What is the measure of an angle?

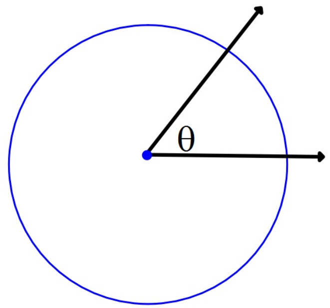
The size of an angle
or
The amount of turn to move from one side the other side.

Units used to measure angles:

- Degrees
- Radians

Central Angle:

An angle whose vertex is at the center of a circle.

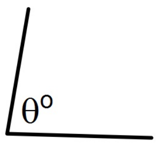


θ

Greek letter Theta

Variable often used to represent an angle

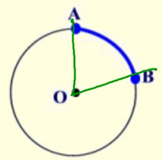
Sinθ



What is an Arc ?

What is Arc Length ?

$\overset{\frown}{AB}$

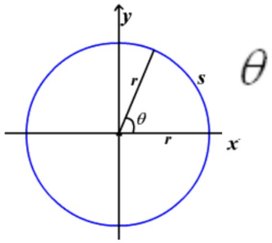


An **arc** of a circle is a "portion" of the circumference of the circle.

The **length of an arc** is simply the length of its "portion" of the circumference. Actually, the circumference itself can be considered an arc length.

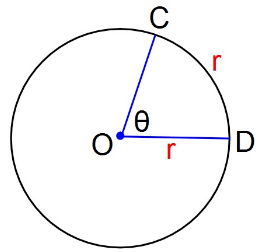
Radian Measure of an angle:

Ratio of the length of the arc intercepted by a central angle to the radius of the circle.



$$\theta = \frac{s}{r} = \frac{\text{Length of intercepted arc}}{\text{Length of radius}}$$

One radian is the measure of an angle that intercepts an arc whose length is equal to the radius of the circle.



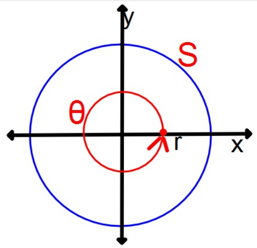
$m\angle COD$ = 1 radian

$$\theta = \frac{s}{r} = \frac{r}{r} = 1$$

Using this formula: $\theta = \frac{s}{r}$

You can write this as: S = θr

Length of an arc equals the measure of the angle, in radians, times the radius.



If the arc length equals the entire circle then S is the entire circumference S=2πr

S = θr becomes 2πr = θr

2π = θ

This means a full circle is equal to 2π radians.

So the relationship between degrees and radians is:

$$2\pi = 360^\circ$$

This can be simplified into: $\pi = 180^\circ$

This relationship: $\pi = 180^\circ$

can be written as the following two conversion factors:

$$\frac{\pi}{180^\circ} \quad or \quad \frac{180^\circ}{\pi}$$

$\frac{\pi}{180^\circ}$ $\frac{180^\circ}{\pi}$

Convert each angle into degrees. Round to the nearest tenth when needed.

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

2. $\frac{5\pi}{9} \cdot \frac{180^\circ}{\pi} = 100^\circ$

3. $\frac{23\pi}{15} \cdot \frac{180^\circ}{\pi} = 276^\circ$

$\frac{\pi}{180^\circ}$ $\frac{180^\circ}{\pi}$

Convert each angle into radians. Give answer in terms of π and as a simplified fraction.

1. $45^\circ \cdot \frac{\pi}{180^\circ} = \frac{1}{4}\pi = \frac{\pi}{4}$

2. $150^\circ \cdot \frac{\pi}{180^\circ} = \frac{5\pi}{6}$

3. $210^\circ \cdot \frac{\pi}{180^\circ} = \frac{7\pi}{6}$

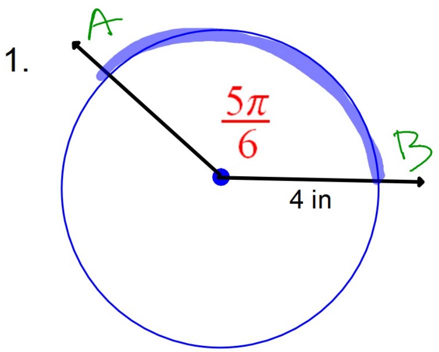
Convert. 5

Since there is no symbol for degrees, this must be an angle measured in radians.

$5 \cdot \frac{180^\circ}{\pi} = 286.5^\circ$

Find the length of the intercepted arc to the nearest hundredth.

1.



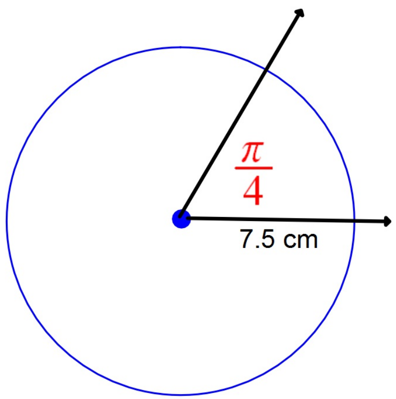
$S = \theta r$

S = arc length
r = radius of the circle
θ = central angle measured in radians

$S = \frac{5\pi}{6} \cdot 4$

$= 10.48 \text{ in}$

2.

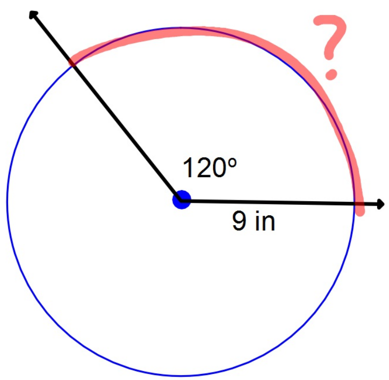


$S = r\theta$

$= (7.5)\left(\frac{\pi}{4}\right)$

$= 5.90 \text{ cm}$

3.



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

$S = (9 \text{ in})\left(\frac{2\pi}{3}\right)$

$= 18.85 \text{ in}$

You can now finish Hwk #24:

Pages 729-730

Problems 1, 3-5, 7-10, 21, 22