1 A circle has radius 18 cm.

Work out the circumference of the circle.
Give your answer correct to 3 significant figures.

circumference = $2\pi r$

$= 2 \times \pi \times 18$ (1)

$= 113$ (3 s.f.) (1)

113 ..... cm

(Total for Question 1 is 2 marks)

2 The diagram shows a shaded shape *ABCD* made from a semicircle *ABC* and a right-angled triangle *ACD*.

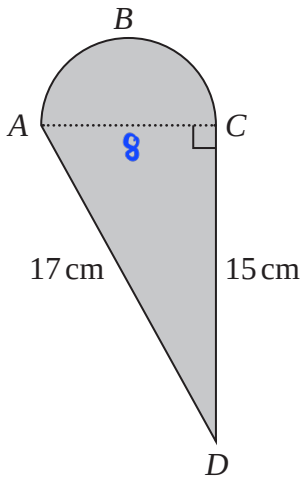


Diagram **NOT** accurately drawn

AC is the diameter of the semicircle *ABC*.

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

By using Pythagoras' Theorem:

$AC^2 = AD^2 - CD^2$

$AC^2 = 17^2 - 15^2$ (1)

$AC = \sqrt{64}$

$= 8$ cm (1)

Length $ABC = \frac{\pi \times 8}{2} = 4\pi$ (1)

Perimeter of shaded shape: $4\pi + 15 + 17$ (1)

$= 44.6$ cm (1)

44.6 cm

(Total for Question 2 is 5 marks)

3 A circle has diameter 18 cm.

Work out the area of the circle.
Give your answer correct to 3 significant figures.

Area of circle : $\pi \times r^2$

$= \pi \times \left(\frac{18}{2}\right)^2$ (1)

$= \pi \times 9^2$

$= 254$ (1)

254 ..... cm^2

(Total for Question 3 is 2 marks)

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

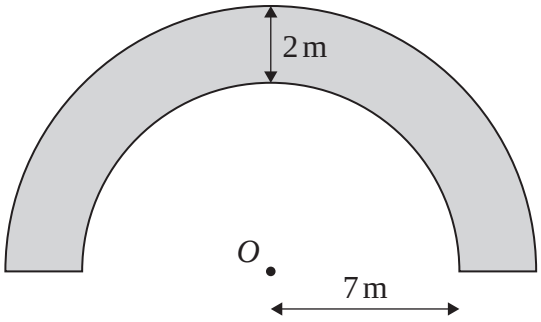


Diagram **NOT** accurately drawn

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.

Inner semicircle $= \frac{1}{2} \times 2\pi r$

$= \pi(7)$

$= 7\pi$ (1)

Outer semicircle $= \frac{1}{2} \times 2\pi r$

$= \pi(9)$

$= 9\pi$

Perimeter $= 9\pi + 7\pi + 2(2)$ (1)

$= 16\pi + 4$

$= 54.3$ (1dp)

(1)
54.3 ..... m

(Total for Question 4 is 3 marks)

5 *A*, *B* and *C* are points on a circle with centre *O*.

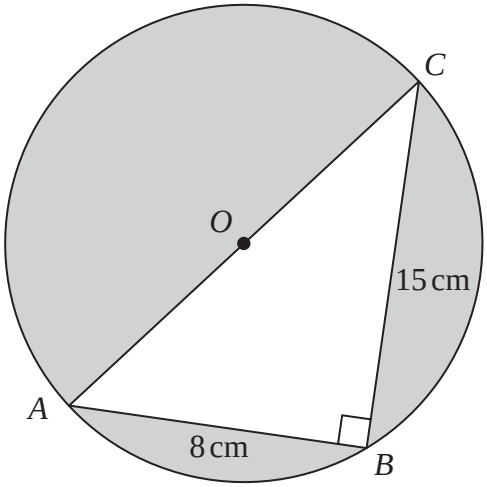


Diagram **NOT** accurately drawn

AOC is a diameter of the circle.

AB = 8 cm *BC* = 15 cm

Angle *ABC* = 90°

Work out the total area of the regions shown shaded in the diagram.
Give your answer correct to 3 significant figures.

Area of triangle $= \frac{1}{2}ab\sin C$

Area of triangle $= \frac{1}{2} \times 8 \times 15 \times \sin 90°$

$= 60$

$AC = \sqrt{8^2 + 15^2}$ (1)

$= 17$ (1)

radius of circle $= 17 \div 2 = 8.5$ cm

Area of circle $= \pi r^2$

$= \pi (8.5)^2$

$= 226.98$ (1)

Area of shaded region $= 226.98 - 60$ (1)

$= 166.98$

$= 167$ (3sf) (1)

167

..... cm^2

(Total for Question 5 is 5 marks)

6 The diagram shows a shape made from a square *ABCD* and 4 identical semicircles.

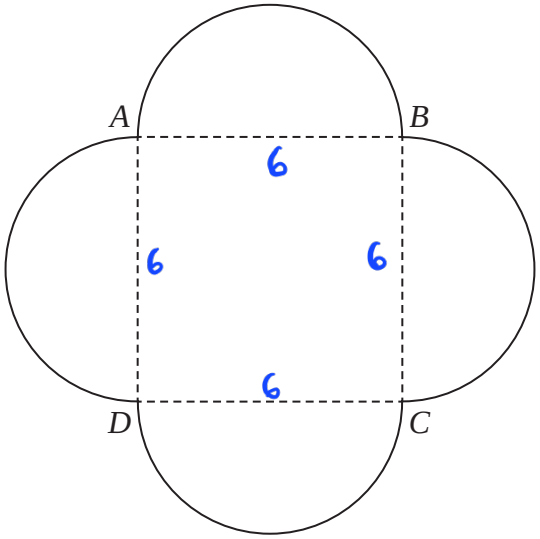


Diagram **NOT** accurately drawn

As shown in the diagram, the semicircles have *AB*, *BC*, *CD* and *DA* as diameters.

The area of the square is $36\,\text{cm}^2$

Calculate the total area of the shape.
Give your answer correct to one decimal place.

Finding length of sides of ABCD :

$x^2 = 36$

$x = 6$ cm (1)

∴ length of side of square = diameter of semicircle = 6 cm

Area of each semicircle:

$\frac{1}{2} \times \pi \times \left(\frac{6}{2}\right)^2 = \frac{9}{2}\pi$ (1)

Area of 4 semicircle : $4 \times \frac{9}{2}\pi$

$= 18\pi$

Total area: area of square + area of 4 semicircle

$= 36 + 18\pi$ (1)

$= 92.5\ \text{cm}^2$ (1)

92.5 ..... cm^2

(Total for Question 6 is 4 marks)

7 A circle has radius 6.5 cm.

Calculate the circumference of the circle.
Give your answer correct to 3 significant figures.

circumference = $2 \times \pi \times 6.5$ (1)

$= 40.8$ (1)

40.8 ..... cm

(Total for Question 7 is 2 marks)

8 In the diagram, *ABC* is a right-angled triangle and *DEF* is a semicircular arc.

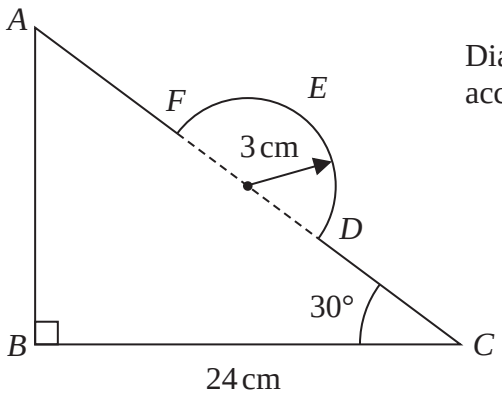


Diagram **NOT** accurately drawn

In triangle *ABC*

BC = 24 cm angle *ABC* = 90° angle *BCA* = 30°

The points *D* and *F* lie on *AC* so that *DF* is the diameter of the semicircular arc *DEF*
The radius of the semicircular arc is 3 cm.

Work out the length of *AFEDC*
Give your answer correct to 2 significant figures.

$\cos 30^\circ = \frac{24}{AC}$ (1)

$AC = \frac{24}{\cos 30^\circ} = 27.712\ldots$ (1)

$FED = \frac{1}{2} \times 2 \times \pi \times 3$ (1)

$= 3\pi = 9.424\ldots$

$AFEDC = 27.712 - 3 - 3 + 9.424$ (1)

$= 31$ (1)

31

..... cm

(Total for Question 8 is 5 marks)

9 *R* and *T* are points on a circle, centre *O*

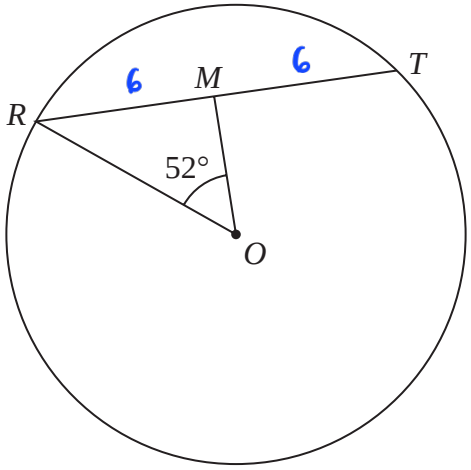


Diagram **NOT** accurately drawn

RT = 12 cm
M is the midpoint of *RT*
Angle *ROM* = 52°

Work out the area of the circle.
Give your answer correct to 3 significant figures.

$\sin 52° = \frac{6}{r}$ (1)

$r = \frac{6}{\sin 52°}$ (1)

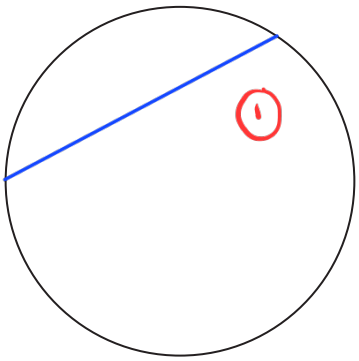
$= 7.614$

Area $= \pi \times 7.614^2$ (1)

$= 182$ (1)

182 ..... cm^2

(Total for Question 9 is 4 marks)



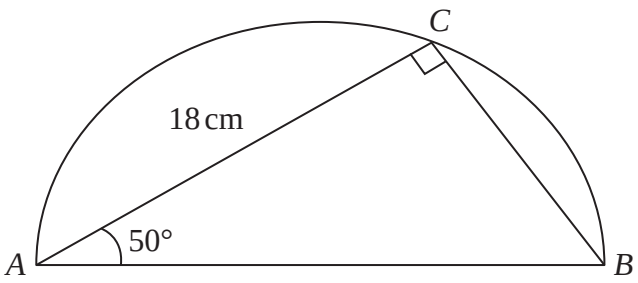
10 (c) On the diagram above, draw a chord of the circle.

(1)

(Total for Question 10 is 1 marks)

11 The diagram shows a triangle *ABC* inside a semicircle.

Diagram **NOT** accurately drawn



A, *B* and *C* are points on the semicircle.

AB is the diameter of the semicircle.

Angle *ACB* = 90°
Angle *BAC* = 50°
AC = 18 cm

Work out the perimeter of the semicircle.
Give your answer correct to 2 significant figures.

$\cos 50^\circ = \frac{18}{AB}$ (1)

$AB = \frac{18}{\cos 50^\circ}$ (1)

$= 28.0030\ldots$

$\frac{1}{2} \times \pi \times 28.0030\ldots = 43.9\ldots$ (1)

$28.0030\ldots + 43.9\ldots$ (1)

$= 71.9900\ldots$

≈ 72 (1)

72

..... cm

(Total for Question 11 is 5 marks)

12 A circle has radius 8.5 cm

Work out the circumference of the circle.
Give your answer correct to 3 significant figures.

circumference = $2 \times \pi \times 8.5$ (1)

= 53.4 (1)

53.4 ..... cm

(Total for Question 12 is 2 marks)