

The diagram shows two storage jars which are mathematically similar.

The volume of the large jar is 1.2 litres.

Find the volume of the smaller jar.

**Give your answer in litres  
correct to 2 significant figures.**

4

Evaluate  $5\frac{1}{2} \div 1\frac{3}{8}$

Article 28: Right to education. Article 29: Goals for education



## Volume, Arcs and Sectors

### Learning Intention

We are learning how to find the length of an arc.

### Steps to Success



I can calculate the area and circumference of a circle.



I can explain what the terms 'arc' and 'sector' mean.



I can recall the formula for arc length.



I can accurately substitute values into a formula and perform the calculations.

### Key Vocabulary

Arc

Sectors

Volume, Arcs and Sectors



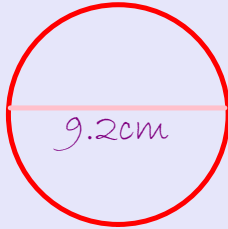
Article 28: Right to education  
Article 29: Goals for education

What do we know about circles?

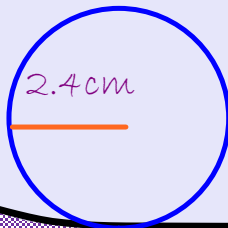


## Circle Revision

Calculate the circumference  $C = \pi \times \text{diameter}$

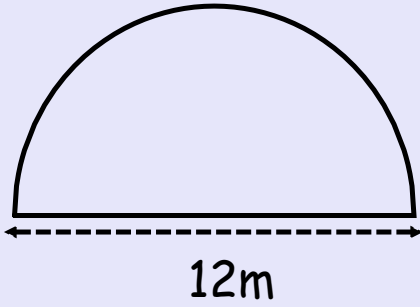


Calculate the area



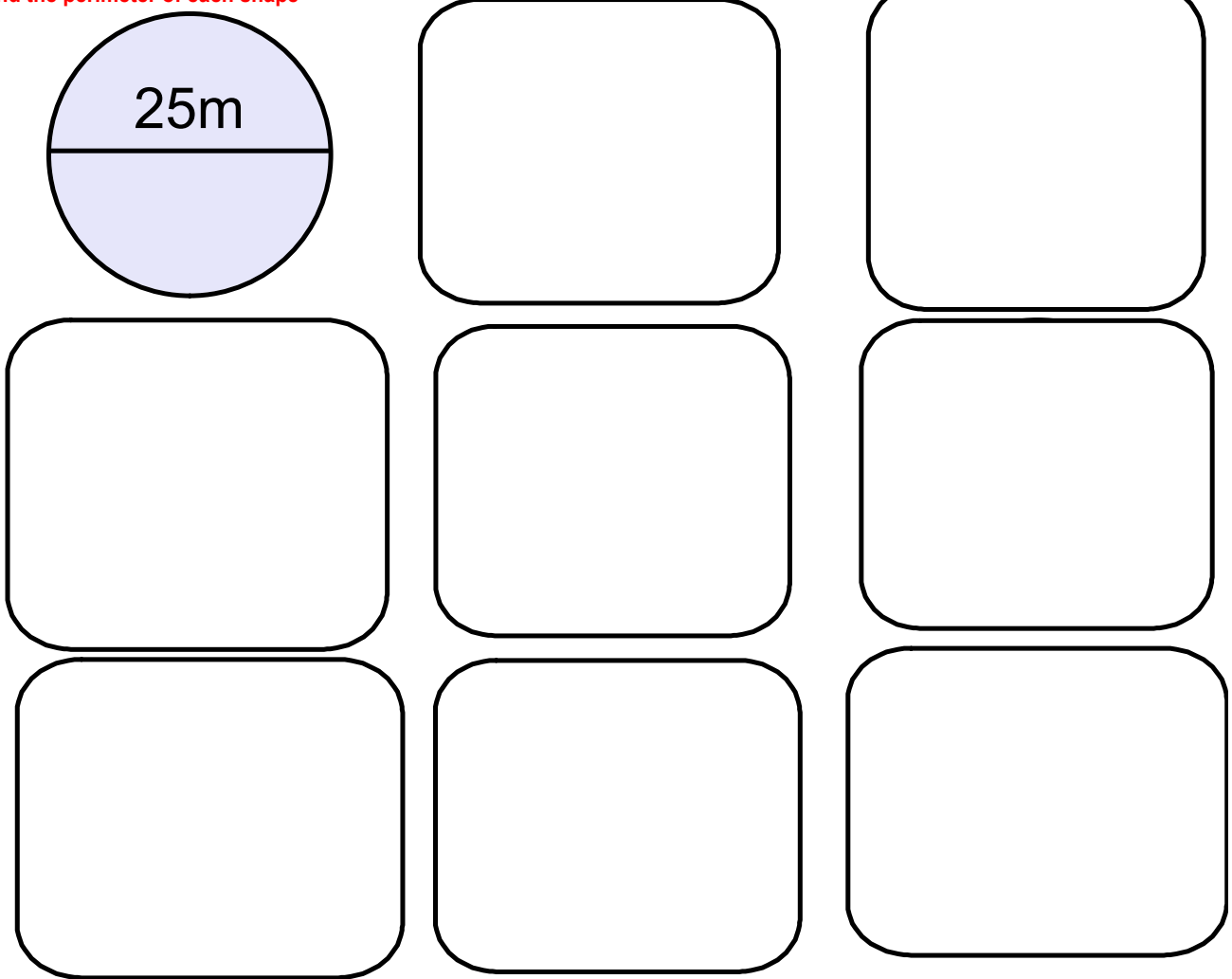


Calculate the perimeter  
of the shape.



# Arcs and Sectors

Find the perimeter of each shape



Points competition!

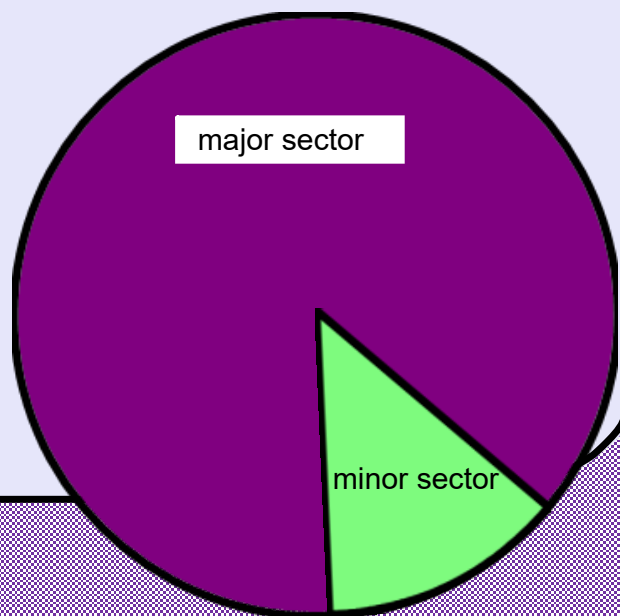
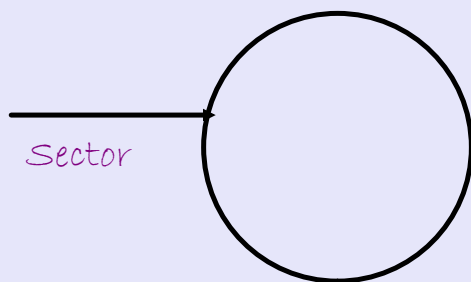
# Arcs and Sectors

## Volume, Arcs and Sectors



Article 28: Right to education  
Article 29: Goals for education

A sector of a circle is a fraction (or part) of a whole circle.



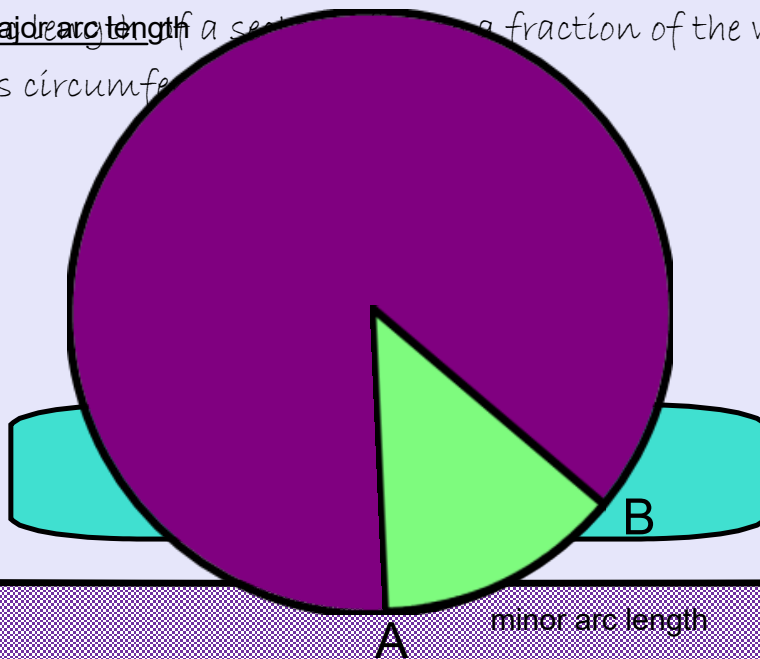
# Arcs and Sectors

Volume, Arcs and Sectors



Article 28. Right to education  
Article 29. Goals for education

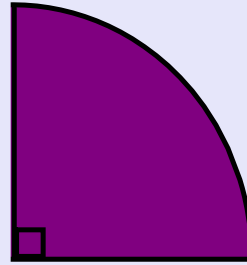
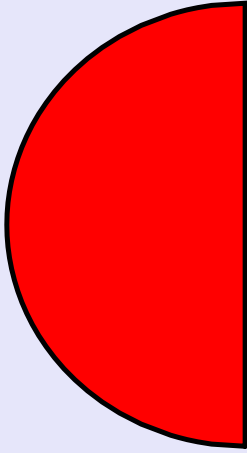
The major arc length of a sector is a fraction of the whole circle's circumference.







What fraction of a circle are these sectors?



Can you relate this to  $360^{\circ}$ ?



## Calculating the Arc Length

The arc length formula is based on the formula for the whole circumference of a circle.

Find the arc length is finding part of of the circumference.

We work out the fraction of the circumference we need using the angle of the sector.!

$$\text{Arc Length} = \frac{x^\circ}{360} \times \pi \times \text{diameter}$$

# Arcs and Sectors

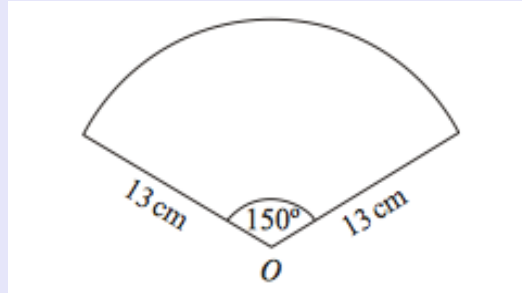
## Volume, Arcs and Sectors



Article 28: Right to education  
Article 29: Goals for education

Example

Find the length of the arc AB.



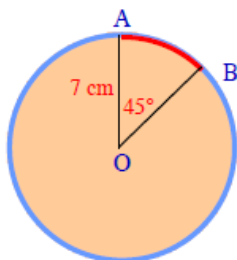
# Arcs and Sectors

## Exercise 13.1

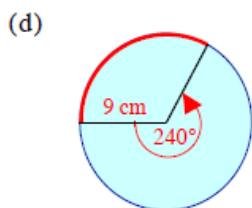
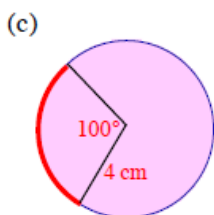
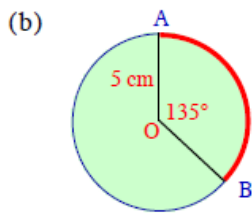
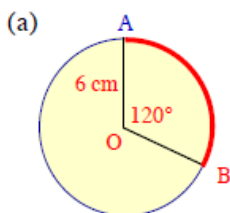


1. Copy and complete the calculation to find the length of the **minor arc** of the circle shown :-

$$\begin{aligned}
 C &= \pi d && \text{note} \\
 C &= 3.14 \times 14 \\
 C &= \dots\dots \text{ cm} \\
 \Rightarrow \text{Arc AB} &= \frac{\dots}{360} \times \dots \\
 &= \dots\dots\dots \text{ cm.}
 \end{aligned}$$



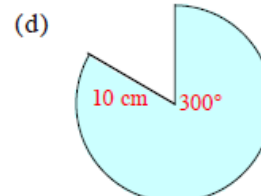
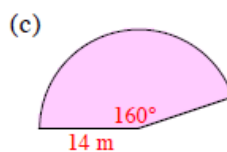
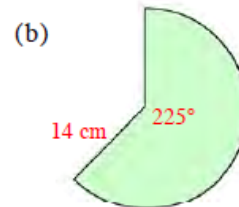
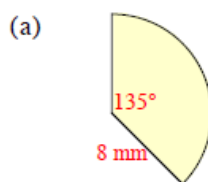
2. Find the length of each **minor arc** :-



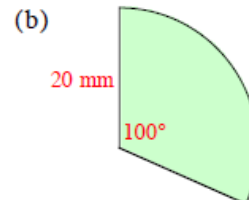
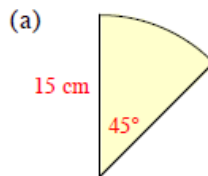
3. Find the length of the **major arc** in question 2(a).

Sometimes the words **minor** or **major** are not used.

4. Calculate the **arc length** in each of these :-



5. Calculate the **perimeter** of each shape :-



6. The shape trapped between two radii and an arc is called a **sector** of a circle.

Calculate the **perimeter** of a sector which is a fifth of a circle with diameter 5 centimetres. (A sketch would help).

Plenary

Without looking at your jotter, explain to your partner what the Arc Length formula is and what each part means.



Article 28: Right to education, Article 29: Goals for education



Volume, Arcs  
and Sectors

Learning Intention

We are learning how to find the length of an arc.

Steps to Success



I can calculate the area and circumference of a circle.



I can explain what the terms 'arc' and 'sector' mean.



I can recall the formula for arc length.

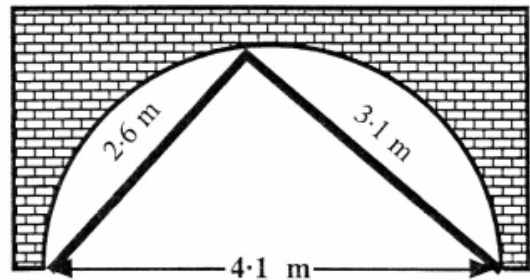


I can accurately substitute values into a formula and perform the calculations.

The central semi-circular archway under a bridge is to be strengthened.

While the work is being carried out, 2 metal beams are to be set in place to support the archway.

For safety reasons, the beams have to just meet on the circumference of the arch.



Will the beams fit this archway which is 4.1 metres wide ?

Evaluate  $4\frac{2}{5} - 1\frac{2}{3}$

Article 28: Right to education. Article 29: Goals for education



## Volume, Arcs and Sectors

### Learning Intention

We are learning how to find the area of a sector.

### Steps to Success



I can calculate the area and circumference of a circle.



I can explain what the terms 'arc' and 'sector' mean.



I can recall the formula for sector area.

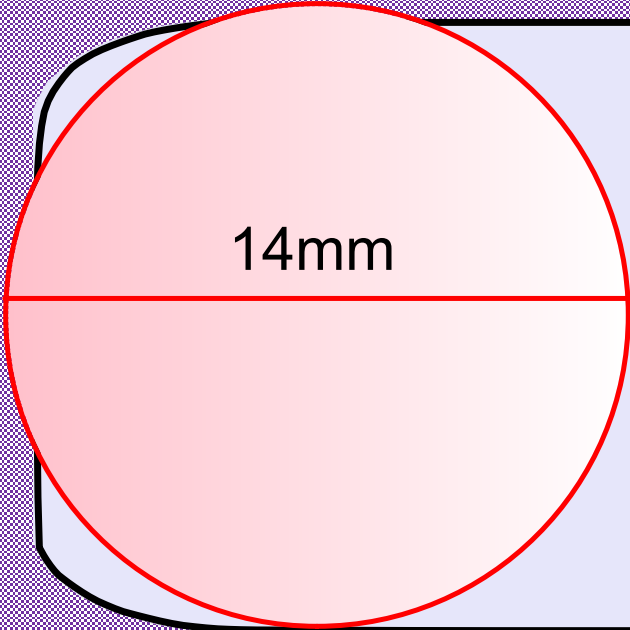


I can accurately substitute values into a formula and perform the calculations.

### Key Vocabulary

Arc

Sectors



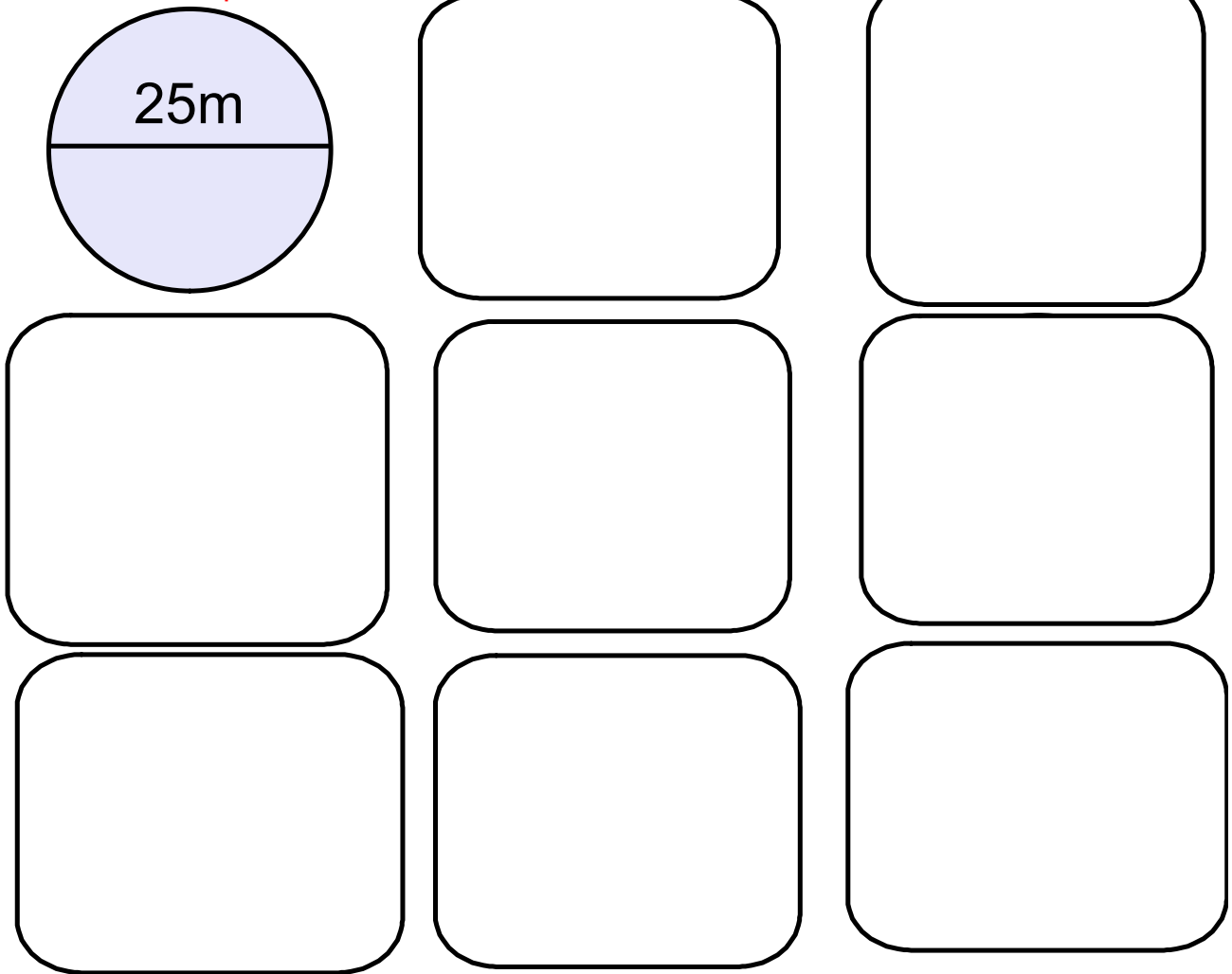
14mm

What is the formula for the area of a circle?



# Arcs and Sectors

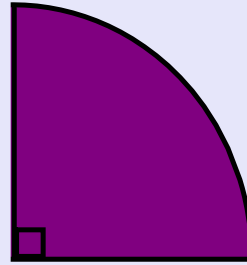
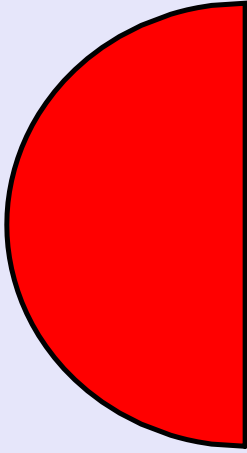
Find the area of each shape



Points competition!



What fraction of a circle are these sectors?



Can you relate this to  $360^{\circ}$ ?

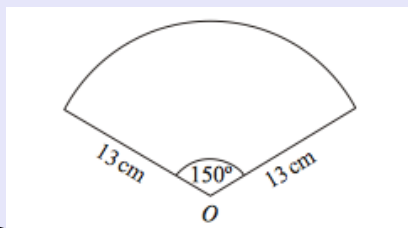


### Calculating the Area of a Sector

The area of a sector formula is based on the formula for the whole area of a circle.

Examples

Find the area of the arc AB.



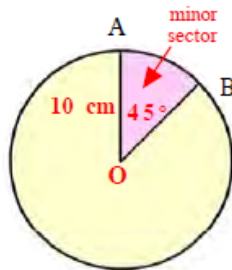
# Arcs and Sectors

## Exercise 13.2

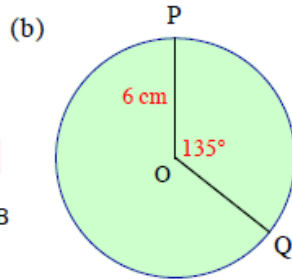
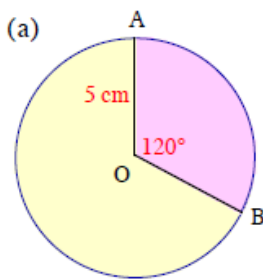


1. Copy and complete the calculation to find the area of the minor sector of this circle :-

$$\begin{aligned}
 A &= \pi r^2 \\
 A &= 3.14 \times 10 \times 10 \\
 A &= \dots\dots \text{ cm}^2 \\
 \text{Minor sector AOB} \\
 &= \frac{\dots\dots}{360} \times \dots\dots \\
 &= \dots\dots \text{ cm}^2 .
 \end{aligned}$$

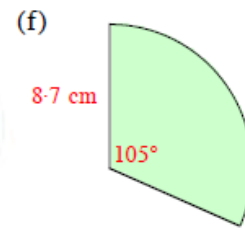
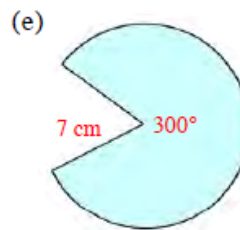
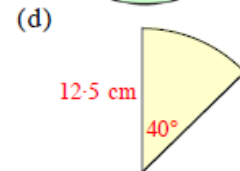
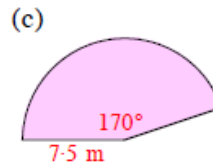
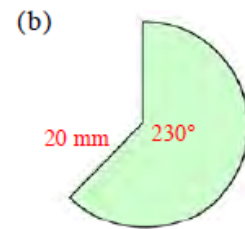
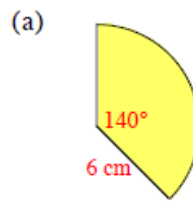


2. Find the area of each **minor** sector :-

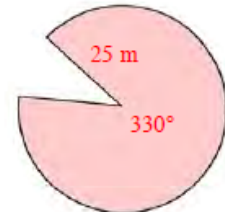


3. (a) Find the area of the **major** sector in question 1.  
 (b) Find the area of the **major** sector in question 2(a).

4. Calculate the **area** of each sector :-

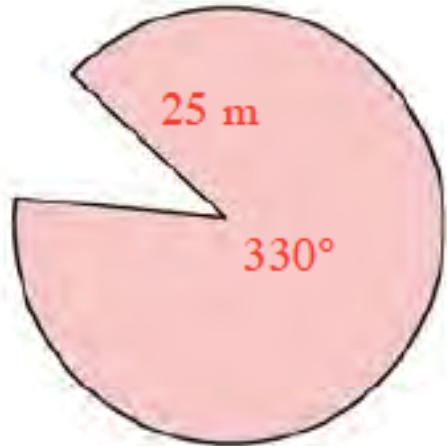


5. Calculate the area of the **small sector** which has been "removed" from the circle shown.



# On your bit of paper...

5. Calculate the area of the **small sector** which has been “removed” from the circle shown.



Article 28: Right to education, Article 29: Goals for education



## Volume, Arcs and Sectors

### Learning Intention

We are learning how to find the area of a sector.



### Steps to Success



I can calculate the area and circumference of a circle.



I can explain what the terms 'arc' and 'sector' mean.



I can recall the formula for sector area.



I can accurately substitute values into a formula and perform the calculations.



## Daily Practice



Article 28. Right to education  
Article 29. Goals for education

Andrew and Doreen each book in at the Sleepwell Lodge.

- a) Andrew stays for 3 nights and has breakfast on 2 mornings.  
His bill is £145

Write down an algebraic equation to illustrate this.

- b) Doreen stays for 5 nights and has breakfast on 3 mornings.  
Her bill is £240.

Write down an equation to illustrate this.

- c) Find the cost of one breakfast.

Article 28: Right to education. Article 29: Goals for education



## Volume, Arcs and Sectors

### Learning Intention

We are learning how to find the radius/diameter/angle in a circle given the Sector Area/Arc Length.

### Steps to Success



I can calculate the area and circumference of a circle.



I can explain what the terms 'arc' and 'sector' mean.



I can recall the formula for sector area and arc length.



I can accurately substitute values into a formula and rearrange to find the correct term.

### Key Vocabulary

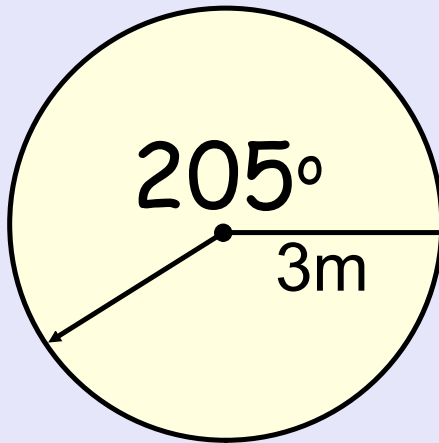
Arc

Sectors



$$\text{Arc length} = \frac{\theta}{360} \times \pi d$$

$$\text{Sector area} = \frac{\theta}{360} \times \pi r^2$$



Find the MAJOR:

(a) Arc Length

(b) Sector Area

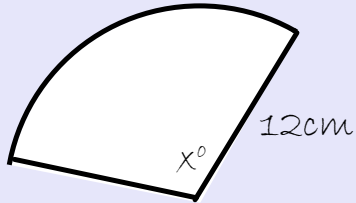




## Working Backwards Arcs and Sectors

Examples

(1) Calculate the angle  $x^\circ$  given that the arc length is 12.56cm



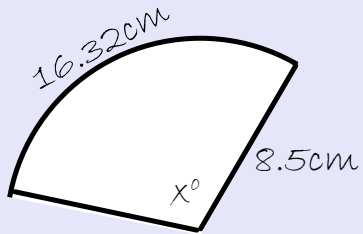
# Arcs and Sectors

## Volume, Arcs and Sectors



Article 28: Right to education  
Article 29: Goals for education

(2) Find  $x^\circ$



## Volume, Arcs and Sectors



Article 28: Right to education  
Article 29: Goals for education

(3) Calculate the angle  $x^\circ$  given that a sector has radius 4cm and an area of  $16.76\text{cm}^2$ .

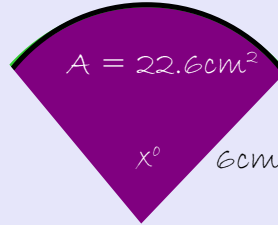
# Arcs and Sectors

## Volume, Arcs and Sectors



Article 28: Right to education  
Article 29: Goals for education

(4) Find  $x^\circ$



# Arcs and Sectors

## Exercise 13.4

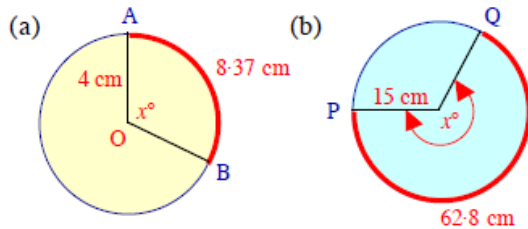


1. The minor arc length AB is 6.28 centimetres. Calculate the size of the angle at the centre.

Copy and complete :-

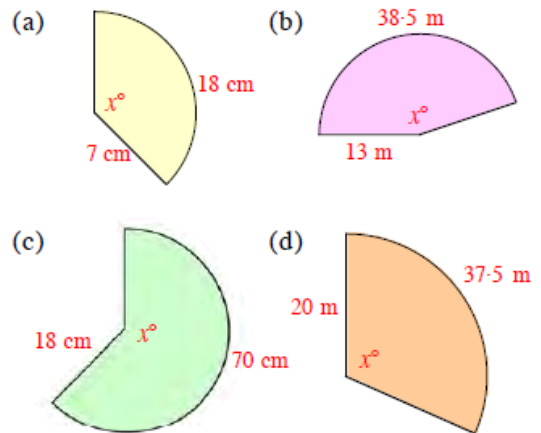
$C = \pi d$ $C = 3.14 \times 16$ $C = 50.24 \text{ cm}$  $\text{Angle } (x) = \frac{6.28}{50.24} \times 360^\circ$ $= \dots^\circ$	<p>note</p>
---	-------------

2. For each of the 2 sectors shown below, calculate the size of the angle at the centre :-

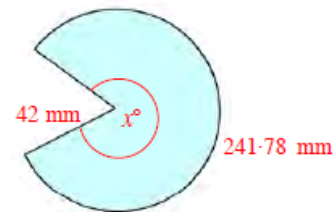


3. A sector of a circle, with a **diameter** of 25 cm, has an arc length of 39.25 cm. Calculate the size of the angle at the centre.

4. Find the angle at the centre of each sector :-

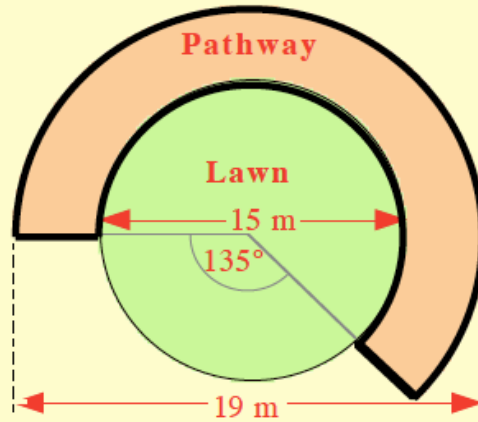


5. This sector has an arc length of 241.78 mm.



- (a) Find the size of the angle at the centre.  
 (b) Calculate the area of the blue sector.

A path runs around part of a circular lawn, which has a diameter of 15 metres.



Plenary

Calculate :-

- the total perimeter of the path.
- the area covered by the path.

Article 28: Right to education, Article 29: Goals for education







## Volume, Arcs and Sectors

### Learning Intention

We are learning how to find the radius/diameter/angle in a circle given the Sector Area/Arc Length.



### Steps to Success

-  I can calculate the area and circumference of a circle.
-  I can explain what the terms 'arc' and 'sector' mean.
-  I can recall the formula for sector area and arc length.
-  I can accurately substitute values into a formula and rearrange to find the correct term.