

Arc Length and Sector Area

For a circle with radius r (or diameter d), the **circumference** of the circle is given by:

$$C = 2\pi r \text{ (or } C = \pi d)$$

The circumference is the **distance around** the circle.

For a circle with radius r , the **area** of the circle is given by:

$$A = \pi r^2$$

The area is the **space inside** the circle.

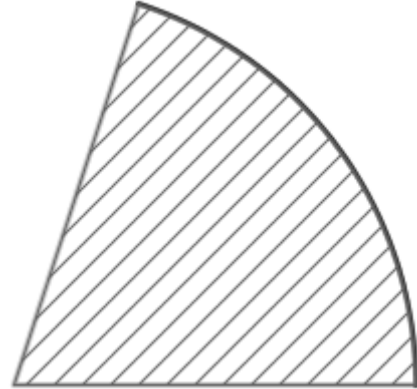
The **arc** is a part of the total **circumference**:



Since the *angle* (θ) tells us how much of the circumference we want, the length is given by:

$$l = \frac{\theta}{360} (2\pi r)$$

The **sector** is a part of the total **area**:



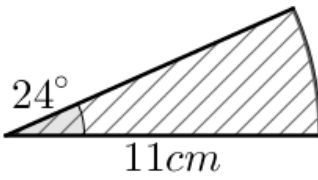
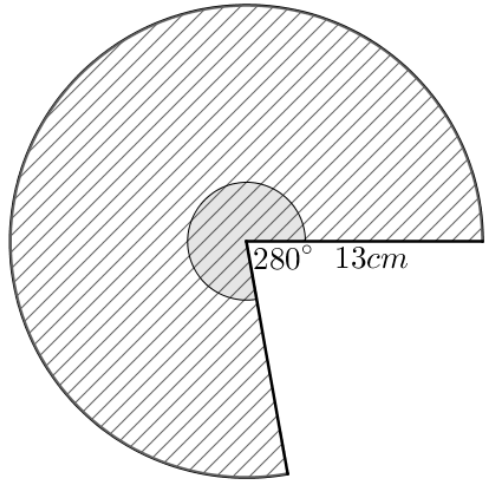
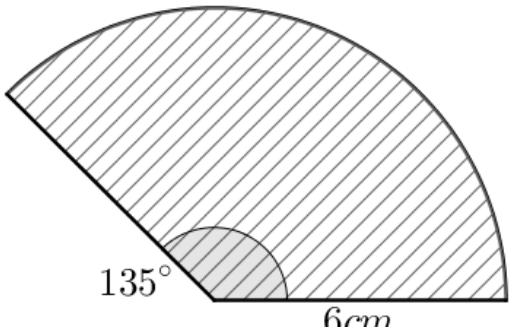
Since the *angle* (θ) tells us how much of the area we want, the area is given by:

$$A = \frac{\theta}{360} (\pi r^2)$$

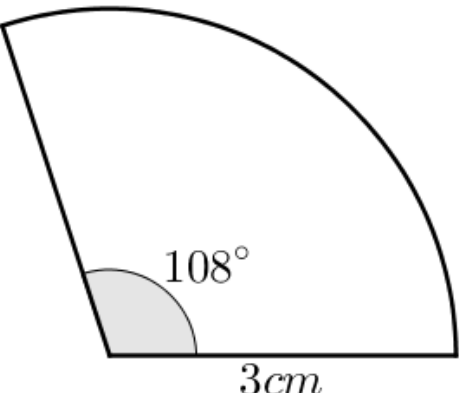
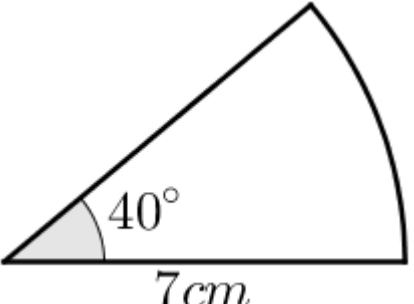
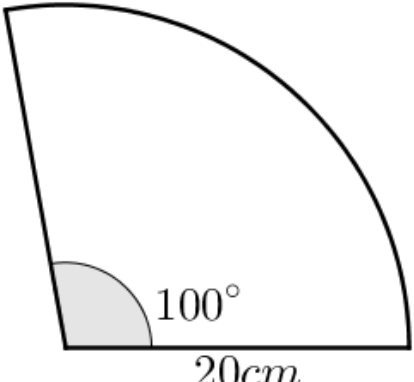
Section A: Find the length of the arcs in each diagram:

<p>1.</p>	<p>2.</p>	<p>3.</p>
<p>4.</p>	<p>5.</p>	

Section B: Find the area of the sectors in each diagram.

<p>1.</p> 	<p>3.</p> 
<p>2.</p> 	

Section C: Find the **area** and the **total perimeter** of each of the shapes shown below.

<p>1.</p> 	<p>Area:</p>	<p>Perimeter:</p>
<p>2.</p> 	<p>Area:</p>	<p>Perimeter:</p>
<p>3.</p> 	<p>Area:</p>	<p>Perimeter:</p>

Arc Length and Sector Area **SOLUTIONS**

For a circle with radius r (or diameter d), the **circumference** of the circle is given by:

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The circumference is the **distance around** the circle.

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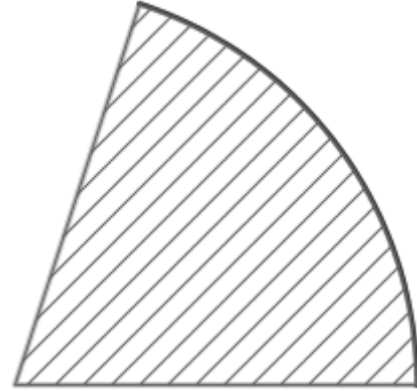
The **arc** is a part of the total **circumference**:



Since the *angle* (θ) tells us how much of the circumference we want, the length is given by:

$$l = \frac{\theta}{360} (2\pi r)$$

The **sector** is a part of the total **area**:

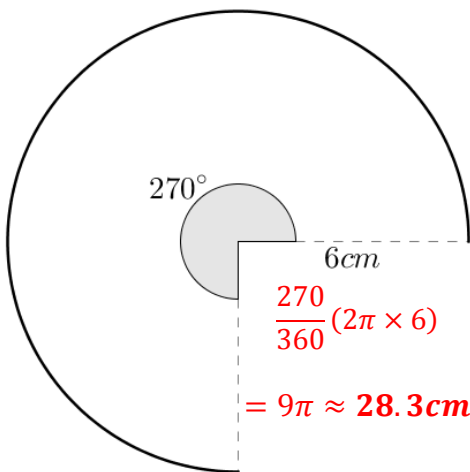


Since the *angle* (θ) tells us how much of the area we want, the area is given by:

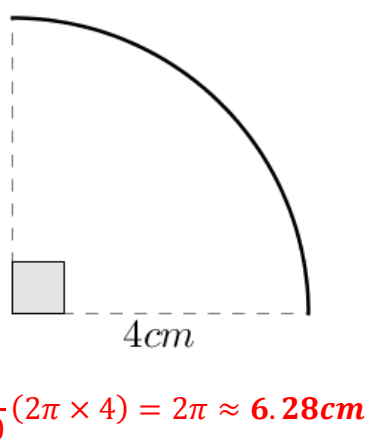
$$A = \frac{\theta}{360} (\pi r^2)$$

Section A: Find the length of the arcs in each diagram:

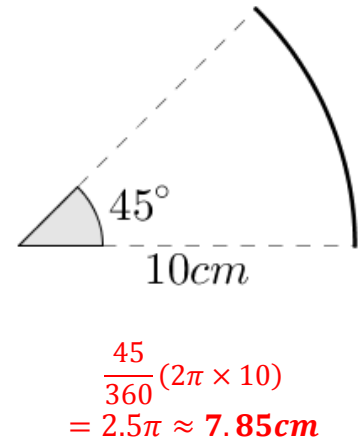
1.



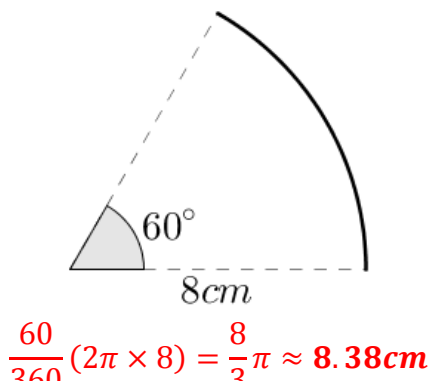
2.



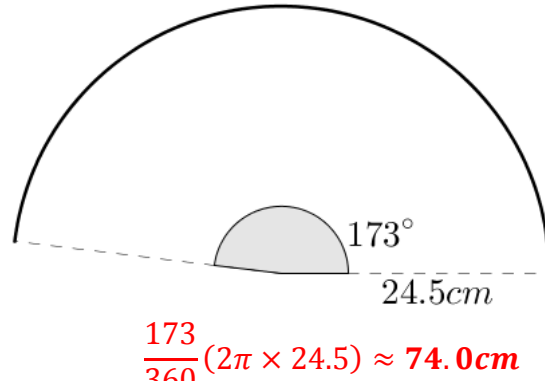
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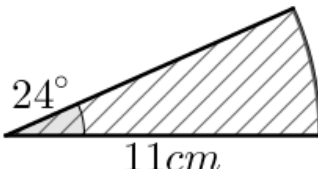
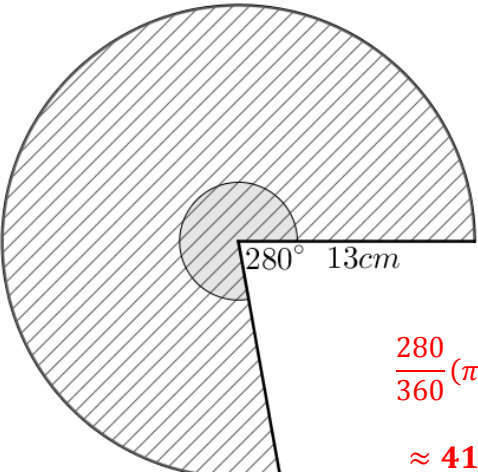
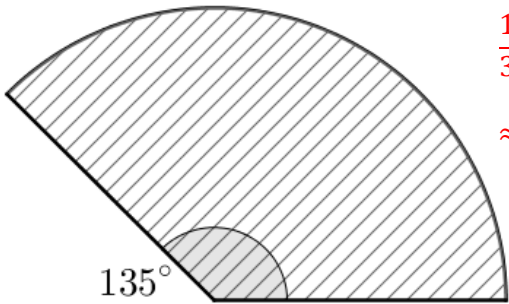
4.



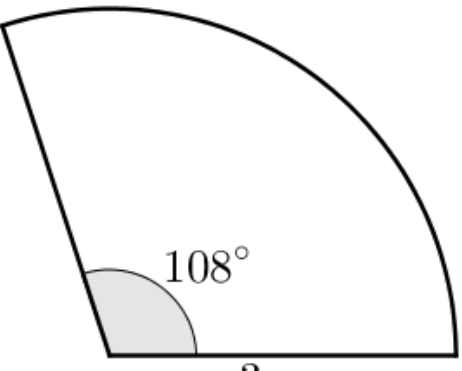
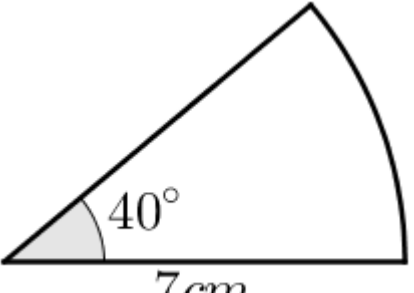
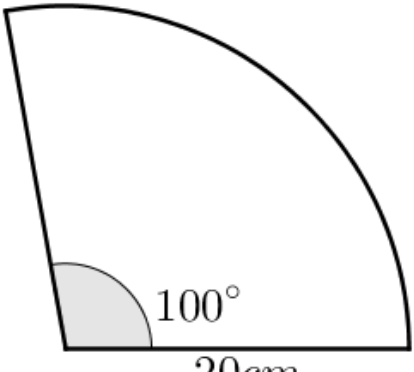
5.



Section B: Find the area of the sectors in each diagram.

<p>1.</p>  <p>24° 11cm</p>	<p>3.</p>  <p>280° 13cm</p>
<p>2.</p>  <p>135° 6cm</p>	$\frac{24}{360}(\pi \times 11^2)$ $\approx 25.3\text{cm}^2$ $\frac{135}{360}(\pi \times 6^2)$ $\approx 42.4\text{cm}^2$ $\frac{280}{360}(\pi \times 13^2)$ $\approx 413\text{cm}^2$

Section C: Find the **area** and the **total perimeter** of each of the shapes shown below.

<p>1.</p>  <p>108° 3cm</p>	<p>Area:</p> $\frac{108}{360}(\pi \times 3^2)$ $\approx 8.48\text{cm}^2$	<p>Perimeter:</p> $\frac{108}{360}(2\pi \times 3) + 2 \times 3$ $\approx 11.7\text{cm}$
<p>2.</p>  <p>40° 7cm</p>	<p>Area:</p> $\frac{40}{360}(\pi \times 7^2)$ $\approx 17.1\text{cm}^2$	<p>Perimeter:</p> $\frac{40}{360}(2\pi \times 7) + 2 \times 7$ $\approx 18.9\text{cm}$
<p>3.</p>  <p>100° 20cm</p>	<p>Area:</p> $\frac{100}{360}(\pi \times 20^2)$ $\approx 349\text{cm}^2$	<p>Perimeter:</p> $\frac{100}{360}(2\pi \times 20) + 2 \times 20$ $\approx 74.9\text{cm}$