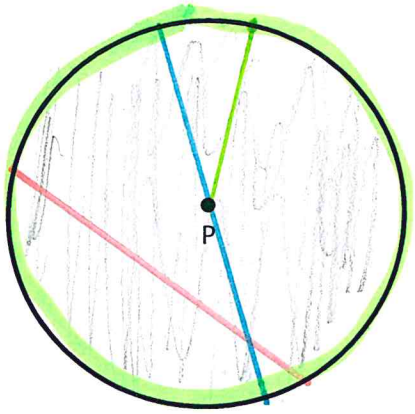
Arc Measure and Length



Radius: From center to edge.

$r = \frac{d}{2}$

Diameter: From edge to edge, through center.

$d = 2 \cdot r$

Chord: From edge to edge, but not through center.

Circumference: Outside distance. Perimeter.

$C = 2\pi r$ / $C = \pi d$

Area: Space inside.

$A = \pi r^2$

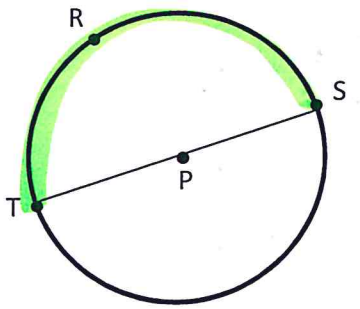
Naming Circles: Always name by the center point.

⊙P / Circle P

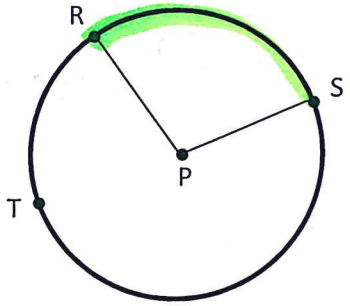
Identifying Arcs:

An arc is part of a circle. One type of arc, a semicircle, is half of a circle.

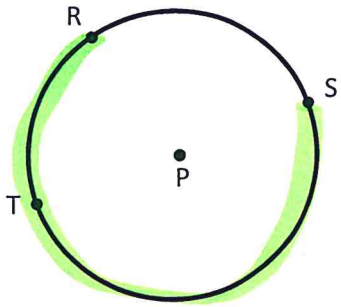
A minor arc is smaller than a semicircle. A major arc is greater than a semicircle.



$\overset{\frown}{TRS}$ is a semicircle. ($m\overset{\frown}{TRS} = 180°$)

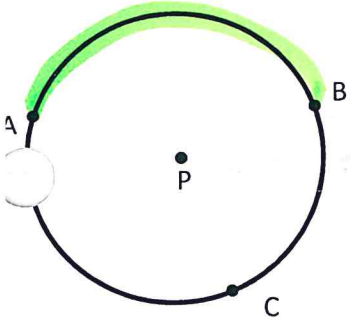


$\overset{\frown}{RS}$ is a minor arc.



$\overset{\frown}{RTS}$ is a major arc.

Highlight $\overset{\frown}{AB}$



Naming Arcs:

We use 3 points to name major arcs and semicircles.

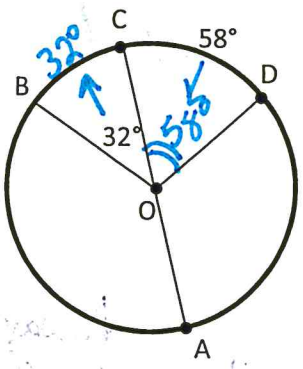
We use 2 points to name minor arcs.

*This will tell us which direction around the circle we are going.

Degrees

Arc Measure: The number of degrees of each arc or central angle (angle that creates the arc).

Find the measure of each arc:



a.) $\overset{\frown}{BC} = 32°$

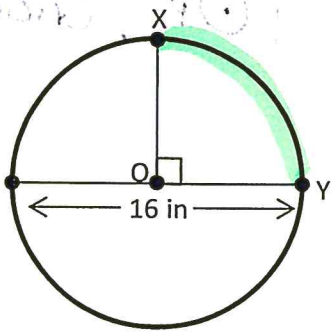
b.) $\angle COD = 58°$

c.) $\overset{\frown}{ABC} = 180°$

d.) $\overset{\frown}{AB} = 180 - 32$

$148°$

Arc Length: Distance / Circumference



Find the length of $\overset{\frown}{XY}$.

Total Circumf. $= 2\pi r$ / πd

$C = 16\pi$

$\frac{16\pi}{4} = 4\pi$

$\overset{\frown}{XY} = 4\pi$ in

*FYI; $\frac{16\pi}{4} = \frac{1}{4} \cdot 16\pi$ $\left(\frac{1}{4} \cdot C\right)$

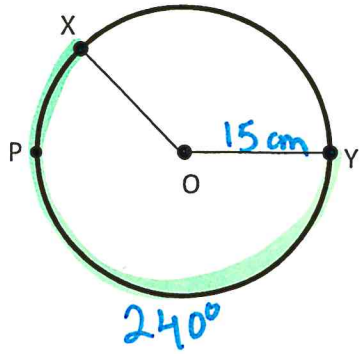
This happens to be $\frac{1}{4}$ of a circle, but how could we find arc length for any arc on a circle (even ones that aren't "perfect parts" of a circle)?

$\overset{\frown}{XY}$ measure $= 90°$. A circle has $360°$. $\frac{90°}{360°} = \frac{1}{4}$.

$$\text{Arc Length} = \frac{\text{Arc Measure}}{360°} \cdot \text{Circumference}$$

$$L\overset{\frown}{XY} = \frac{m\overset{\frown}{XY}}{360°} \cdot \pi d$$

$$= \frac{90°}{360°} \cdot 16\pi$$



Find the length of $\overset{\frown}{XPY}$ if its measure is 240° and the circle has a radius of 15 cm.

$$L\overset{\frown}{XPY} = \frac{m\overset{\frown}{XPY}}{360} \cdot 2\pi r$$

$$= \frac{240}{360} \cdot 2\pi(15)$$

$$= \frac{2}{3} \cdot 30\pi$$

20π cm