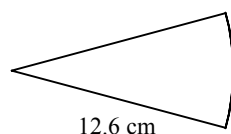
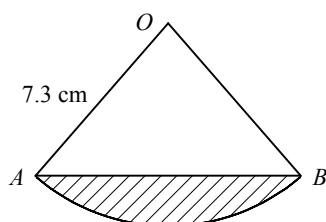


1



The diagram shows a sector of a circle of radius 12.6 cm.  
Given that the perimeter of the sector is 31.7 cm, find its area.

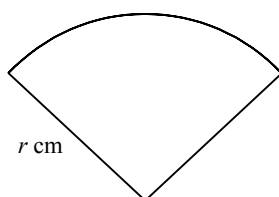
2



The diagram shows a sector  $OAB$  of a circle, centre  $O$  and radius 7.3 cm.  
Given that the area of the sector is  $38.4 \text{ cm}^2$ , find

- the size of  $\angle AOB$  in radians,
- the perimeter of the shaded segment.

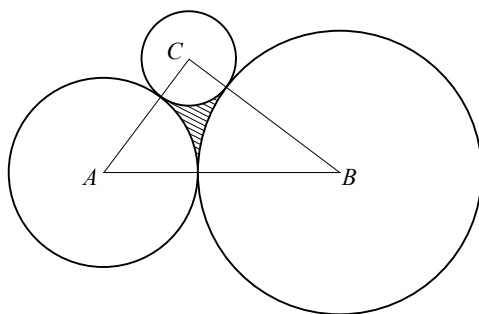
3



The diagram shows a sector of a circle of radius  $r \text{ cm}$ . The area of the sector is  $40 \text{ cm}^2$ .

- Show that the perimeter of the sector is  $(2r + \frac{80}{r}) \text{ cm}$ .
- Hence find the set of values of  $r$  for which the perimeter of the sector is less than 26 cm.

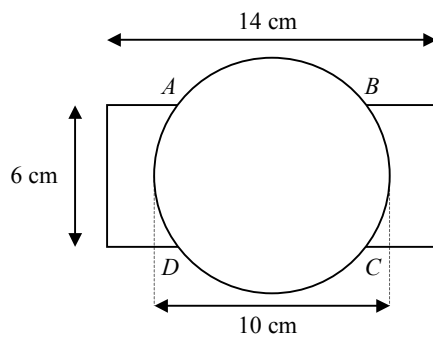
4



The diagram shows three circles with centres  $A$ ,  $B$  and  $C$ , and radii 4 cm, 6 cm and 2 cm respectively. Each circle touches the other two circles.

- Prove that triangle  $ABC$  is a right-angled triangle.
- Find  $\angle ABC$  in radians to 2 decimal places.
- Show that the area of the shaded region enclosed by the three circles is  $1.86 \text{ cm}^2$  to 3 significant figures.

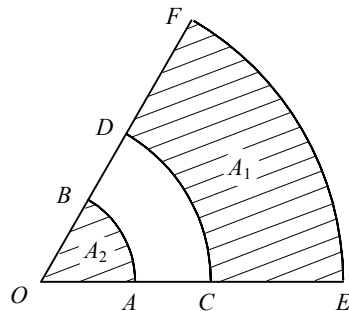
5



The diagram shows a company logo which consists of a circle of diameter 10 cm drawn on top of a rectangle measuring 6 cm by 14 cm. The centres of the circle and rectangle are coincident and the two shapes intersect at  $A$ ,  $B$ ,  $C$  and  $D$ .

- Find the length of the chord of the circle  $AB$ .
- Show that the perimeter of the logo is 42.5 cm to 3 significant figures.
- Find the area of the logo.

6



$AB$ ,  $CD$  and  $EF$  are arcs of concentric circles, centre  $O$ , such that  $OACE$  and  $OBDF$  are straight lines as shown in the diagram. The area of the shaded region  $CEFD$  is denoted by  $A_1$  and the area of the shaded sector  $OAB$  by  $A_2$ .

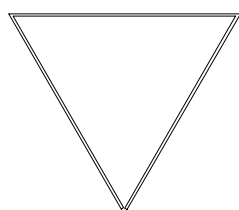
Given that  $OA = r$  cm,  $AC = 2$  cm,  $OE = 8$  cm and  $\angle AOB = \theta$  radians,

- find an expression for  $A_1$  in terms of  $r$  and  $\theta$ .

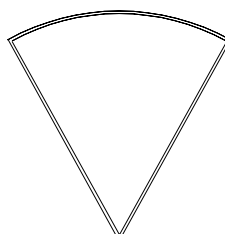
Given also that  $A_1 = 7A_2$ ,

- show that  $r = 2.5$

7



Shape A



Shape B

A girl is playing with a paper clip. She straightens the wire and then bends it to form an equilateral triangle, *Shape A* above. She then curves one side of the triangle to form a sector of a circle, *Shape B* above.

Find, to 1 decimal place, the percentage change in the area enclosed by the paper clip when it is changed from *Shape A* to *Shape B*, indicating whether this is an increase or decrease.