Area of a Sector and Arc Length

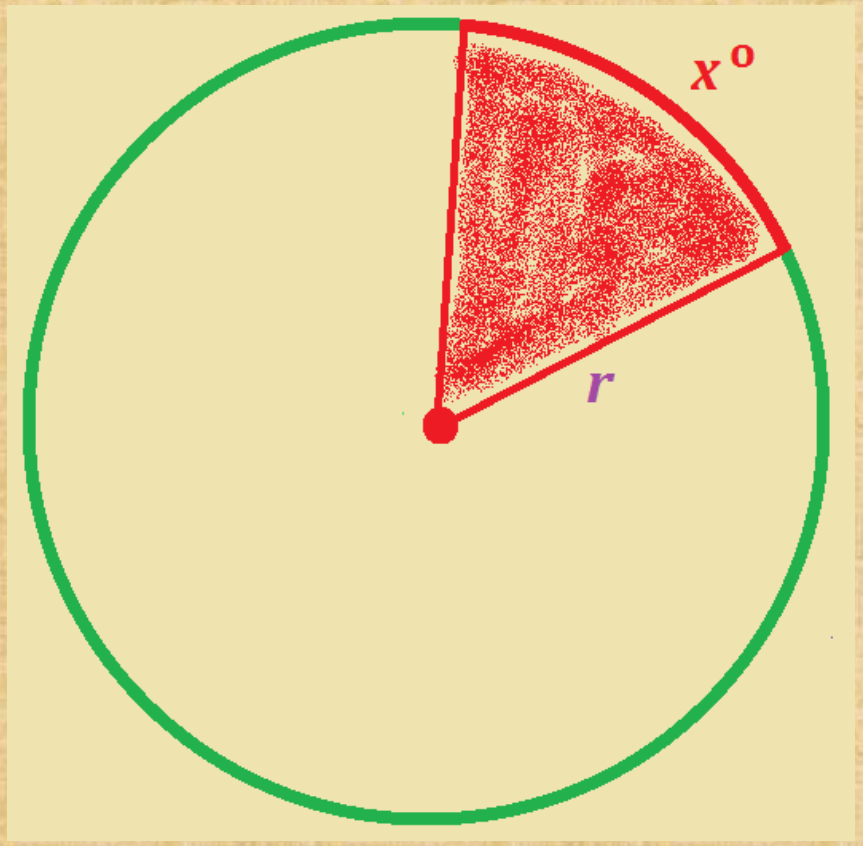
Geometry

BowerPower.net

Mr. Bower

What is a sector?

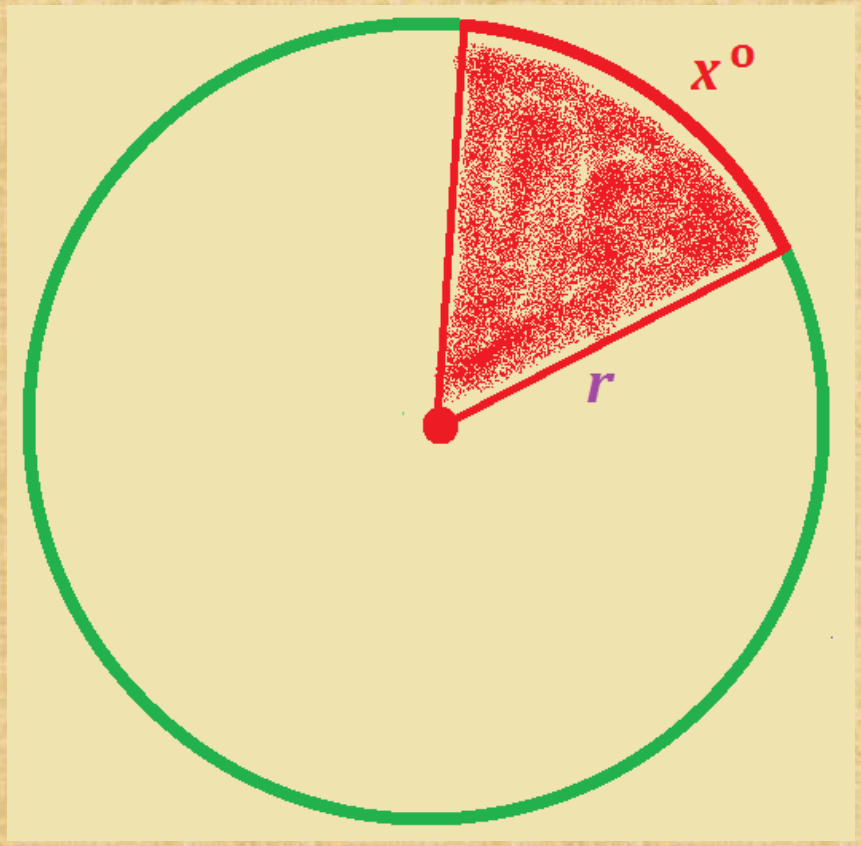
- A **sector** of a circle is a region bounded by two radii and an arc of the circle



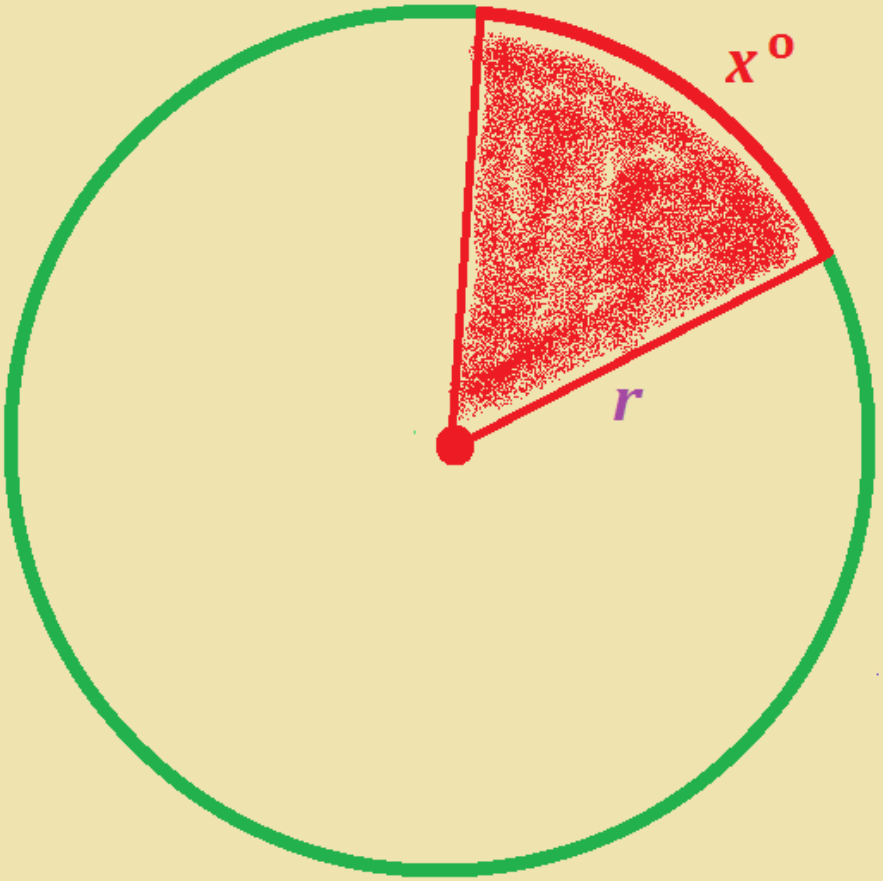
What is a sector?

- A **sector** of a circle is a region bounded by two radii and an arc of the circle

- It looks like a slice of pizza or a piece of pie!



Area of a sector



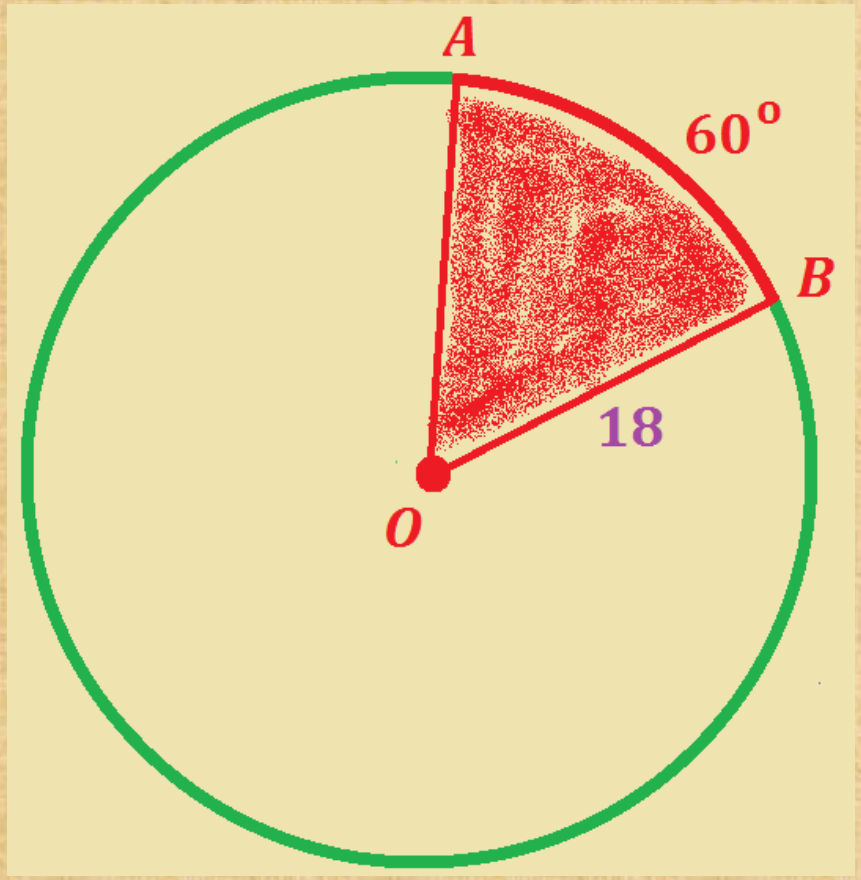
$$\text{Area of a sector} = \frac{x^o}{360} \cdot \text{Area of the circle}$$

OR

$$\text{Area of a sector} = \frac{x^o}{360} \cdot \pi r^2$$

Area of a Sector – Example 1

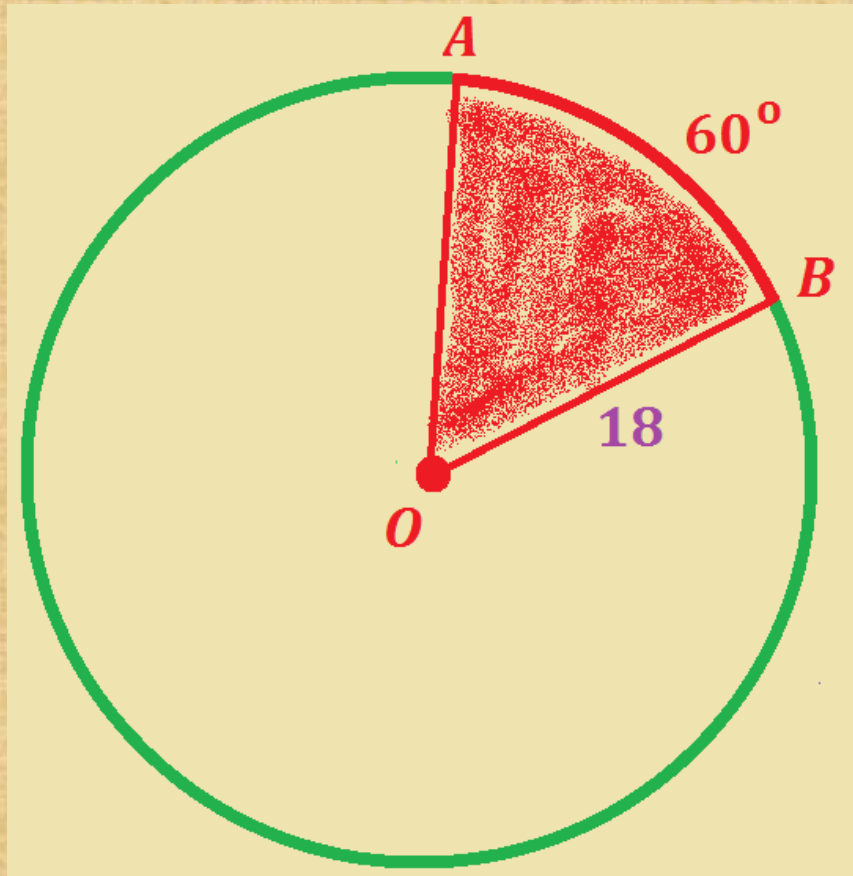
- Find the area of sector AOB (leave answer in terms of π)



Area of a Sector – Example 1

- Find the area of sector AOB (leave answer in terms of π)
- The formula is

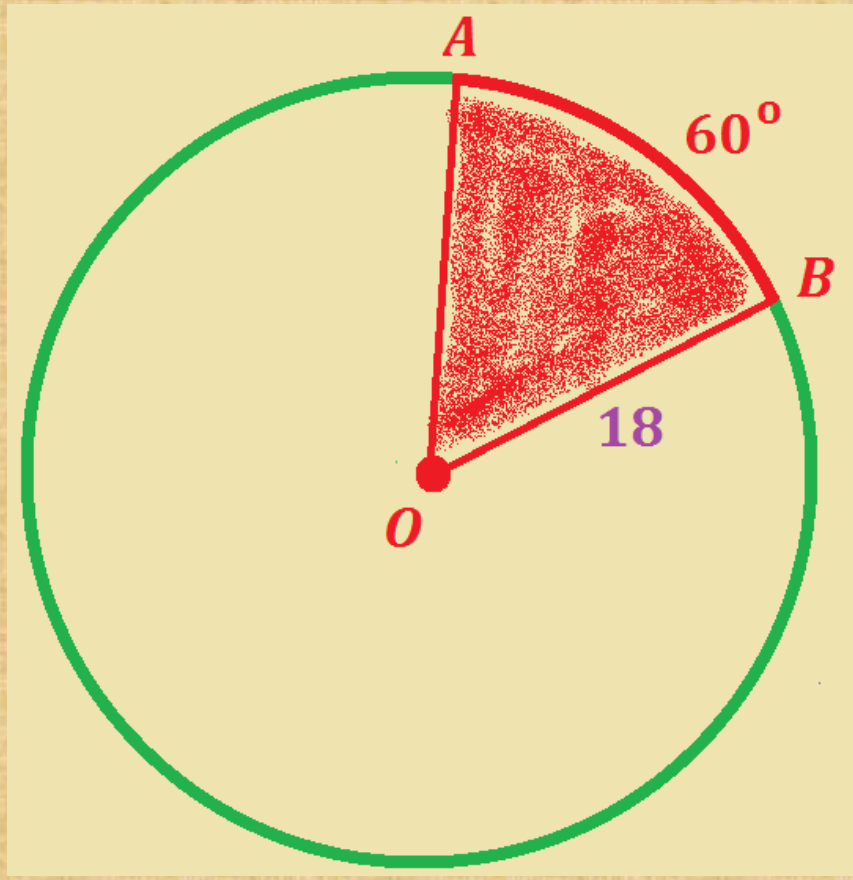
$$A = \frac{x^\circ}{360} \bullet \pi \bullet r^2$$



Area of a Sector – Example 1

- Find the area of sector AOB (leave answer in terms of π)
- The formula is

$$A = \frac{x^\circ}{360} \bullet \pi \bullet r^2$$



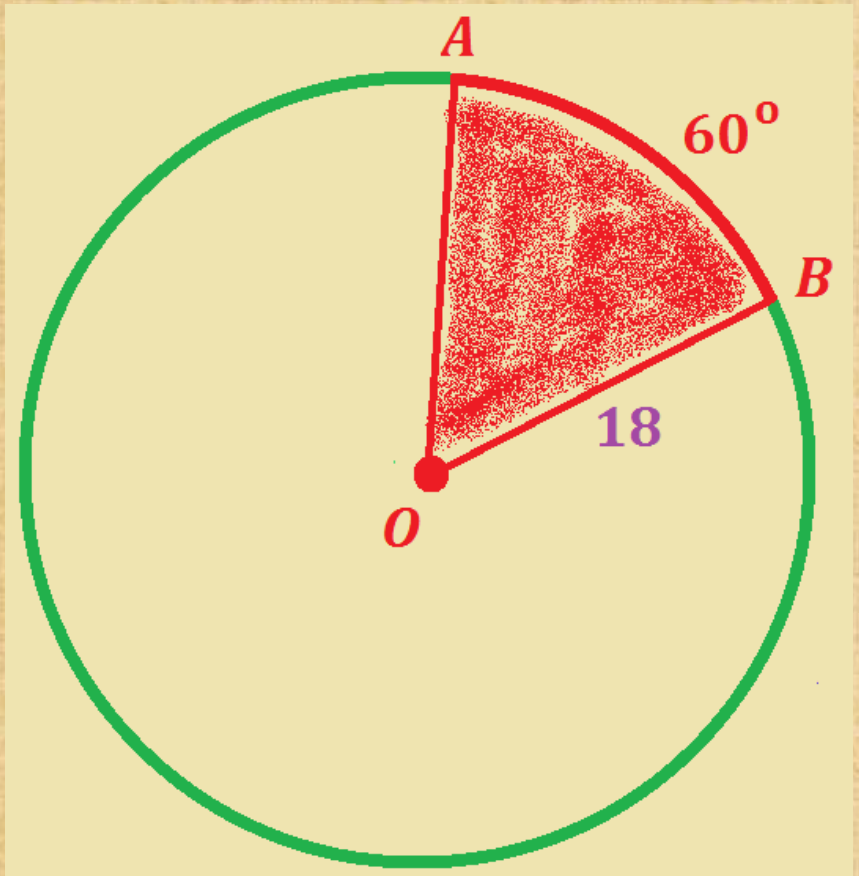
First, let's find the fraction – our arc is 60° and we'll put that in for x.

Area of a Sector – Example 1

- Find the area of sector AOB (leave answer in terms of π)
- Our work is now

$$A = \frac{60}{360} \bullet \pi \bullet r^2$$

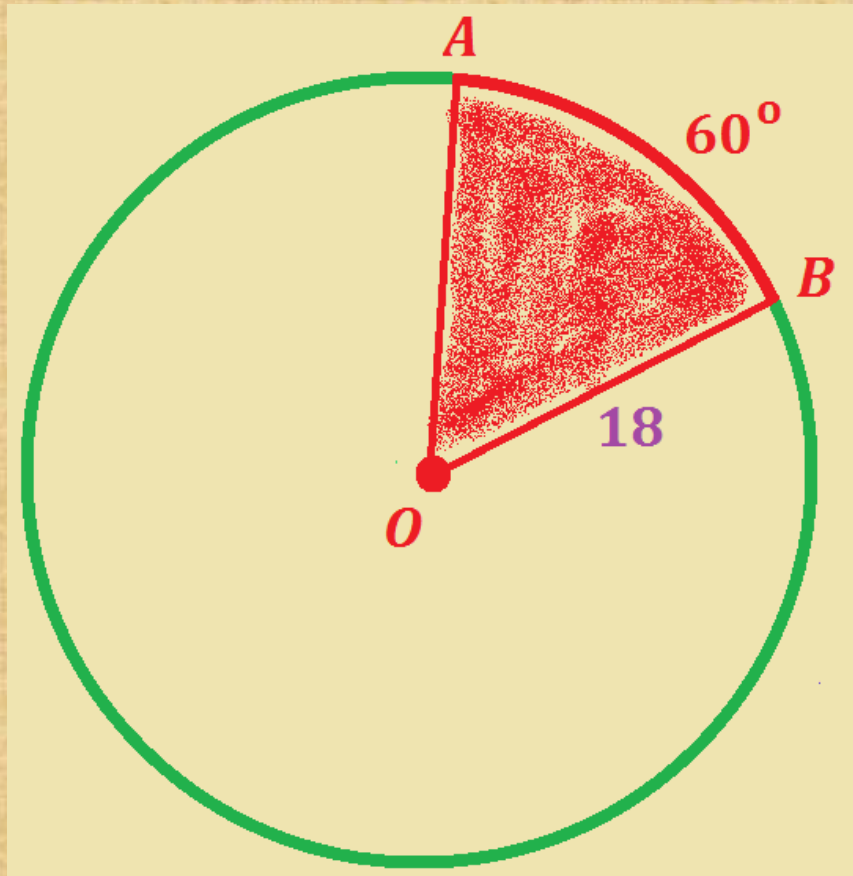
First, let's find the fraction – our arc is 60° and we'll put that in for x.



Area of a Sector – Example 1

- Find the area of sector AOB (leave answer in terms of π)
- Our work is now

$$A = \frac{60}{360} \bullet \pi \bullet r^2$$

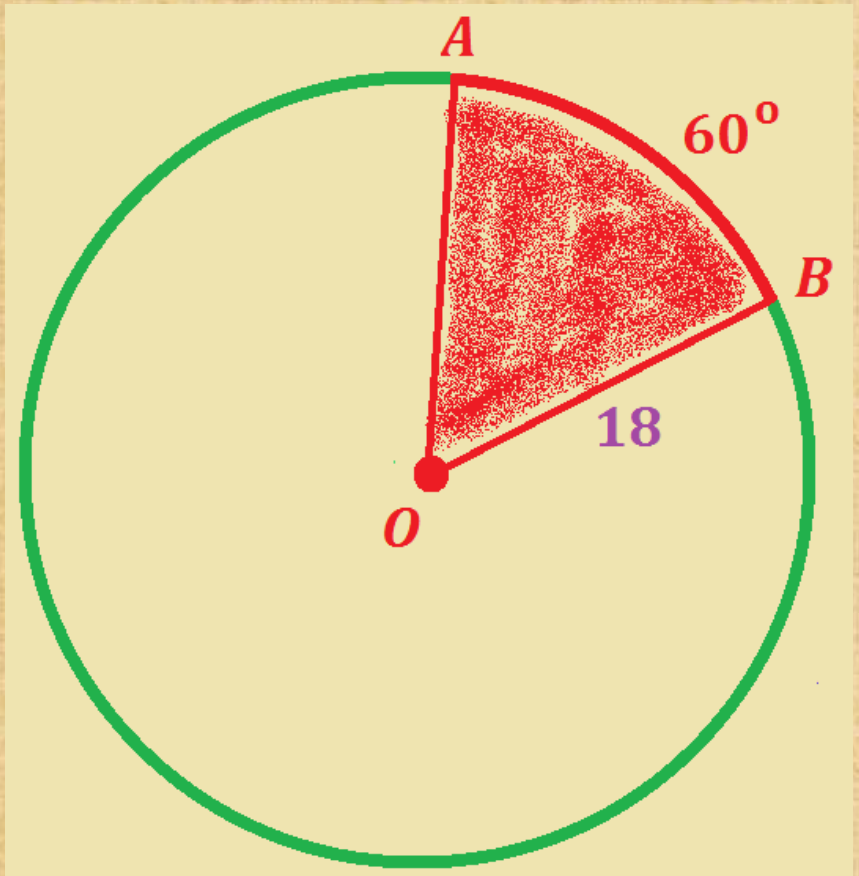


Area of a Sector – Example 1

- Find the area of sector AOB (leave answer in terms of π)
- Our work is now

$$A = \frac{60}{360} \bullet \pi \bullet r^2$$

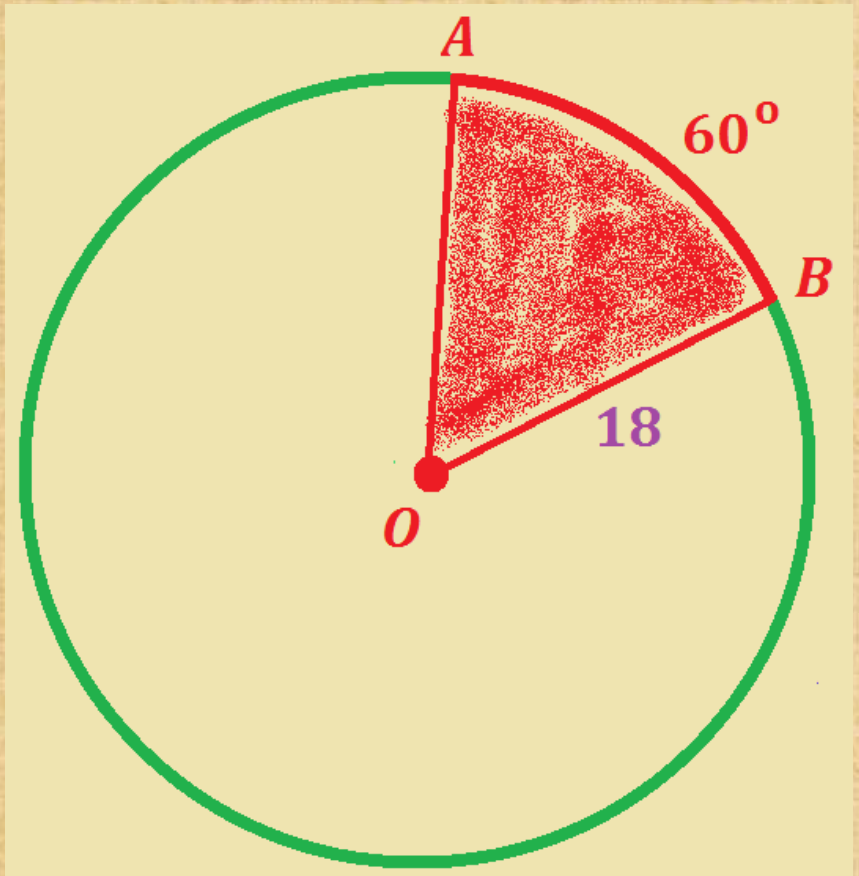
Next, let's reduce the fraction.



Area of a Sector – Example 1

- Find the area of sector AOB (leave answer in terms of π)
- Our work is now

$$A = \frac{1}{6} \bullet \pi \bullet r^2$$

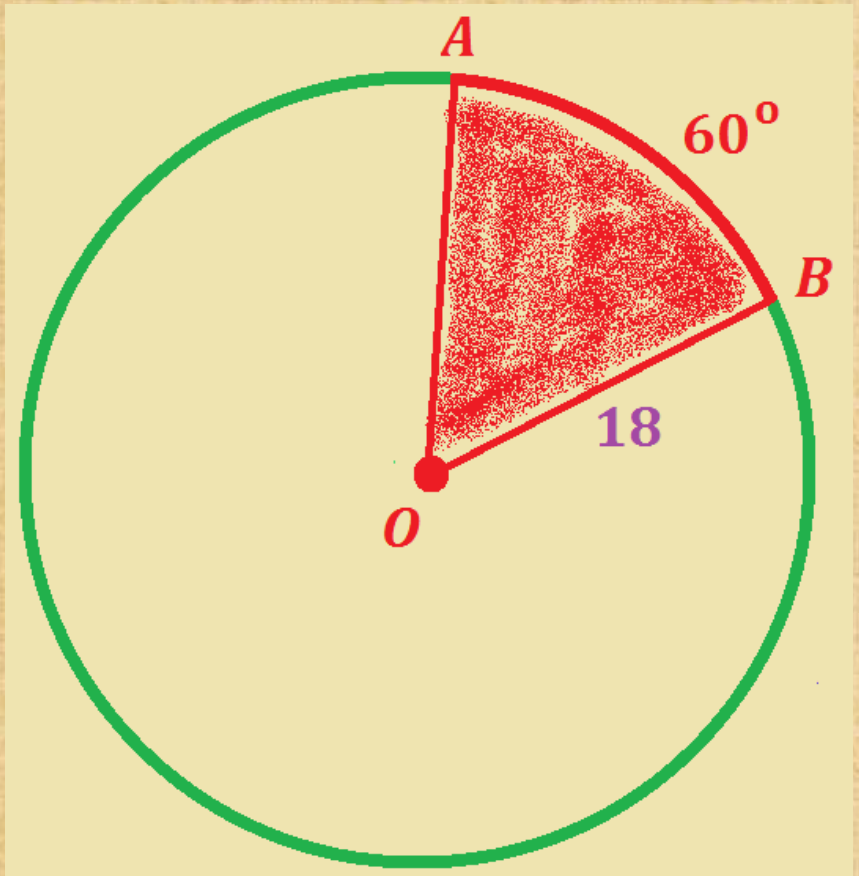


Area of a Sector – Example 1

- Find the area of sector AOB (leave answer in terms of π)
- Our work is now

$$A = \frac{1}{6} \bullet \pi \bullet r^2$$

Let's use $r = 18$ in the equation.

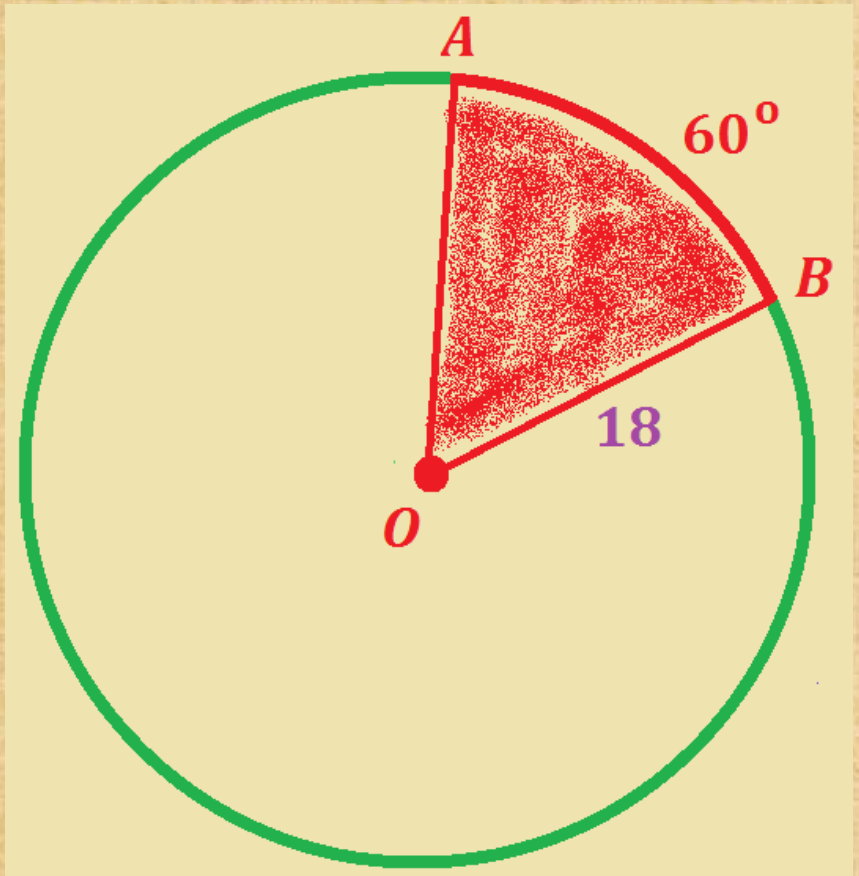


Area of a Sector – Example 1

- Find the area of sector AOB (leave answer in terms of π)
- Our work is now

$$A = \frac{1}{6} \bullet \pi \bullet (18)^2$$

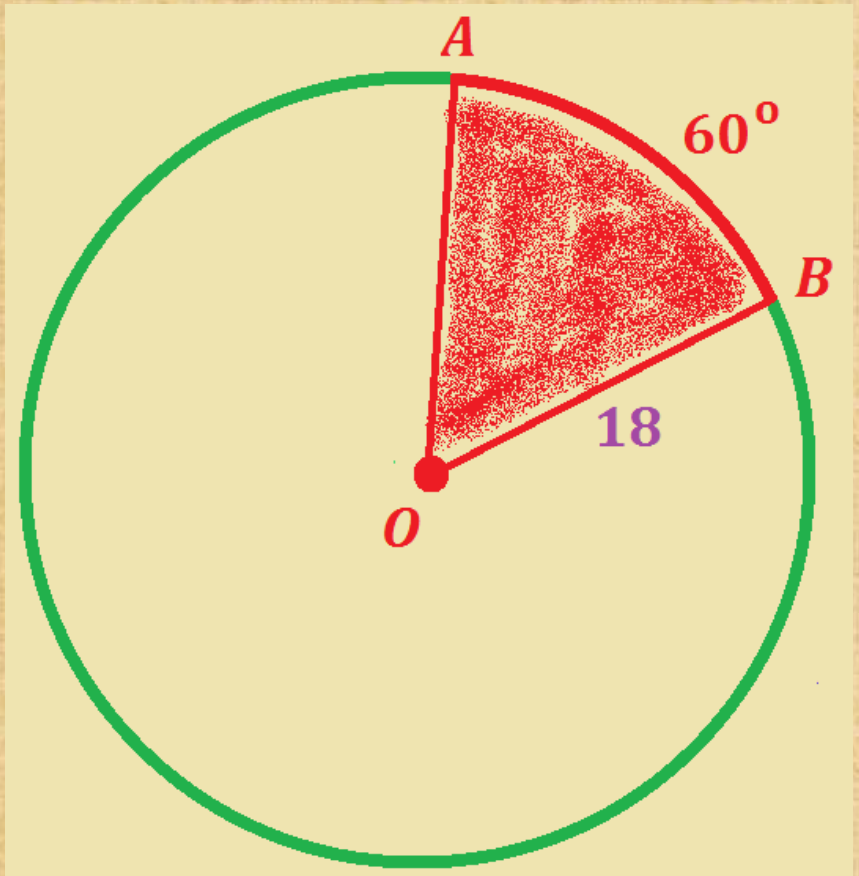
Let's use $r = 18$ in the equation.



Area of a Sector – Example 1

- Find the area of sector AOB (leave answer in terms of π)
- Our work is now

$$A = \frac{1}{6} \bullet \pi \bullet 324$$

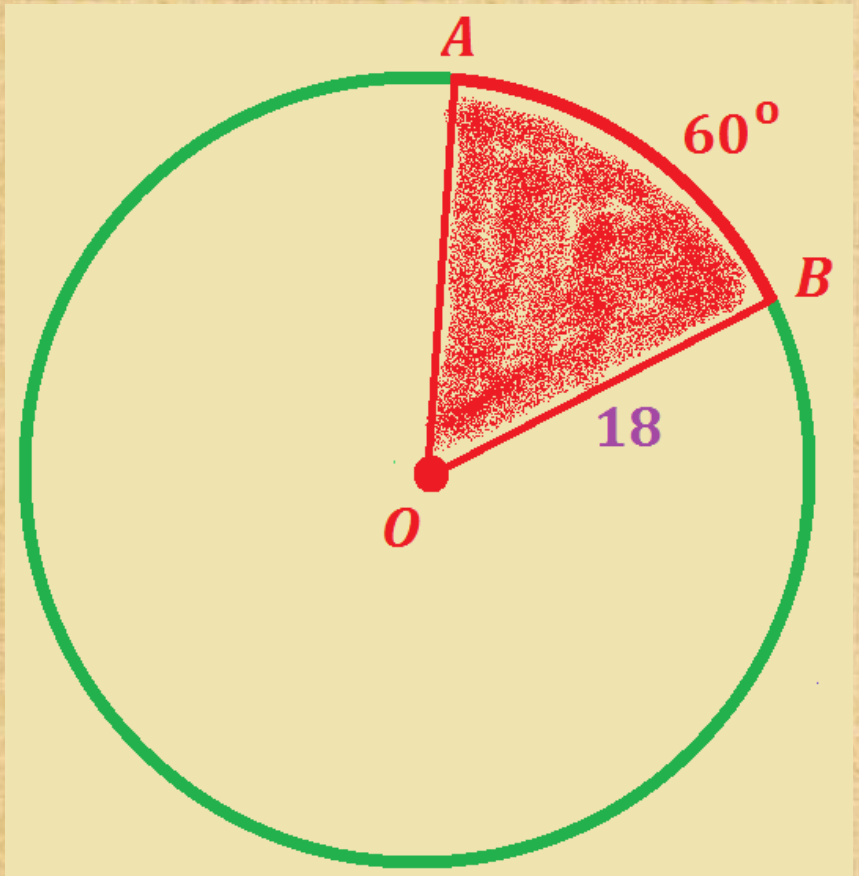


Area of a Sector – Example 1

- Find the area of sector AOB (leave answer in terms of π)
- Our work is now

$$A = \frac{1}{6} \bullet \pi \bullet 324$$

- We can multiply $\frac{1}{6} \bullet 324$

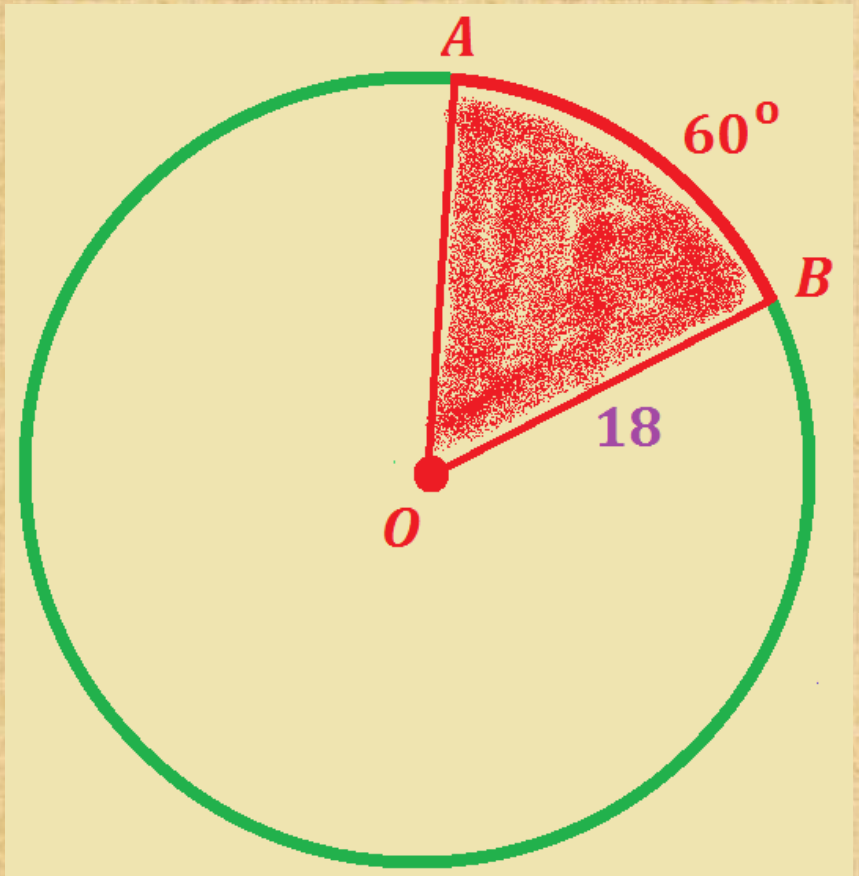


Area of a Sector – Example 1

- Find the area of sector AOB (leave answer in terms of π)
- Our work is now

$$A = \frac{1}{6} \bullet \pi \bullet 324$$

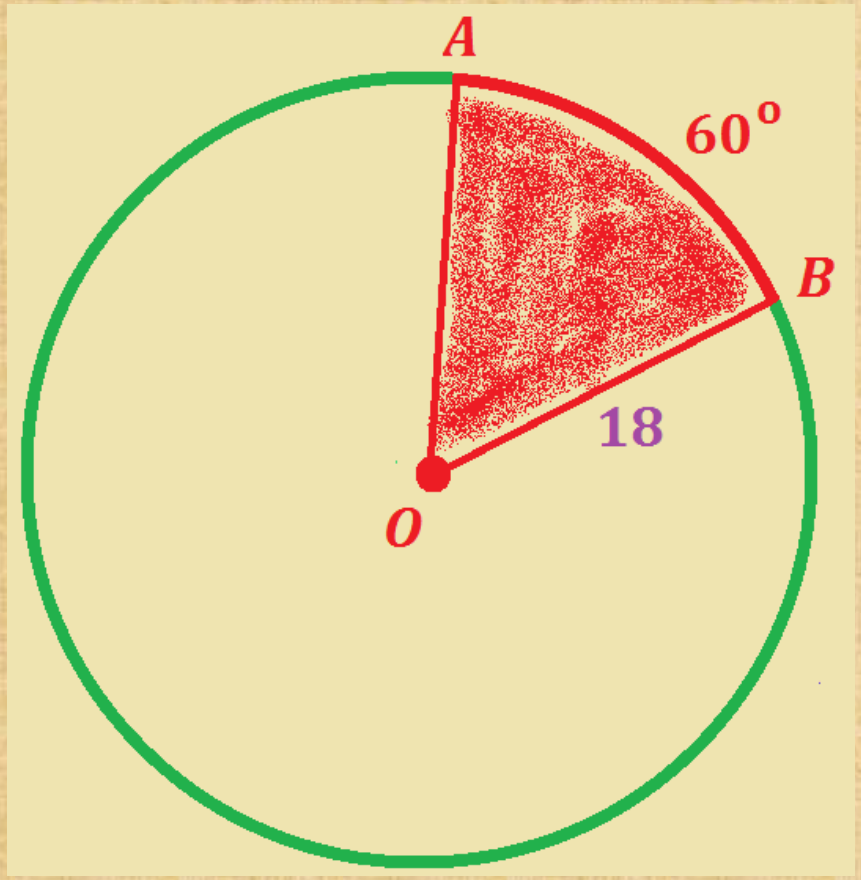
$$\frac{1}{6} \bullet 324 = 54$$



Area of a Sector – Example 1

- Find the area of sector AOB (leave answer in terms of π)
- Our work is now

$$A = 54\pi$$

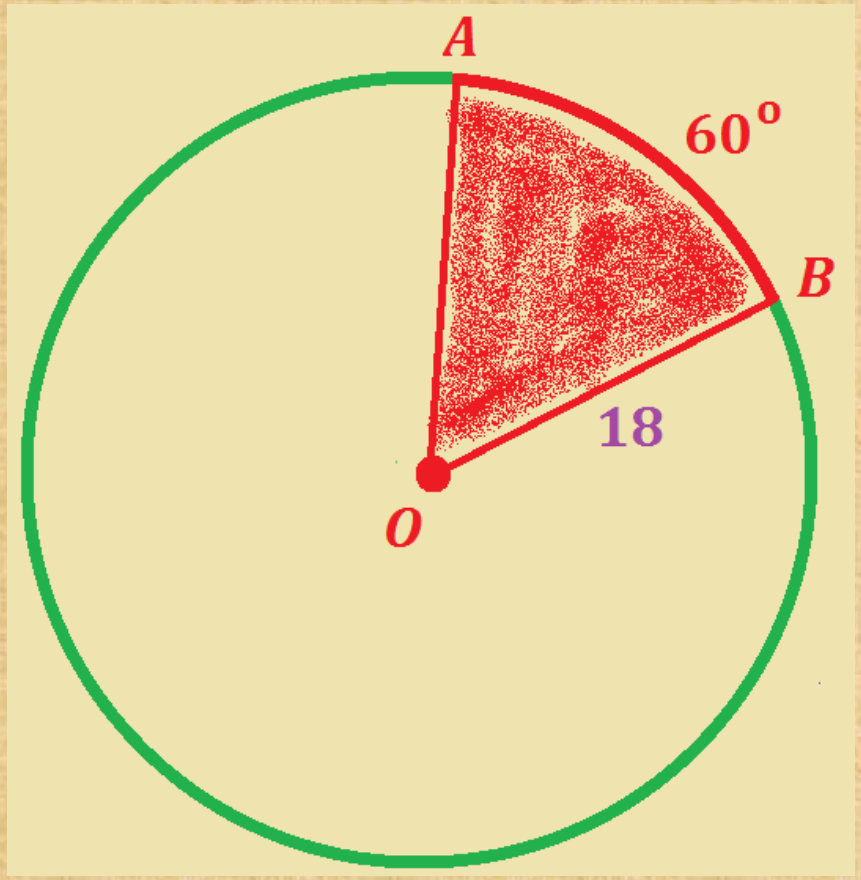


Area of a Sector – Example 1

- Find the area of sector AOB (leave answer in terms of π)
- Our work is now

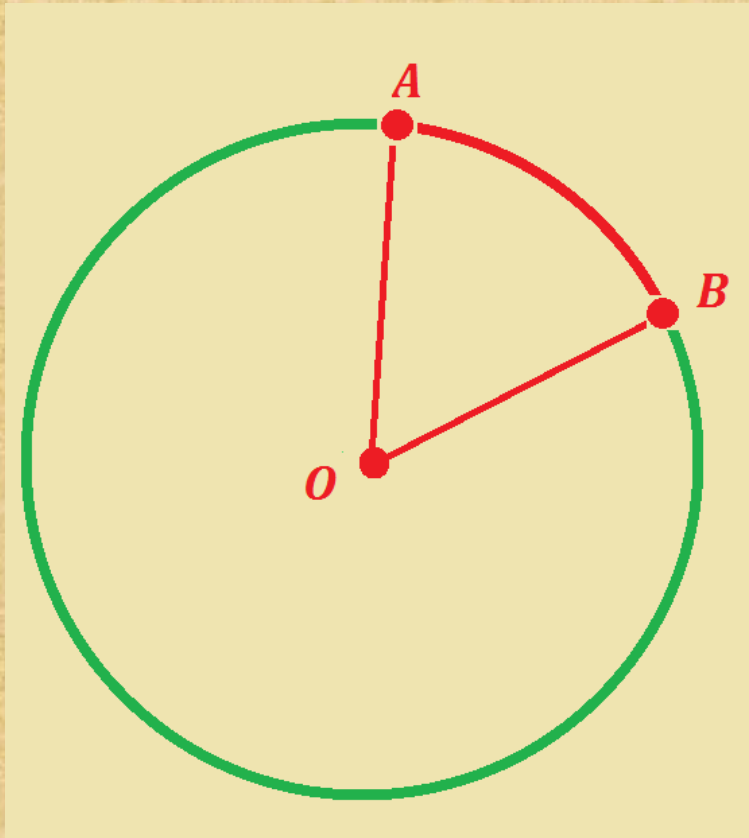
$$A = 54\pi$$

54π



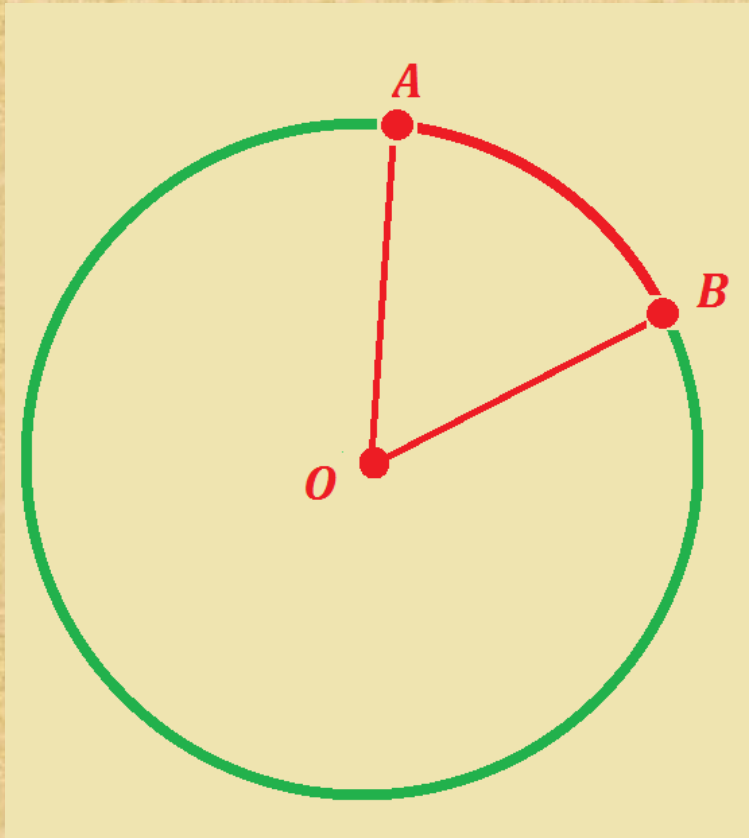
What is arc length?

- The length of arc $\overset{\frown}{AB}$ is the distance from A to B on the path of the circle

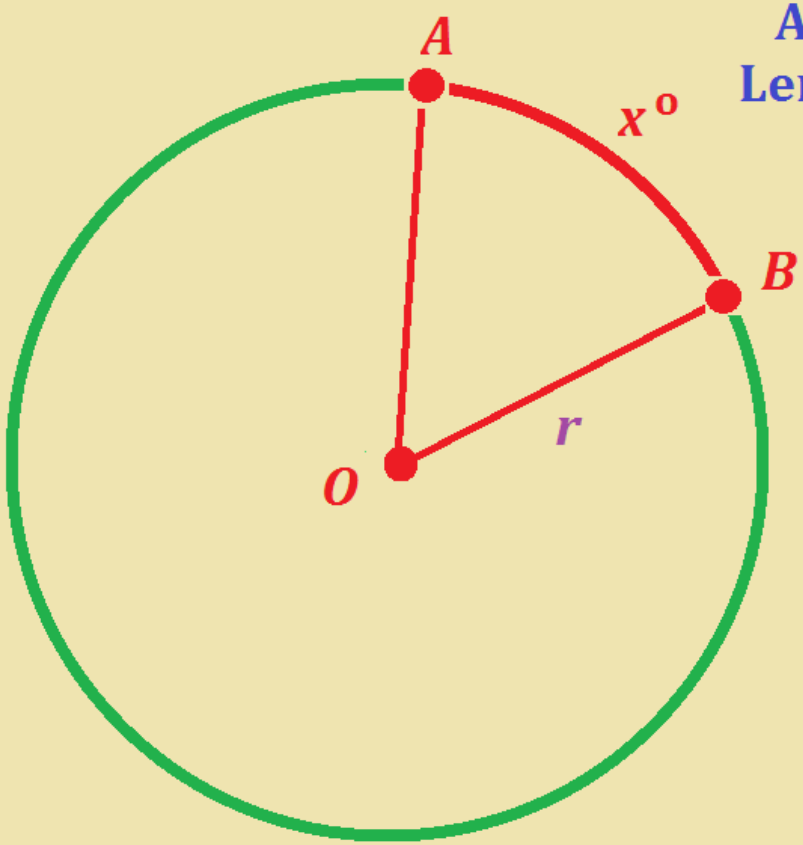


What is arc length?

- The length of arc $\overset{\frown}{AB}$ is the distance from A to B on the path of the circle
- It is a fraction of the circumference



Arc Length



$$\text{Arc Length} = \frac{x^{\circ}}{360} \bullet \text{Circumference of the circle}$$

OR

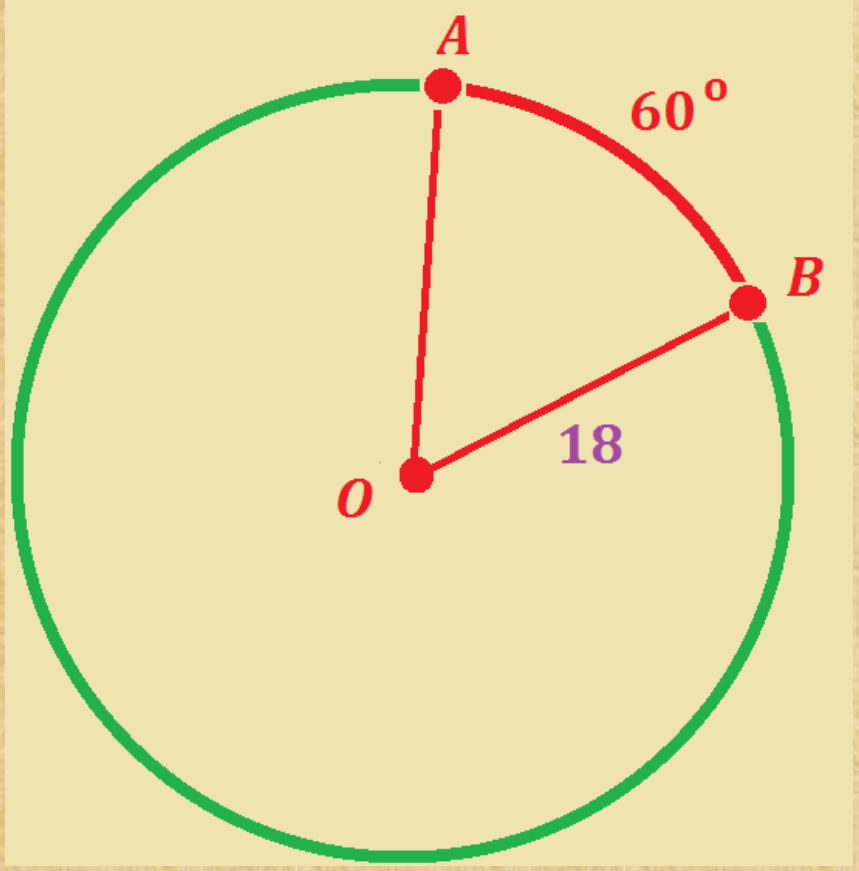
$$\text{Arc Length} = \frac{x^{\circ}}{360} \bullet 2 \bullet \pi \bullet r$$

OR

$$\text{Arc Length} = \frac{x^{\circ}}{360} \bullet \pi \bullet d$$

Arc Length – Example 2

- Find the length of $\overset{\frown}{AB}$

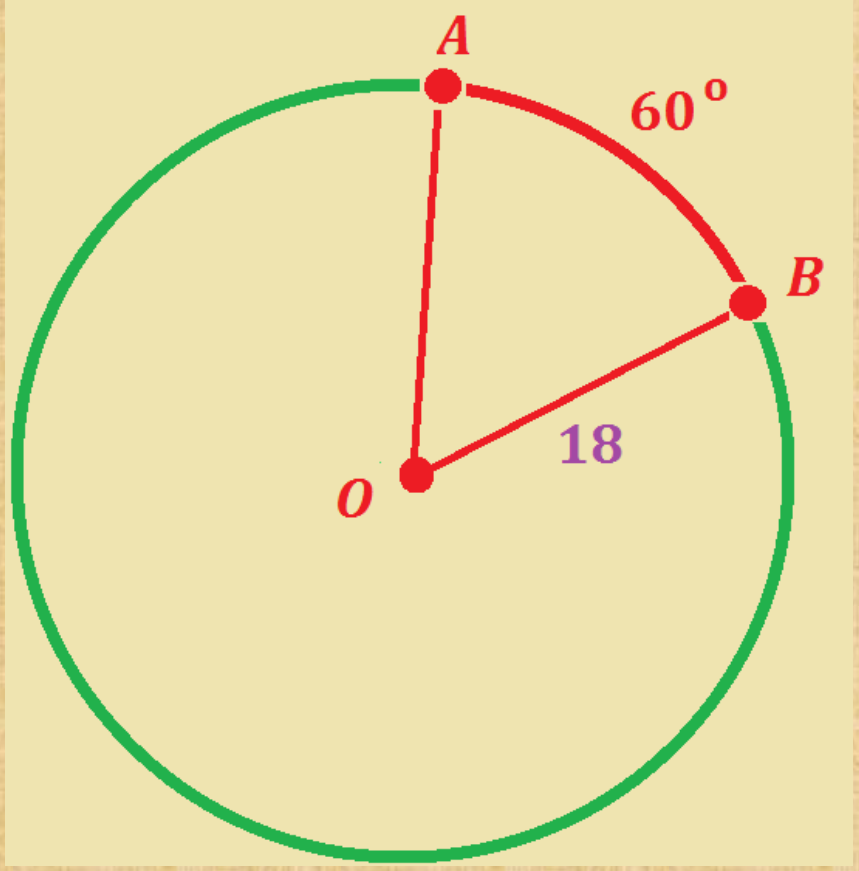


Arc Length – Example 2

- Find the length of $\overset{\frown}{AB}$

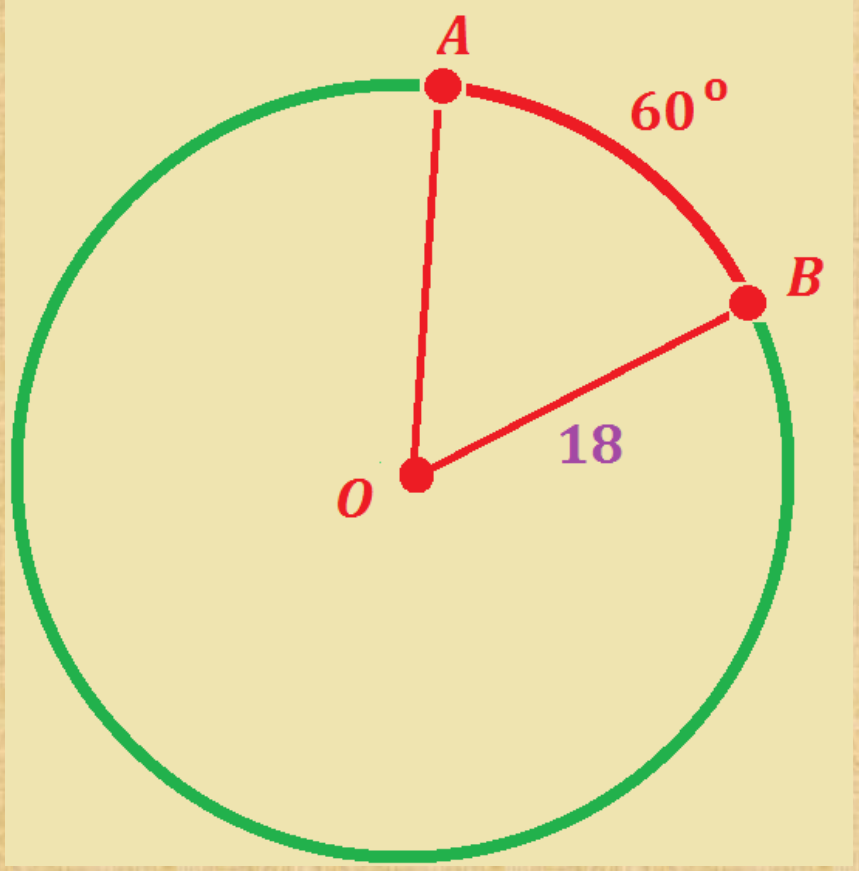
- The formula is

$$L = \frac{x^\circ}{360} \bullet 2 \bullet \pi \bullet r$$



Arc Length – Example 2

- Find the length of $\overset{\frown}{AB}$
- The formula is
  $L = \frac{x^\circ}{360} \bullet 2 \bullet \pi \bullet r$
- First, let's find the fraction – our arc is 60° and we'll put that in for x.

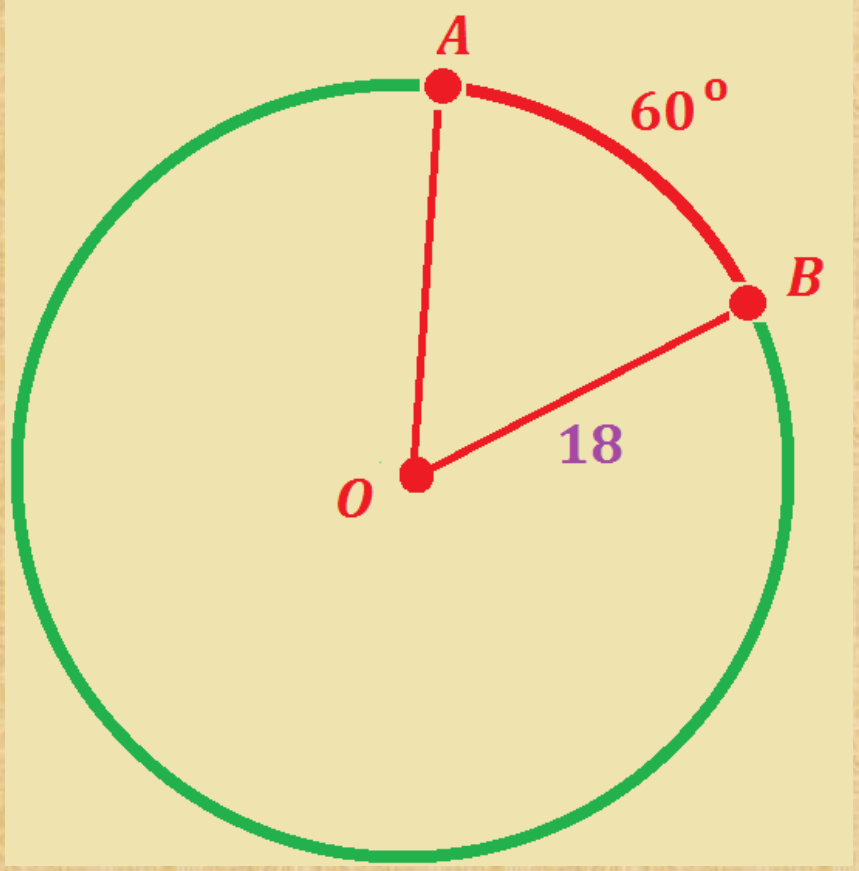


Arc Length – Example 2

- Find the length of $\overset{\frown}{AB}$

- Our work is now
  $L = \frac{60}{360} \bullet 2 \bullet \pi \bullet r$

- First, let's find the fraction – our arc is 60° and we'll put that in for x.

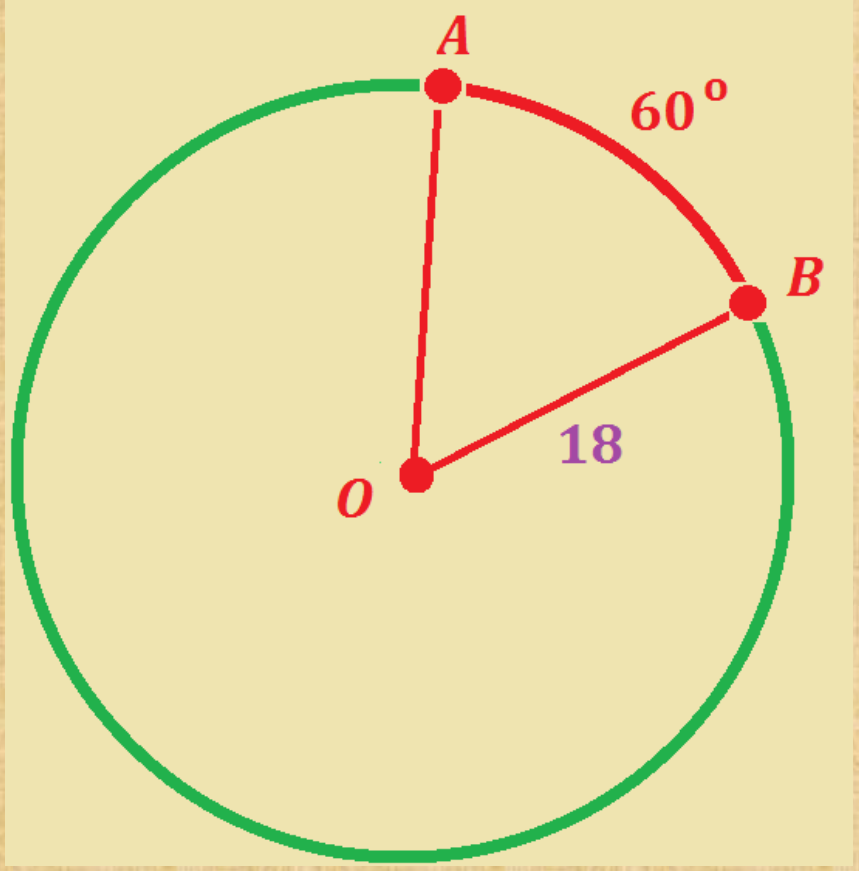


Arc Length – Example 2

- Find the length of $\overset{\frown}{AB}$

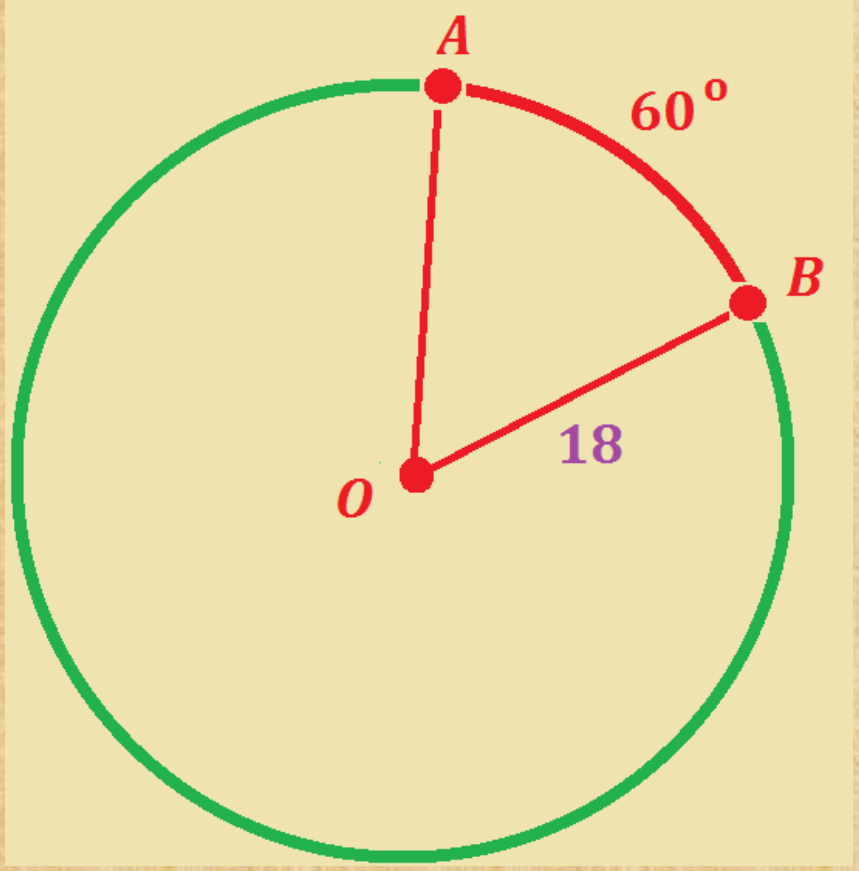
- Our work is now

$$L = \frac{60}{360} \bullet 2 \bullet \pi \bullet r$$



Arc Length – Example 2

- Find the length of $\overset{\frown}{AB}$
- Our work is now
  $L = \frac{60}{360} \bullet 2 \bullet \pi \bullet r$
- Next, let's reduce the fraction.

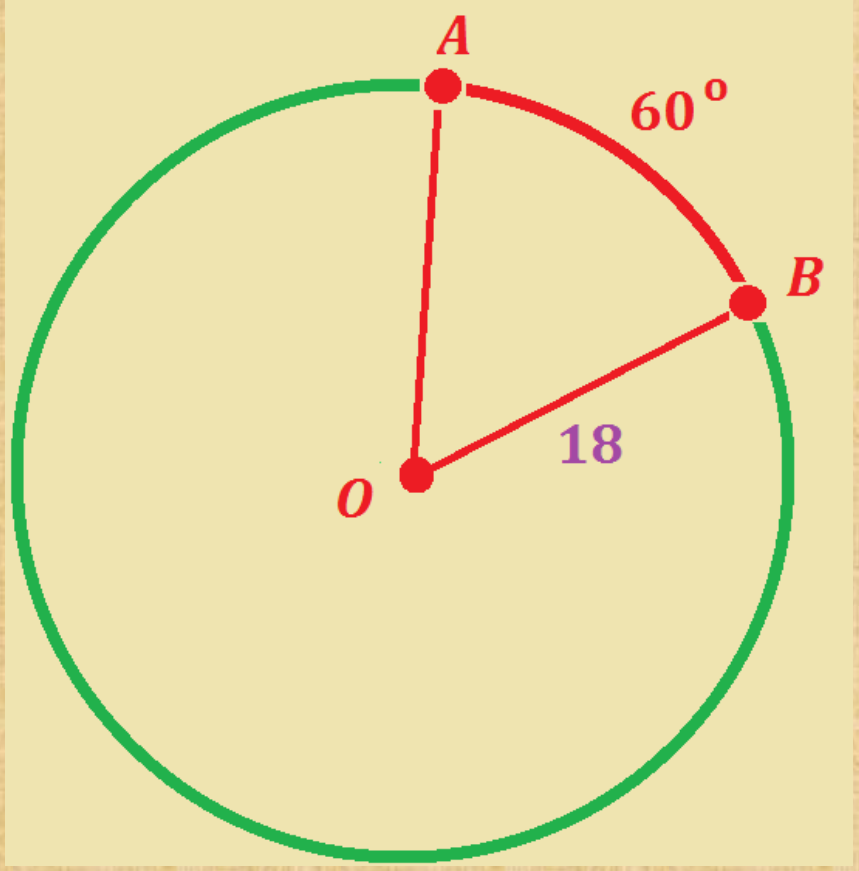


Arc Length – Example 2

- Find the length of $\overset{\frown}{AB}$

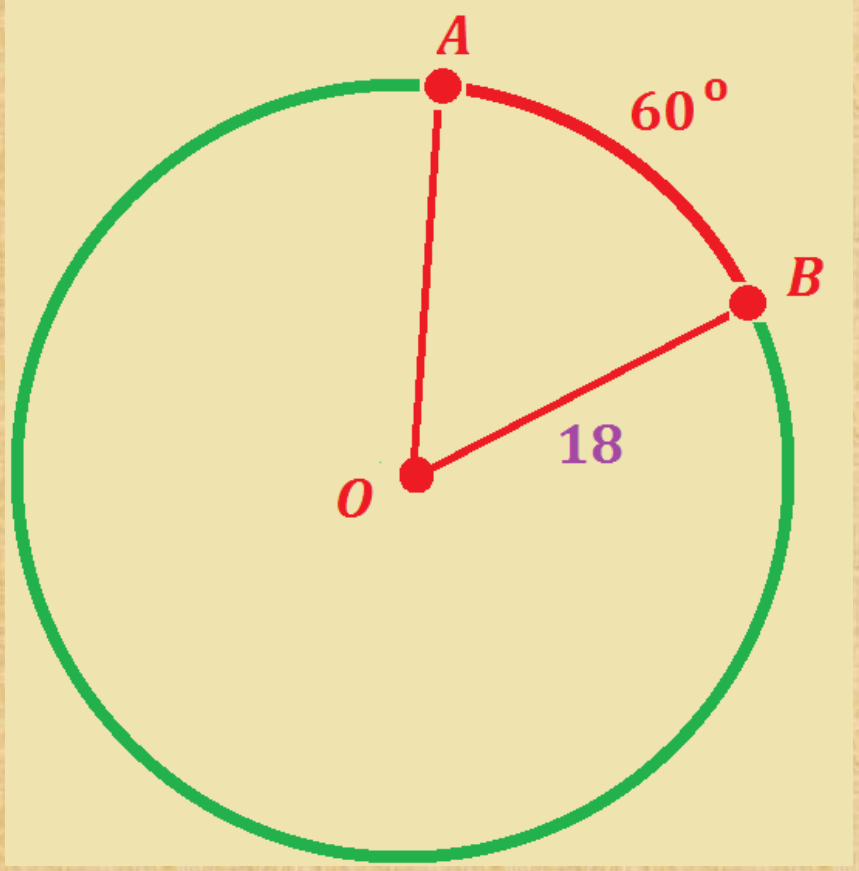
- Our work is now

$$L = \frac{1}{6} \bullet 2 \bullet \pi \bullet r$$



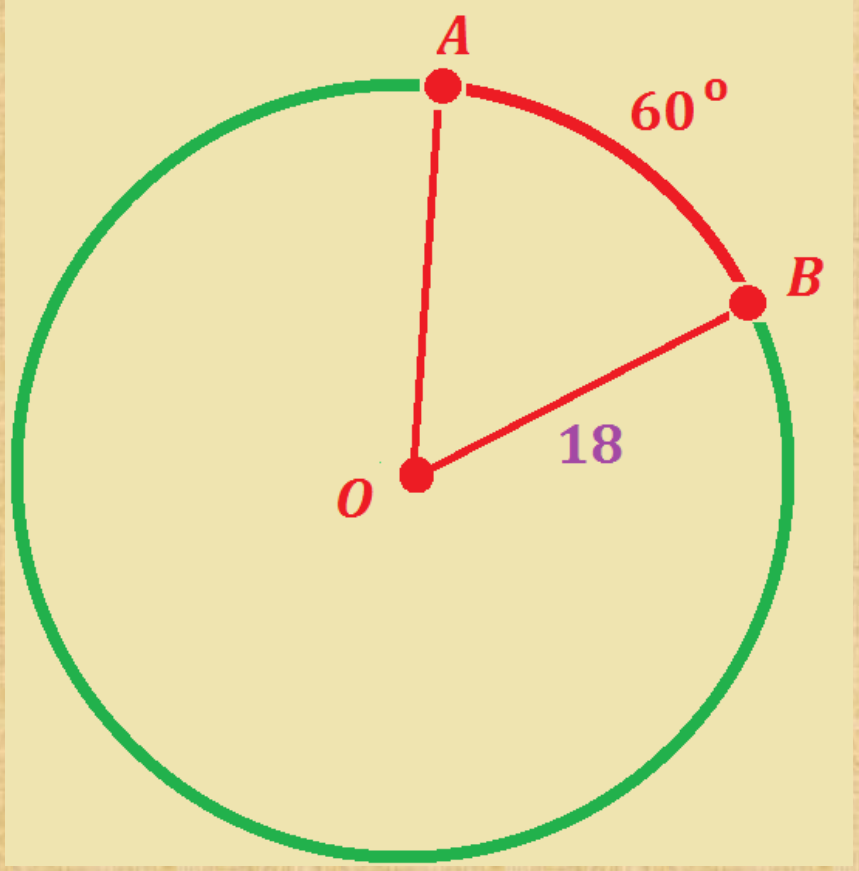
Arc Length – Example 2

- Find the length of $\overset{\frown}{AB}$
- Our work is now
  $L = \frac{1}{6} \bullet 2 \bullet \pi \bullet r$
- Let's use $r = 18$ in the equation.



Arc Length – Example 2

- Find the length of $\overset{\frown}{AB}$
- Our work is now
  $L = \frac{1}{6} \bullet 2 \bullet \pi \bullet (18)$
- Let's use $r = 18$ in the equation.

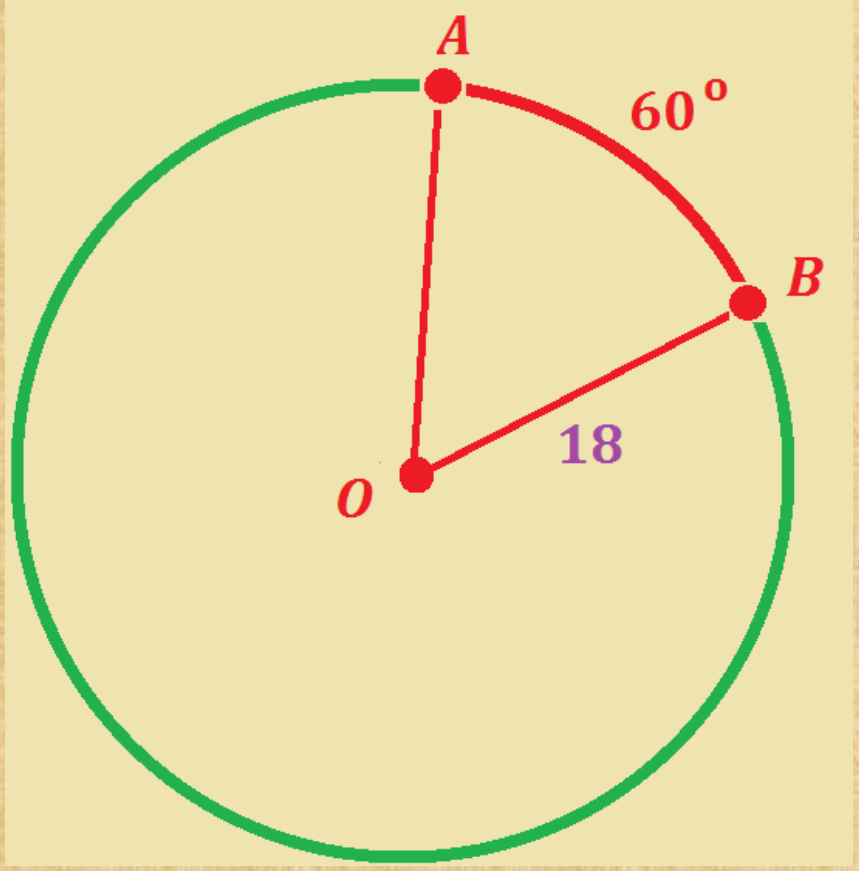


Arc Length – Example 2

- Find the length of $\overset{\frown}{AB}$

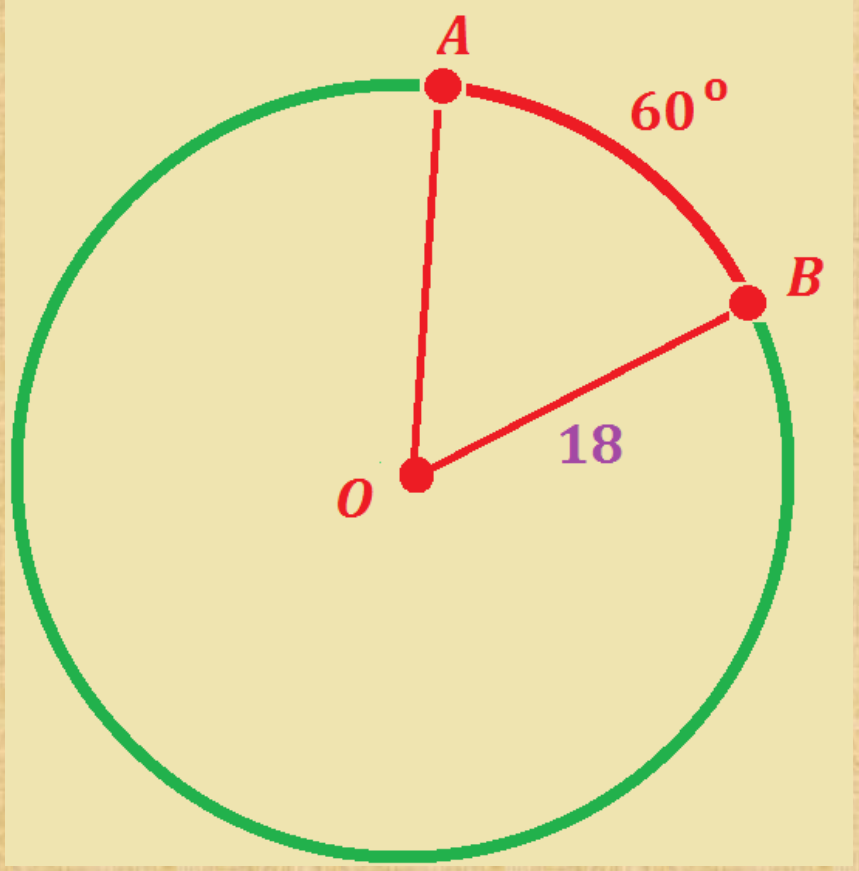
- Our work is now

$$L = \frac{1}{6} \bullet 2 \bullet \pi \bullet 18$$



Arc Length – Example 2

- Find the length of $\overset{\frown}{AB}$
- Our work is now
  $L = \frac{1}{6} \bullet 2 \bullet \pi \bullet \mathbf{18}$
- Let's multiply $\frac{1}{6} \bullet 2 \bullet 18$



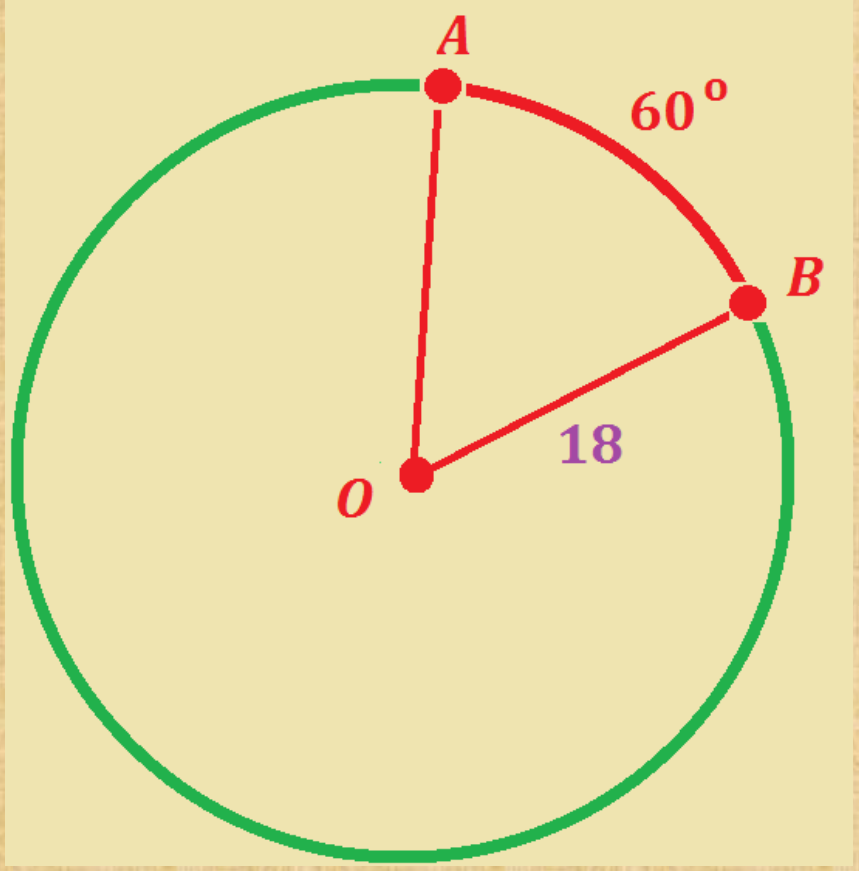
Arc Length – Example 2

- Find the length of $\overset{\frown}{AB}$

- Our work is now

$$L = \frac{1}{6} \bullet 2 \bullet \pi \bullet 18$$

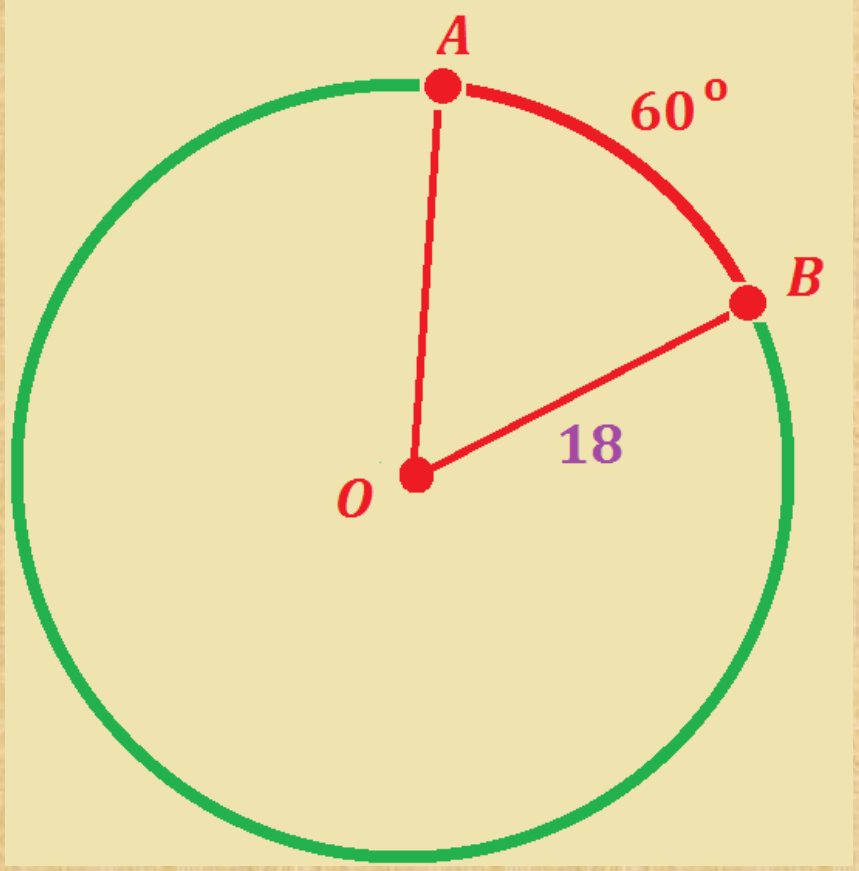
$$\frac{1}{6} \bullet 2 \bullet 18 = 6$$



Arc Length – Example 2

- Find the length of $\overset{\frown}{AB}$

- Our work is now
  $L = 6\pi$

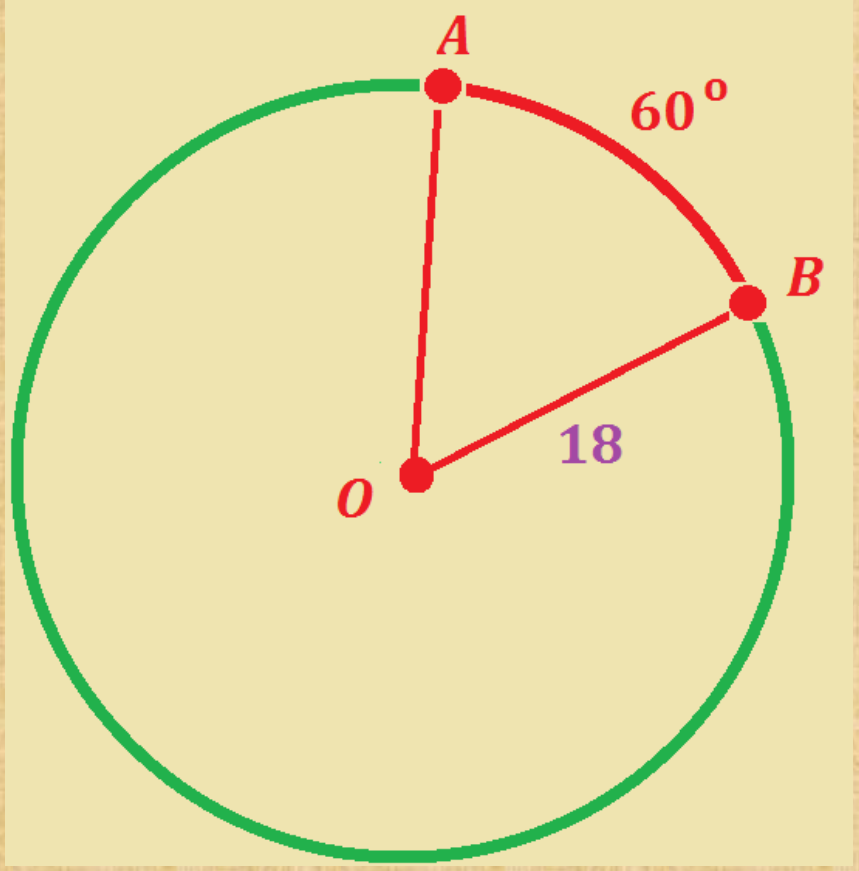


Arc Length – Example 2

- Find the length of $\overset{\frown}{AB}$

- Our work is now
  $L = \mathbf{6}\pi$

6π



BowerPower.net