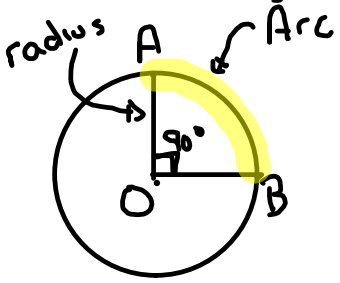
Lesson # 31
Relationship Between Central Angles / Arc / Circumference

The arc can be measured in degrees or in length:

Full Circle = 360°

example ~

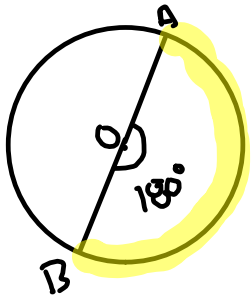


$\frac{90^\circ}{360^\circ} = \frac{1}{4} = \frac{\text{Arc}}{\text{Circumference}}$

Ex $\overset{\frown}{AB} = 15\text{cm}$

C $\Rightarrow \frac{90}{360} = \frac{15}{x} \Rightarrow x = 60$

A) In a circle, the measures of an arc in degrees is equal to the measure of the central angle that creates the arc.



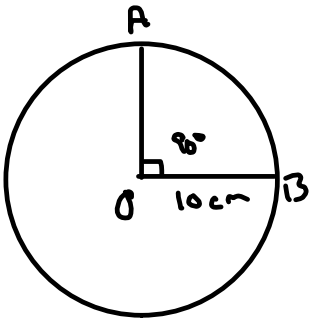
$\angle AOB = 180^\circ = \overset{\frown}{AB}$

B) In order to find the length of the arc, we use the relationship between the measure of the central angle and the circumference in a proportion.

example 1:

radius 10cm
central angle = 90°
circumference ?

$C = 2\pi r$
$= 2(3.14)(10)$
$= 62.8\text{cm}$



$\frac{90^\circ}{360^\circ} = \frac{x}{62.8}$

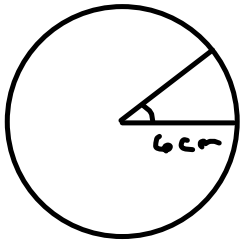
$x = \overset{\frown}{AB} = 15.7\text{cm}$

Formula

	Angle	ARC
Sector	degrees	length of arc
Circle	degrees	circumference

Central Angle → $\frac{CA}{360^\circ} = \frac{Arc}{C}$

example 2: A circle with a radius of 6cm. Find the measure of the arc created by a central angle of 45°.



$\frac{CA}{360} = \frac{Arc}{C}$

$C = 2\pi r$
$= 2(3.14)6$
$= 37.68\ cm$

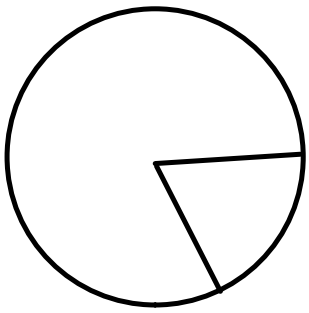
$\frac{45}{360} = \frac{x}{37.68}$ $Arc = 4.71cm$

example 3: arc 5cm c= 25cm CA ??

$\frac{CA}{360} = \frac{Arc}{C}$

$\frac{x}{360} = \frac{5}{25}$

$CA = 72^\circ$



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Circle Quiz ~ Lesson ~~30~~ 31

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1. Complete the following chart. Show all work below. Hint: Setup proportion.

	Radius (cm)	Circumference (cm)	Central angle (°)	Arc length (cm)
a)	12		45°	
b)	18			50.24
c)			60°	25.12
d)	10			31.4

8

a) b) c) d)

2. A circle has a diameter of 12cm. Find the central angle that contains an arc of 12.56cm.

2

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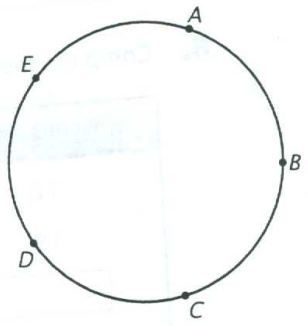
2. Five points are placed on a circle so that the distance between two consecutive points is always the same.



a) Give the measures, in degrees, of the central angles determined by the arcs.

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b) What is the name of polygon *ABCDE*?

_____

3. True or false?

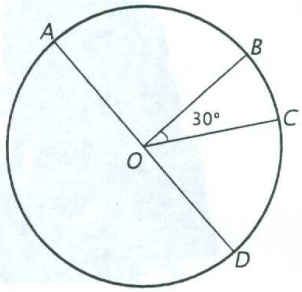
a) An arc corresponding to one eighth of the circumference measures 45°. _____

b) A central angle of 60° intercepts an arc corresponding to one third of the circumference. _____

c) The greater the central angle, the greater the intercepted arc. _____

d) If a central angle of 20° in a circle intercepts an arc of 3 cm, then a central angle of 70° must intercept an arc of 10.5 cm. _____

4. This circle has a circumference of 72 cm. Determine:



a) m $\overset{\frown}{BC}$. _____

b) m ∠*COD*. _____

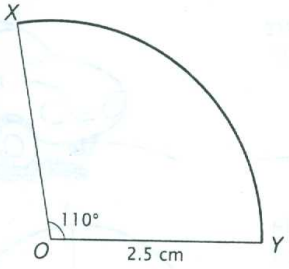
c) m $\overset{\frown}{AD}$. _____

d) m ∠*AOB*. _____

e) m $\overset{\frown}{ABC}$. _____

5. In each example, calculate the measure of arc *XY*.

a)



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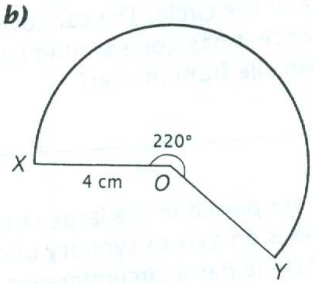
b)



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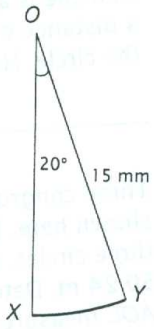
c)



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6. Complete the table ($\pi \approx 3.14$).

Radius (cm)	Circumference (cm)	Central angle (°)	Arc length (cm)
12		45	
18			50.24
		60	25.12
10			31.4

7. Marie opens her compass to 3 cm. She draws an arc corresponding to one third of the circumference of a circle. Determine the length of the arc.

_____

8.

$\pi \approx 3.14$

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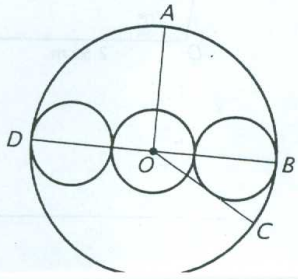
9. Danielle's remote-control car travels in circles. Danielle is at the centre of the circle. The car covers a distance of 62.83 m once it has gone around half the circle. How far is Danielle from the car?

_____

10. Three congruent circles are placed in the large circle shown here. Diameter *DB* is an axis of symetry of all three circles. Each small circle has a circumference of 50.24 m. Determine the length of arc *ABC*, if angle *AOC* measures 120°.



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