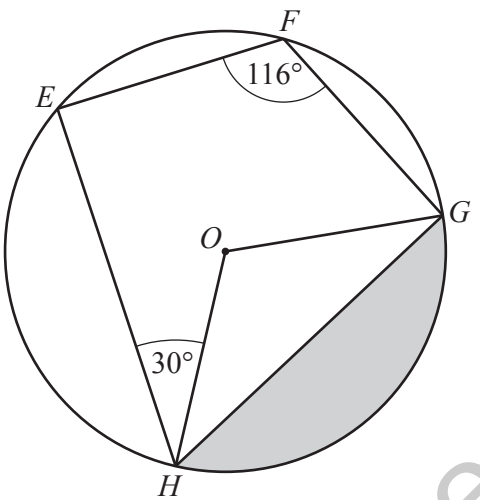
PapaCambridge Name:

Section:

Arc length & Area of Sector worksheet

1



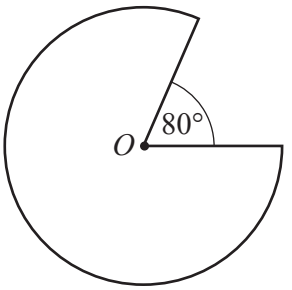
NOT TO SCALE

E, F, G and H are points on a circle with centre O and radius 6 cm.
$E\hat{H}O = 30°$ and $E\hat{F}G = 116°$.

Calculate the shaded area.

..... cm^2 [5]

2



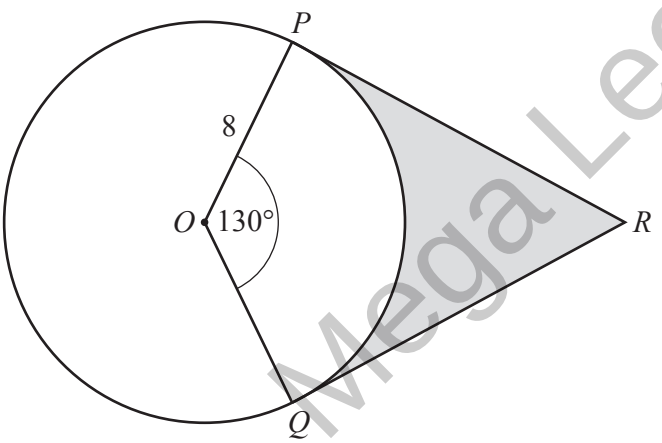
NOT TO SCALE

The diagram shows the major sector of a circle with centre O and radius 3 cm.

Calculate the area of this sector.
Give your answer in the form $k\pi$, where k is an integer.

..... cm^2 [2]

3



NOT TO SCALE

P and Q are points on the circumference of a different circle, centre O.
PR and QR are tangents to the circle at P and Q respectively.
$OP = 8$ cm and $P\hat{O}Q = 130°$.

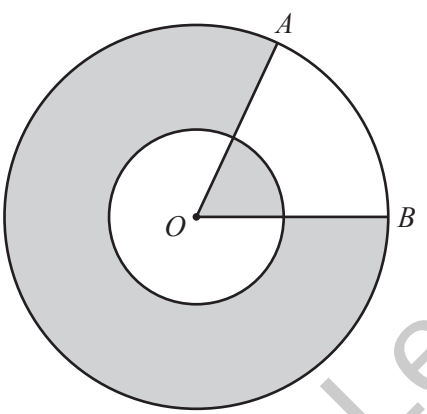
(i) Find PR.

$PR =$ ..... cm [2]

(ii) Calculate the percentage of quadrilateral *OPRQ* that is shaded.

..... % [4]

4



NOT TO SCALE

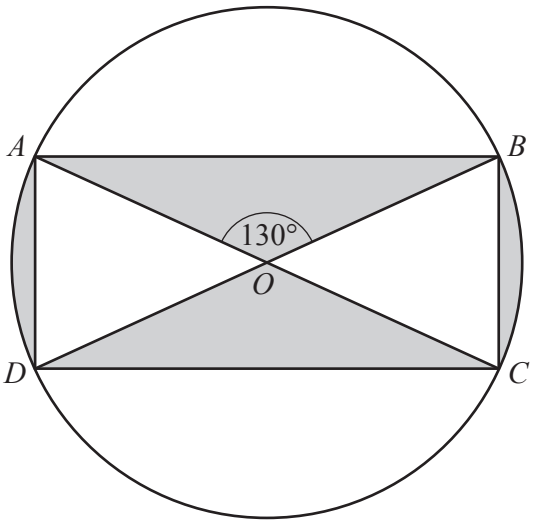
The diagram shows two circles, both with centre *O*.
The radius of the small circle is 3 cm and the radius of the large circle is 6 cm.
The minor sector *AOB* has an angle of 60°.

The total area of the shaded regions is $k\pi$ cm^2.

Find the value of *k*.

k = ... [4]

5



AC and BD are diameters of the circle, centre O.
$AC = 12$ cm and $A\hat{O}B = 130°$.

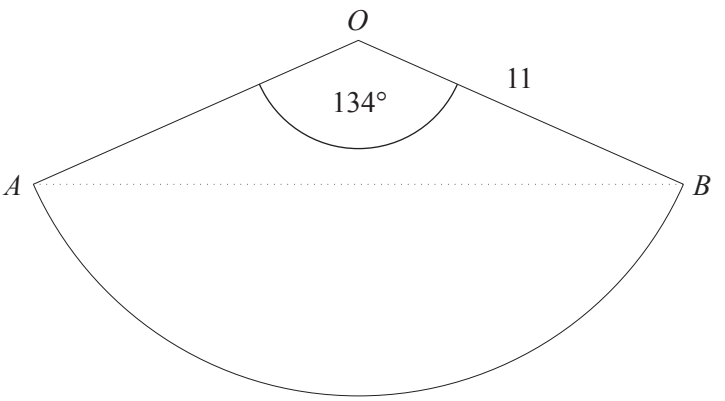
(a) Calculate the area of triangle AOB.

Answer ..... cm^2 [2]

(b) Calculate the area of the sector AOD.

Answer ..... cm^2 [2]

6 (a)



OAB is a sector of a circle, centre O, radius 11 cm.
$A\hat{O}B = 134°$.

(i) Calculate the length of the arc AB.

Answer ..... cm [2]

(ii) Calculate the shortest distance from O to the line AB.

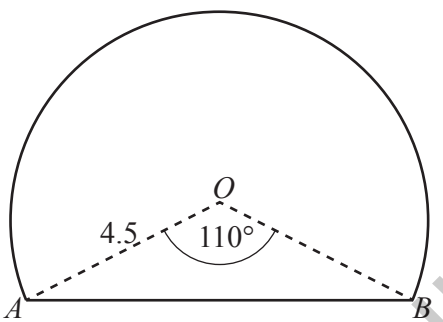
Answer ..... cm [2]

7 **(a)** The ventilation shaft for a tunnel is in the shape of a cylinder.
The cylinder has radius 0.4 m and length 15 m.

Calculate the volume of the cylinder.

Answer ..... m^3 [2]

(b) The diagram shows the cross-section of the tunnel.

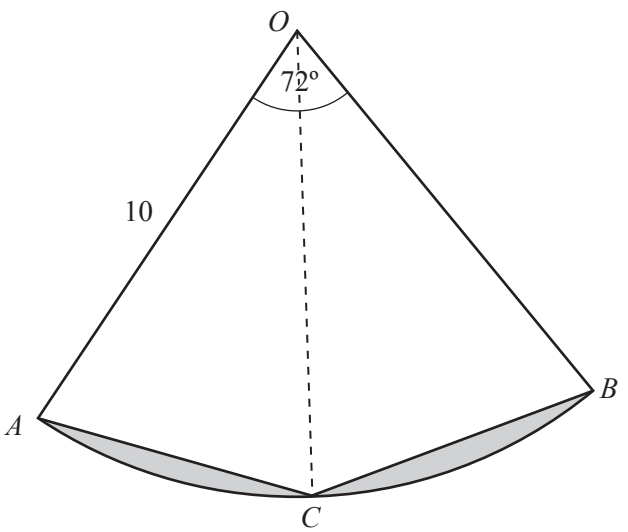


The cross-section of the tunnel is a major segment of a circle, centre O.
The radius of the circle is 4.5 m and $A\hat{O}B = 110°$.

Calculate the area of the cross-section of the tunnel.

Answer ..... m^2 [4]

8



OAB is a sector of a circle, centre *O*, and radius 10 cm.
$A\hat{O}B = 72°$ and *C* is the point on the arc *AB* such that *OC* bisects $A\hat{O}B$.

(a) Calculate the perimeter of sector *OAB*.

..... cm [3]

(b) (i) Calculate the area of sector *OAB*.

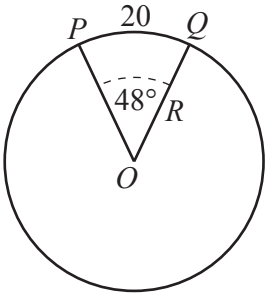
..... cm^2 [2]

(ii) Calculate the total shaded area.

..... cm^2 [3]

9 **(a)** P and Q are points on the circumference of a circle, centre O, radius R cm.
The minor arc $PQ = 20$ cm and $P\hat{O}Q = 48°$.

(i) Show that $R = 23.9$, correct to one decimal place.

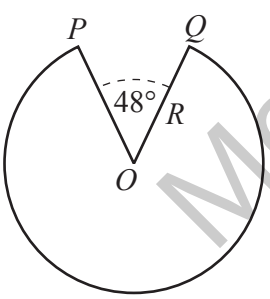


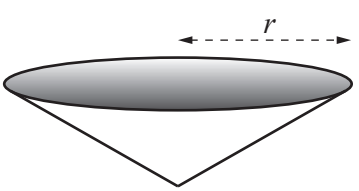
[3]

(ii) Calculate the area of the minor sector POQ.

Answer ..... cm^2 [2]

(iii) The minor sector POQ is removed from the circle and the remaining major sector is shaped to form an open cone of radius r cm.

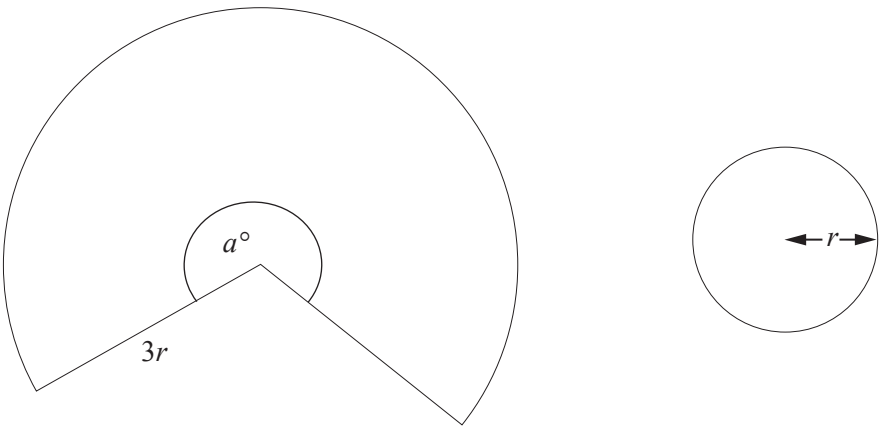




Calculate r.

Answer $r =$ ..... [2]

10



The diagram shows a sector of a circle with radius $3r$ cm and angle $a°$ and a circle with radius r cm.
The ratio of the area of the sector to the area of the circle with radius r cm is 8 : 1.

(a) Find the value of a.

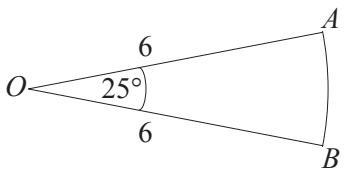
Answer $a =$ ..... [3]

(b) Find an expression, in terms of π and r, for the perimeter of the sector.

Answer ..... cm [2]

11 **(a)** OAB is a sector of a circle, centre O, radius 6 cm.

$A\hat{O}B = 25°$.



(i) Calculate the length of the arc AB.

Answer ..... cm [2]

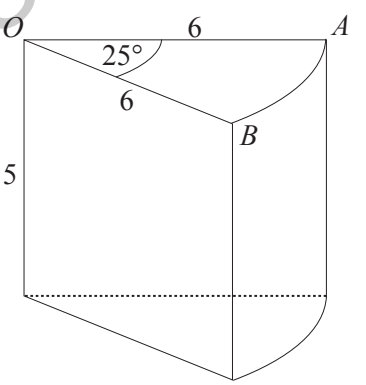
(ii) Calculate the area of the sector OAB.

Answer ..... cm^2 [2]

(b) The sector OAB from part **(a)** is the cross-section of a slice of cheese.

The slice has a height of 5 cm.

(i) Calculate the volume of this slice of cheese.

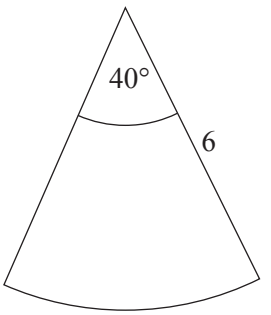


Answer ..... cm^3 [1]

(ii) Calculate the total surface area of this slice of cheese.

Answer ..... cm^2 [3]

12



The angle of a sector of a circle, radius 6 cm, is 40°.

(i) The area of the sector is $k\pi\,\text{cm}^2$.

Find the value of k.

Answer ..... [2]

(ii) Find an expression, in terms of π, for the perimeter of the sector.
Give your answer in the form $(a + b\pi)$ centimetres.

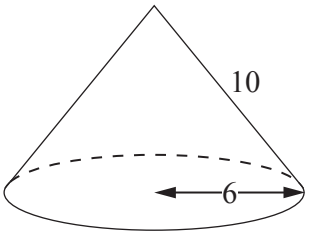
Answer ..... cm [2]

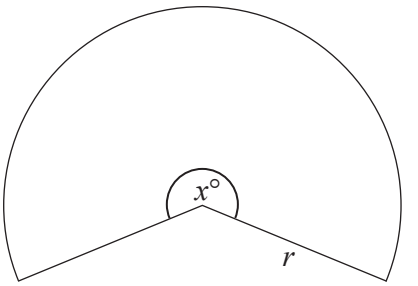
(iii) A geometrically similar sector has perimeter $(72 + n\pi)$ centimetres.

Find the value of n.

Answer ..... [1]

13





A hollow cone has a base radius 6 cm and slant height 10 cm.
The curved surface of the cone is cut, and opened out into the shape of a sector of a circle, with angle $x°$ and radius r cm.

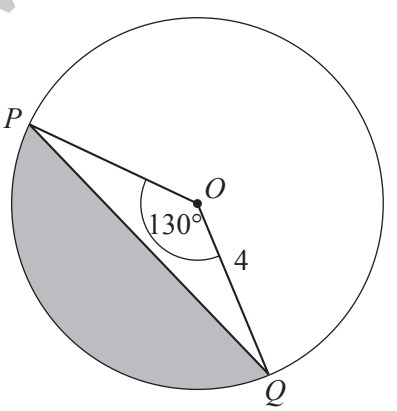
(a) Write down the value of r.

Answer $r =$ ..... [1]

(b) Calculate x.

Answer $x =$ ..... [2]

14 P and Q are points on the circle centre O with radius 4 cm.
$P\hat{O}Q = 130°$.



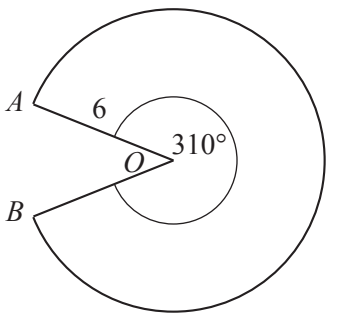
(i) Calculate the area of triangle POQ.

Answer ..... cm^2 [2]

(ii) Calculate the area of the major segment, shown **unshaded** in the diagram.

Answer ..... cm^2 [3]

15



The diagram shows a sector AOB of a circle with centre O and radius 6 cm.
The angle of the sector is 310°.

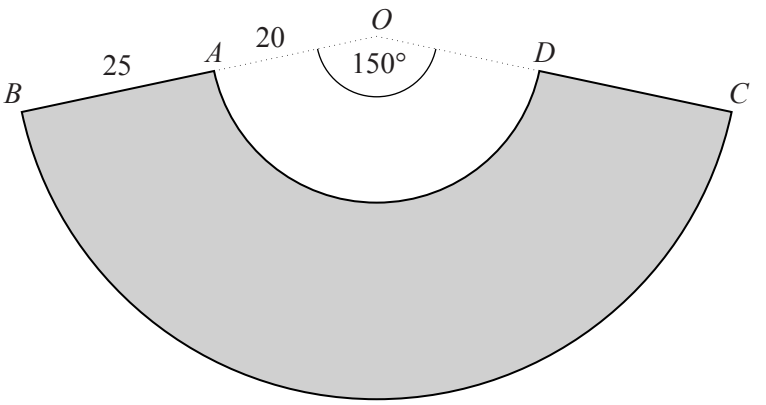
(a) Calculate the total perimeter of the sector.

Answer ..... cm [3]

(b) Calculate the area of the sector.

Answer ..... cm^2 [2]

16



AD and BC are arcs of circles with centre O.
A is a point on OB, and D is a point on OC.
$OA = 20$ cm and $AB = 25$ cm.
$A\hat{O}D = 150°$.

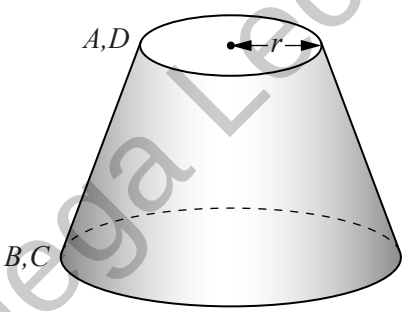
(a) Calculate the perimeter of the shaded shape $ABCD$.

..... cm [3]

(b) Calculate the area of the shaded shape *ABCD*.

..... cm^2 [3]

(c) The shape *ABCD* is used to make a lampshade by joining *AB* and *DC*.



Calculate the radius, *r* cm, of the circular top of the lampshade.

Answer ..... cm [2]