

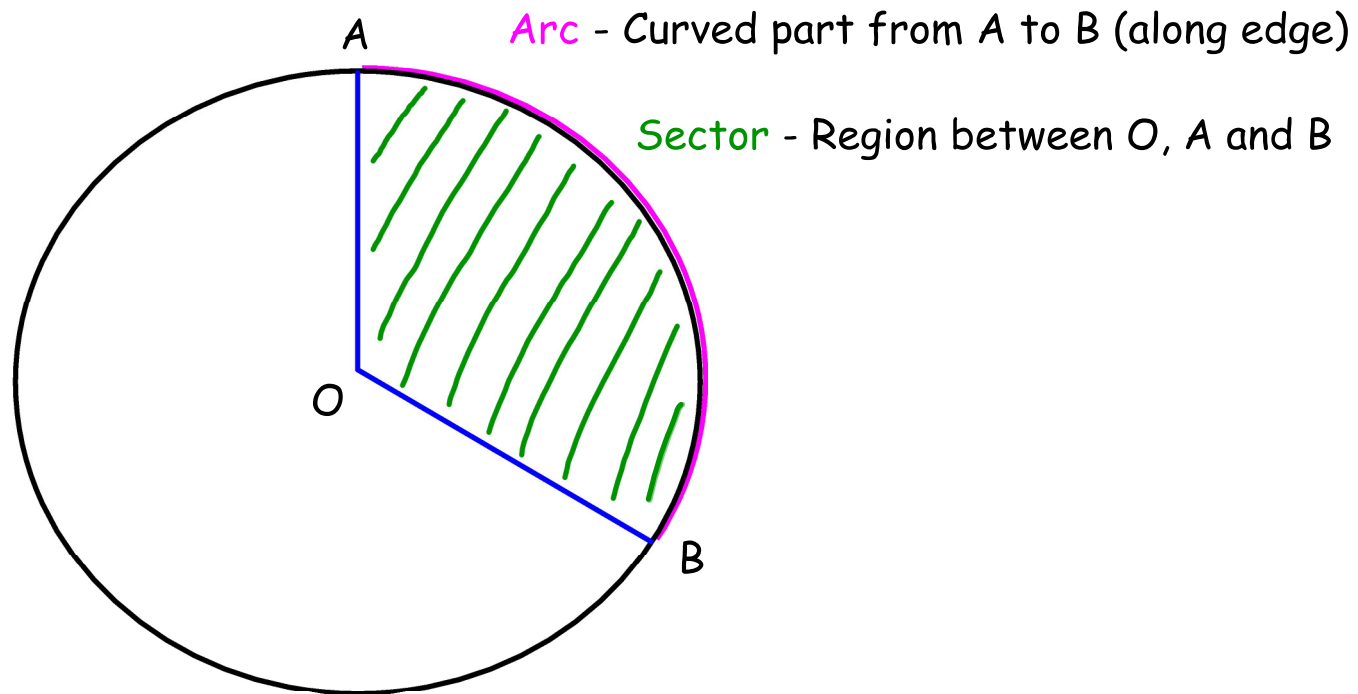
*Arc Length and Sector Area - Lesson 4***Sector Area - Non-Calculator**LI

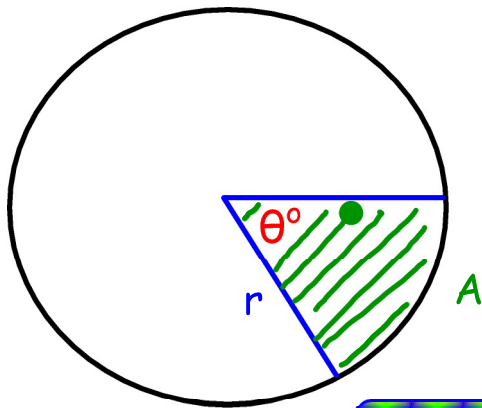
- Calculate the Sector Area of a circle without a calculator.

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- Use the Sector Area Formula.
- Non-calculator arithmetic.

Parts of a Circle





r = Radius

θ° = Sector Angle

A = Sector Area

The Sector Area (aka Area of Sector)
is calculated using the formula :

$$A = \frac{\theta^\circ}{360^\circ} \times \pi r^2$$

Example 1

Calculate the exact sector area (meaning leave the answer in terms of π) of a circle with radius 3 cm and sector angle 120° .

$$\theta^\circ = 120^\circ, r = 3 \text{ cm}$$

$$A = \frac{\theta^\circ}{360^\circ} \times \pi r^2$$

$$\Rightarrow A = \frac{120^\circ}{360^\circ} \times \pi \times 3^2$$

$$\Rightarrow A = 9 \times \pi \div 3$$

$$\Rightarrow A = 3\pi \text{ cm}^2$$

Example 2

Calculate the exact sector area (meaning leave the answer in terms of π) of a circle with radius 2 mm and sector angle 180° .

$$\theta^\circ = 180^\circ, r = 2 \text{ mm}$$

$$A = \frac{\theta^\circ}{360^\circ} \times \pi r^2$$

$$\Rightarrow A = \frac{180^\circ}{360^\circ} \times \pi \times 2^2$$

$$\Rightarrow A = 4 \times \pi \div 2$$

$$\Rightarrow A = 2\pi \text{ mm}^2$$

Example 3

Taking $\pi = 3.14$, calculate the sector area of a circle with radius 10 m and sector angle 180° .

$$\theta^\circ = 180^\circ, r = 10 \text{ m}$$

$$A = \frac{\theta^\circ}{360^\circ} \times \pi r^2$$

$$\Rightarrow A = \frac{180^\circ}{360^\circ} \times 3.14 \times 10^2$$

$$\Rightarrow A = 100 \times 3.14 \div 2$$

$$\Rightarrow A = 314 \div 2$$

$$\Rightarrow A = 157 \text{ m}^2$$

Example 4

Taking $\pi = 3.14$, calculate the sector area of a circle with radius 6 cm and sector angle 10° .

$$\theta^\circ = 10^\circ, r = 6 \text{ cm}$$

$$A = \frac{\theta^\circ}{360^\circ} \times \pi r^2$$

$$\Rightarrow A = \frac{10^\circ}{360^\circ} \times 3.14 \times 6^2$$

$$\Rightarrow A = 36 \times 3.14 \div 36$$

$$\Rightarrow A = 3.14 \times 36 \div 36$$

$$\Rightarrow A = 3.14 \text{ cm}^2$$

Calculate the areas of these sectors :

Exact length (answer in terms of π)

Take $\pi = 3.14$

1) $\theta^\circ = 60^\circ$, $r = 6$ cm

2) $\theta^\circ = 45^\circ$, $r = 40$ mm

3) $\theta^\circ = 9^\circ$, $r = 20$ m

4) $\theta^\circ = 72^\circ$, $r = 25$ ft

5) $\theta^\circ = 40^\circ$, $r = 600$ yd

6) $\theta^\circ = 240^\circ$, $r = 30$ in

7) $\theta^\circ = 60^\circ$, $r = 6$ mm

8) $\theta^\circ = 90^\circ$, $r = 10$ in

9) $\theta^\circ = 45^\circ$, $r = 8$ cm

10) $\theta^\circ = 45^\circ$, $r = 20$ yd

11) $\theta^\circ = 40^\circ$, $r = 30$ m

12) $\theta^\circ = 72^\circ$, $r = 5$ ft

Answers

Exact length (answer in terms of π)	Take $\pi = 3.14$
1) $6\pi \text{ cm}^2$	7) 18.84 mm^2
2) $200\pi \text{ mm}^2$	8) 78.5 in^2
3) $10\pi \text{ m}^2$	9) 25.12 cm^2
4) $125\pi \text{ ft}^2$	10) 157 yd^2
5) $40\,000\pi \text{ yd}^2$	11) 314 m^2
6) $600\pi \text{ in}^2$	12) 15.7 ft^2