4$$

On a clock face, the minute hand of a clock is 10 inches long. To the nearest tenth of an inch, how far does the tip of the minute hand travel as the time progresses from 12:00 to 12:15?

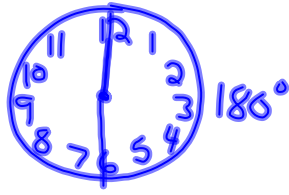
$$\frac{3}{12} \cdot 360^\circ$$



$$\frac{90}{360} \cdot 2\pi(10)$$

$$15.7 \text{ in}$$

The minute hand of a clock is 6 inches long. To the nearest tenth of an inch, how far does the tip of the minute hand travel as the time progresses from 12:00 to 12:30?



$$\frac{180}{360} \cdot 2\pi(6)$$

18.8 in.

How to convert to radian measure?

Formula Sheet gives:

$$1 \text{ degree} = \frac{\pi}{180^\circ} \text{ radians}$$

Degrees To Radians
(Degrees) $\left(\frac{\pi}{180}\right)$

$$1 \text{ radian} = \frac{180^\circ}{\pi} \text{ degrees}$$

Radians To Degrees
(Radians) $\left(\frac{180}{\pi}\right)$

Radian- a unit of angle measure based on arc length. In a circle of radius r , if a central angle has a measure of 1 radian, then the length of the intercepted arc is r units.

$$2\pi \text{ radians} = 360^\circ \quad 1 \text{ radian} \approx 57^\circ$$

Convert 180° to radian measure.

$$\frac{180}{1} \cdot \left(\frac{\pi}{180}\right) = \frac{180\pi}{180} = \pi$$

Convert 60° to radian measure.

$$\frac{60}{1} \cdot \frac{\pi}{180} = \frac{60\pi}{180} = \frac{1\pi}{3}$$

Convert $\frac{\pi}{4}$ to degrees.

$$\frac{\pi}{4} \cdot \frac{180}{\pi} = \frac{180\pi}{4\pi} = 45^\circ$$

Convert $\frac{2\pi}{3}$ to degrees.

$$\frac{2\pi}{3} \cdot \frac{180}{\pi} = \frac{360\pi}{3\pi} = 120^\circ$$

pg. 856

4-11

page 868-870

5-8, 13-17