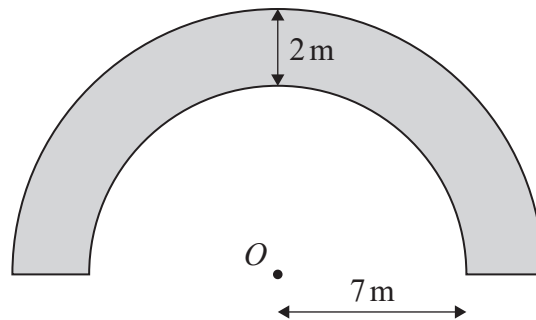**8** The region, shown shaded in the diagram, is a path.

Diagram **NOT** accurately drawn

2 m

O

7 m

The boundary of the path is formed by two semicircles, with the same centre *O*, and two straight lines.

The inner semicircle has a radius of 7 metres.
The path has a width of 2 metres.

Work out the perimeter of the path.
Give your answer correct to one decimal place.

.... m

(Total for Question 8 is 3 marks)

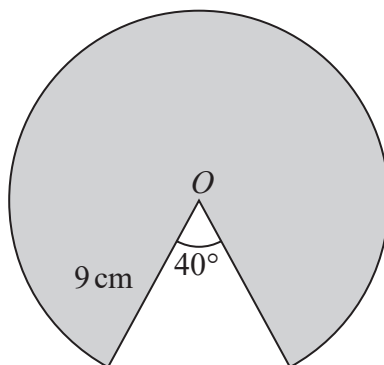**11** A circle centre O has radius 9 cm.

Diagram **NOT** accurately drawn

O

9 cm $40°$

Calculate the perimeter of the shaded sector of the circle.
Give your answer correct to 3 significant figures.

.... cm

(Total for Question 11 is 4 marks)

12 The diagram shows a sector of a circle with radius 7 cm.

7 cm

50°
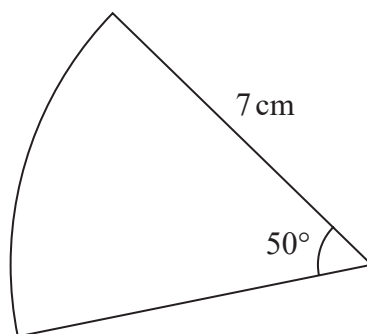
Diagram **NOT** accurately drawn

Work out the length of the arc of the sector.
Give your answer correct to one decimal place.

.... cm

(Total for Question 12 is 2 marks)

13 OAB is a sector of a circle with centre O and radius r cm.

A

Diagram **NOT**
accurately drawn

60°

O r cm B

Angle $AOB = 60°$
The perimeter of the sector is P cm.

Find a formula for P in terms of r
Give your answer in the form $P = r(c\pi + k)$ where c and k are values to be found.

....

(Total for Question 13 is 3 marks)

13 The diagram shows a sector AOB of a circle with centre O
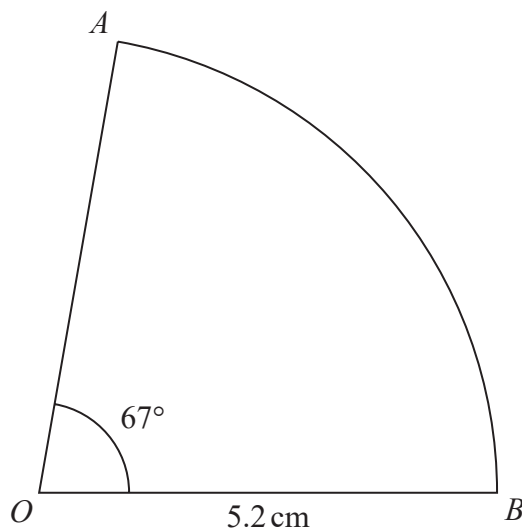

Diagram **NOT** accurately drawn

Angle $AOB = 67°$
$OA = OB = 5.2$ cm

Calculate the perimeter of the sector.
Give your answer correct to 3 significant figures.

.... cm

(Total for Question 13 is 3 marks)

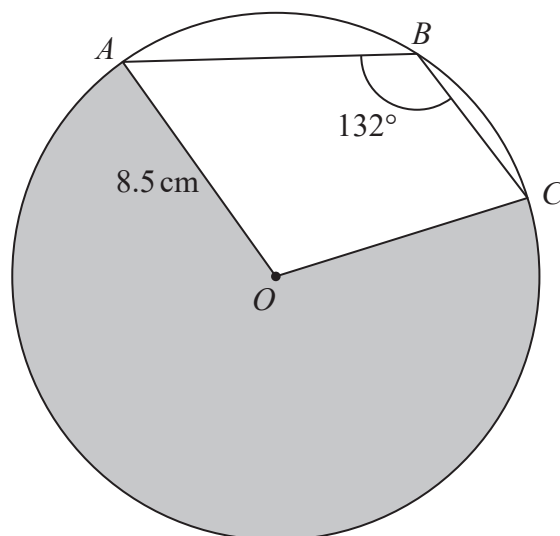**14** *A*, *B* and *C* are points on a circle, centre *O*

Diagram **NOT** accurately drawn

The radius of the circle is 8.5 cm
Angle *ABC* = 132°

Work out the perimeter of the shaded sector *AOC*
Give your answer correct to 3 significant figures.

.... cm

(Total for Question 14 is 3 marks)

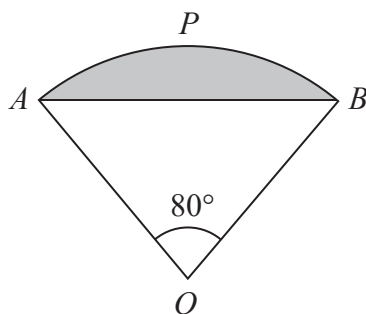**19** The diagram shows a sector *OAPB* of a circle, centre *O*.

Diagram **NOT** accurately drawn

AB is a chord of the circle.
Angle *AOB* = 80°

The area of sector *OAPB* is $\dfrac{25}{2}\pi\,\text{cm}^2$

Work out the perimeter of the shaded segment.
Give your answer correct to 3 significant figures.

.... cm

(Total for Question 19 is 6 marks)

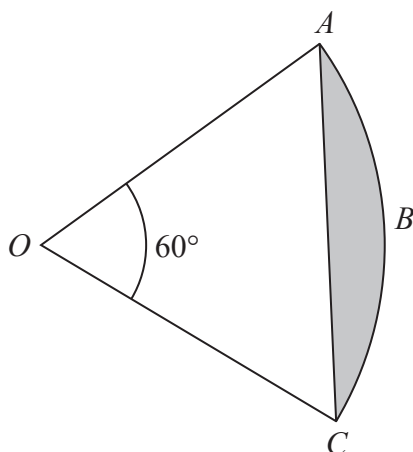**20** The diagram shows a sector $OABC$ of a circle centre O

Diagram **NOT**
accurately drawn

Angle $AOC = 60°$

The area of the shaded segment ABC is $38\,\text{cm}^2$

Work out the perimeter of the shaded segment ABC
Give your answer correct to one decimal place.

.... cm

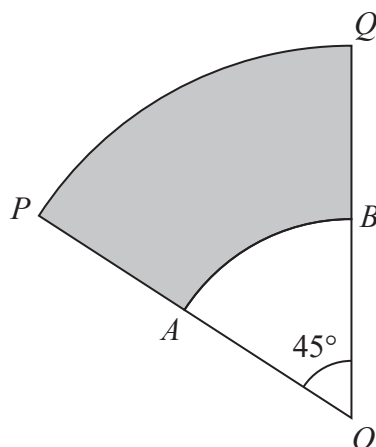**(Total for Question 20 is 4 marks)**

22

Diagram **NOT** accurately drawn

OPQ is a sector of a circle, centre *O*
OAB is a sector of a circle, centre *O*

A is the point on *OP* such that $OA:AP = 3:2$
B is the point on *OQ* such that $OB:BQ = 3:2$
Angle $POQ = 45°$

The area of the shaded region is $\dfrac{81}{2}\pi$ cm^2

Work out the perimeter of the shaded region.
Give your answer in terms of π.

.... cm

(Total for Question 22 is 6 marks)

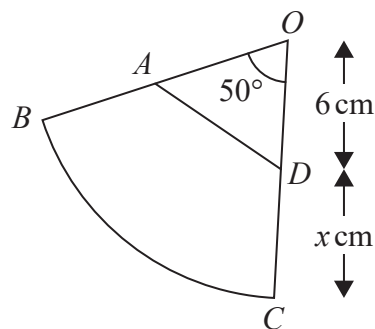**22** The diagram shows a sector OBC of a circle with centre O and radius $(6 + x)$ cm.

Diagram **NOT** accurately drawn

A is the point on OB and D is the point on OC such that $OA = OD = 6$ cm

Angle $BOC = 50°$

Given that

$$\text{the perimeter of sector } OBC = 2 \times \text{the perimeter of triangle } OAD$$

find the value of x.
Give your answer correct to 3 significant figures.

$x = $ ....

(Total for Question 22 is 6 marks)

25 The diagram shows two circles such that the region **R**, shown shaded in the diagram, is the region common to both circles.
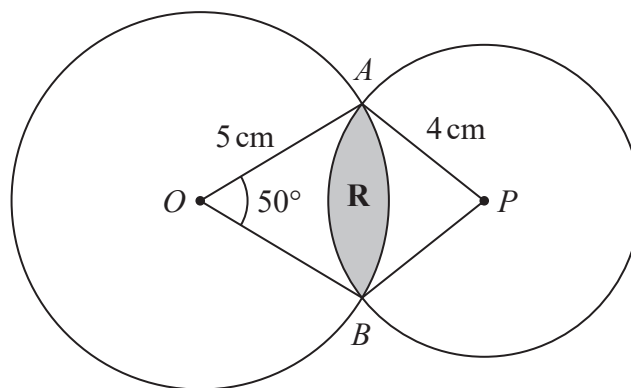

Diagram **NOT** accurately drawn

One of the circles has centre O and radius 5 cm.
The other circle has centre P and radius 4 cm.
Angle $AOB = 50°$

Calculate the area of region **R**.
Give your answer correct to 3 significant figures.

.... cm^2

(Total for Question 25 is 6 marks)