# GCSE Maths – Geometry and Measures

## Arc Length and Area of Sector

Worksheet

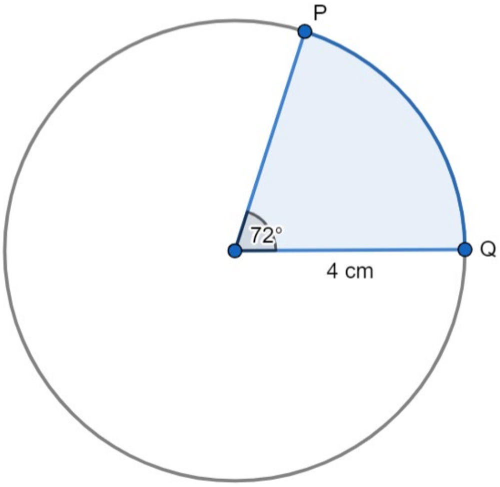
NOTES

SOLUTIONS

This worksheet will show you how to work out different types of arc length and sector area questions. Each section contains a worked example, a question with hints and then questions for you to work through on your own.

# Section A

## Worked Example




**Calculate the major arc length of PQ to 1 decimal place.**

**Step 1:** Work out numerical values for r and $\theta$.

$$r = 4\ cm$$

*For the major arc length, we use the angle that is greater than 180°.*
*Angles around a point add up to 360°:*

$$\theta = 360° - 72°$$
$$\theta = 288°$$

**Step 2:** Substitute the values into the equation.

$$Arc\ Length = 2\pi r \times \frac{\theta}{360}$$

$$Arc\ Length = 2\pi(4) \times \frac{288}{360}$$

**Step 3:** Calculate the numerical value of the arc length and round the answer to the required degree of accuracy.

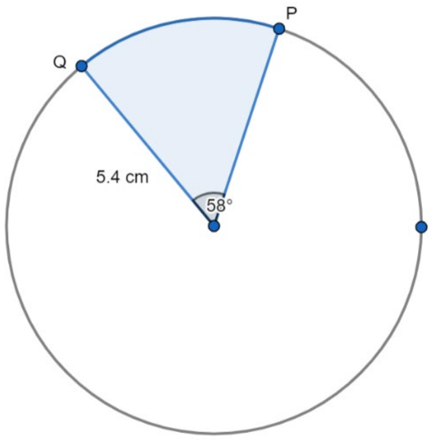
$$Arc\ Length = \left[2(4) \times \frac{288}{360}\right]\pi$$

$$Arc\ Length = 6.4\pi$$

$$Arc\ Length = 20.106\ldots cm$$

The major arc length PQ is $20.1\ cm$ to 1 decimal place.

## Guided Example




**Calculate the minor arc length of PQ to 1 decimal place.**

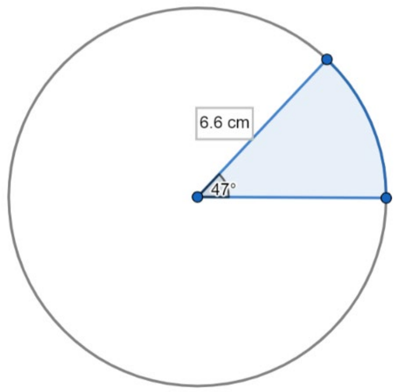
**Step 1:** Work out numerical values for r and $\theta$.

**Step 2:** Substitute values into the equation.

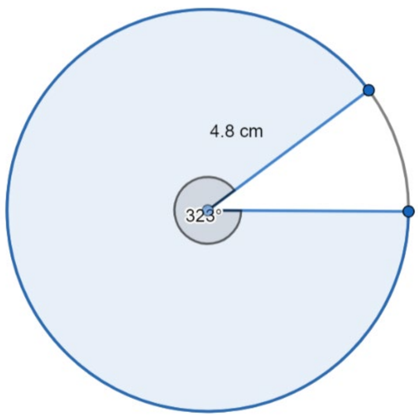
**Step 3:** Calculate the numerical value of the arc length and round the answer to the required degree of accuracy.

**Now it's your turn!**
If you get stuck, look back at the worked and guided examples.

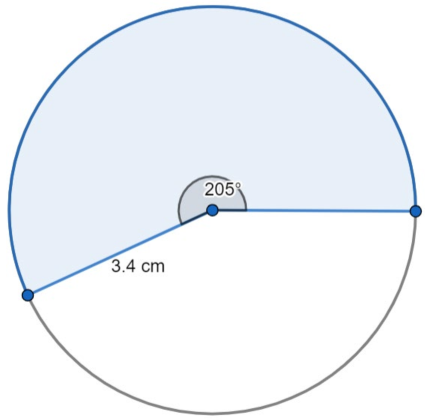
1. Calculate the minor arc length to 1 decimal place



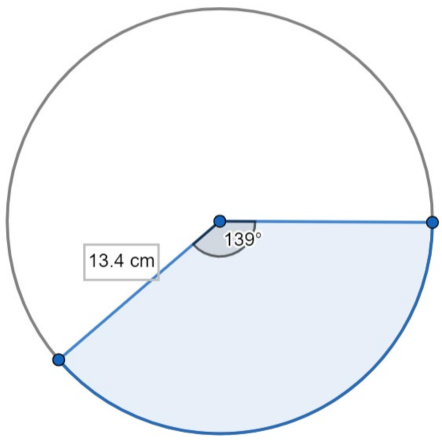

2. Calculate the major arc length to 1 decimal place.



3. Calculate the minor arc length to 1 decimal place.

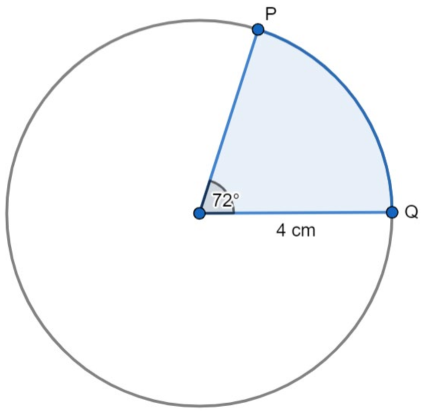



4. Calculate the major arc length to 1 decimal place.



## Section B

### Worked Example




**Calculate the area of the major sector to 1 decimal place.**

**Step 1:** Work out numerical values for r and $\theta$.

$$r = 4\,cm$$

*For the major sector, we use the angle that is greater than 180°.*

$$\theta = 360° - 72°$$

$$\theta = 288°$$

**Step 2:** Substitute values into the equation.

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

$$Area = \pi(4)^2 \times \frac{288}{360}$$

**Step 3:** Calculate the numerical value of the sector area and round the answer to the required degree of accuracy.

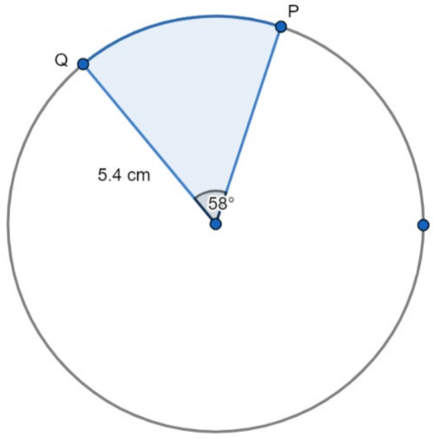
$$Area = \left[(16) \times \frac{288}{360}\right]\pi$$

$$Area = [12.8]\pi$$

$$Area = 40.21\ldots cm^2$$

The area of the major arc sector is **40.2** $cm^2$ to 1 decimal place.

## Guided Example




**Calculate the area of the minor sector to 1 decimal place.**

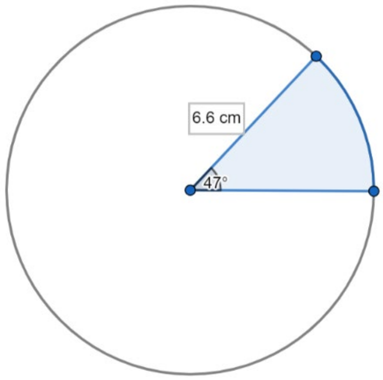
**Step 1:** Work out numerical values for r and $\theta$.

**Step 2:** Substitute values into the equation.

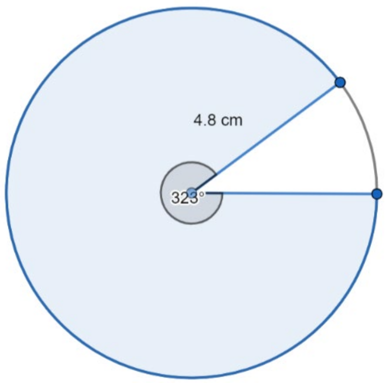
**Step 3:** Calculate the numerical value of the arc area in terms of $\pi$.

**Now it's your turn!**
If you get stuck, look back at the worked and guided examples.

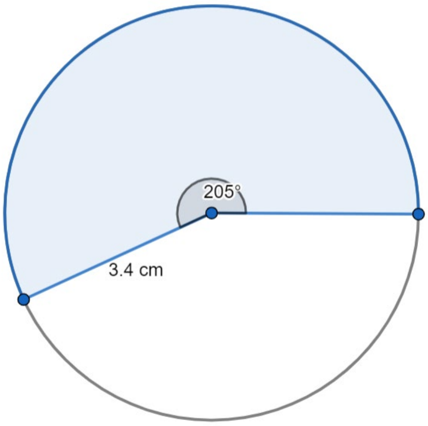
5. Calculate the area of the minor arc sector to 1 decimal place.



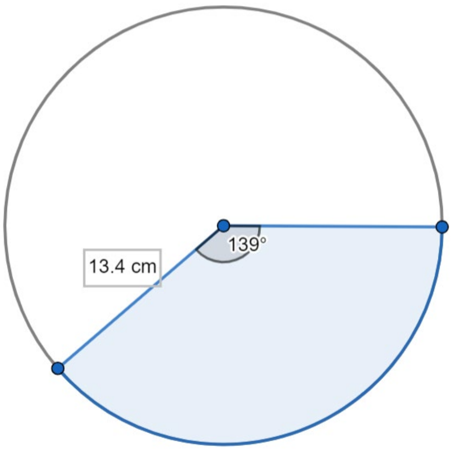

6. Calculate the area of the major arc sector to 1 decimal place.



7. Calculate the area of the minor arc sector to 1 decimal place.

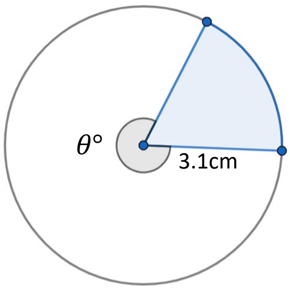



8. Calculate the area of the major arc sector to 1 decimal place



## Section C

### Worked Example




**Calculate $\theta$ to 1 decimal place when the minor arc length is 3.5 cm**

**Step 1:** Work out numerical values for r.

$$r = 3.1\ cm$$

*For minor arc length we use the angle that is less than 180°- calling this $x°$*

**Step 2:** Substitute values into the equation.

$$Arc\ Length = 2\pi r \times \frac{\theta}{360}$$
$$Arc\ Length = 2\pi(3.1) \times \frac{x}{360}$$

**Step 3:** Calculate the numerical value of the arc length in terms of $\pi$.

$$Arc\ Length = \left[2(3.1) \times \frac{x}{360}\right]\pi$$
$$Arc\ Length = \frac{6.2x}{360}\pi$$

**Step 4:** Equate the arc length with the value in the question

$$3.5 = \frac{6.2x}{360}\pi$$

**Step 5:** Solve for the angle $x$

$$3.5 \div \left(\frac{6.2\pi}{360}\right) = x$$
$$64.688..° = x$$

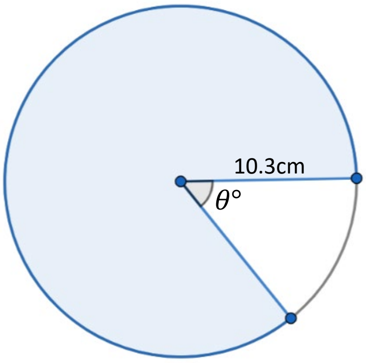
**Step 6:** Calculate $\theta$

*Angles around a point equal 360°*

$$360 - x = \theta$$
$$360 - 64.688.. = \theta$$
$$295.31.. = \theta$$

$\theta = 295.3$ **to 1.d.p**

## Guided Example




**Calculate $\theta$ to 1 decimal place when the major arc length is 56.3 cm**

**Step 1:** Work out numerical values for r.

**Step 2:** Substitute values into the equation.

**Step 3:** Calculate the numerical value of the arc length in terms of $\pi$.

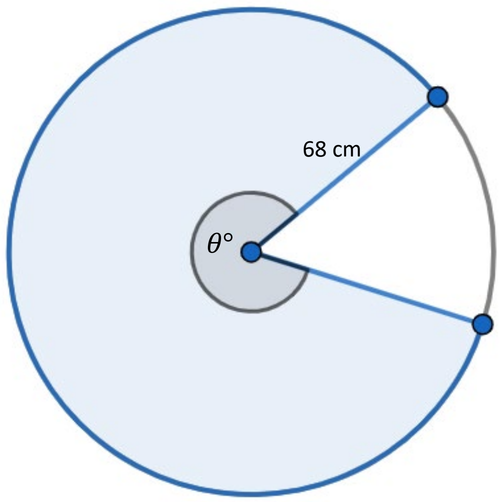
**Step 4:** Equate the arc length with the value in the question

**Step 5:** Solve for $x$

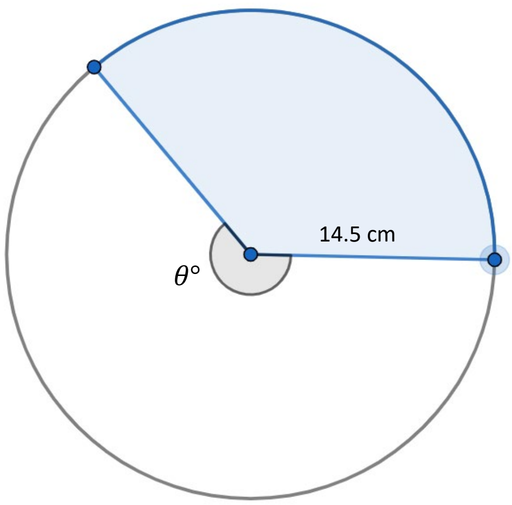
**Step 6:** Calculate $\theta$

**Now it's your turn!**
If you get stuck, look back at the worked and guided examples.

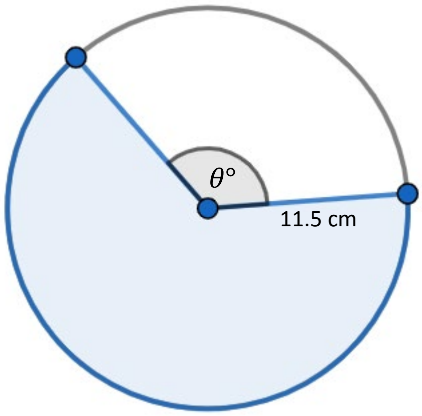
9. Calculate $\theta$ to 1 decimal place when the major arc length is 341.3 cm




10. Calculate $\theta$ to 1 decimal place when the minor arc length is 34.2 cm



11. Calculate $\theta$ to 1 decimal place when the major arc length is 47.7 cm




12. Calculate $\theta$ to 1 decimal place when the area of the major sector is 1876 $cm^2$