TRIGONOMETRY

1

12.6 cm
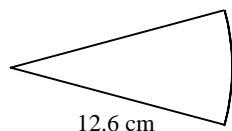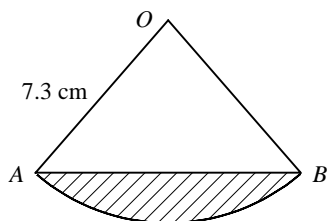
The diagram shows a sector of a circle of radius 12.6 cm.

Given that the perimeter of the sector is 31.7 cm, find its area.

2

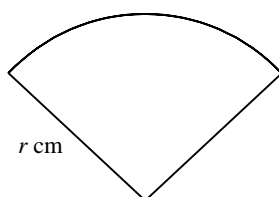The diagram shows a sector *OAB* of a circle, centre *O* and radius 7.3 cm.

Given that the area of the sector is 38.4 cm^2, find

a the size of $\angle AOB$ in radians,

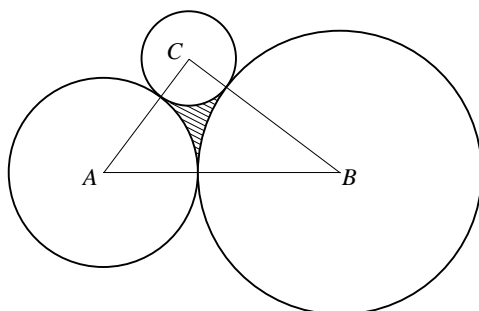**b** the perimeter of the shaded segment.

3

r cm

The diagram shows a sector of a circle of radius *r* cm. The area of the sector is 40 cm^2.

a Show that the perimeter of the sector is $(2r + \dfrac{80}{r})$ cm.

b Hence find the set of values of *r* for which the perimeter of the sector is less than 26 cm.
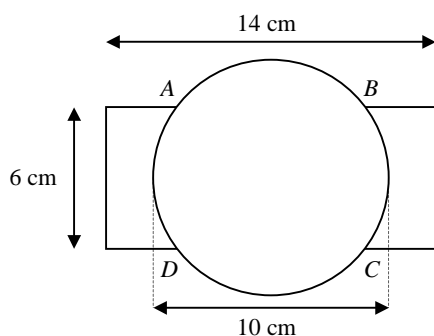
4

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.

a Prove that triangle *ABC* is a right-angled triangle.

b Find $\angle ABC$ in radians to 2 decimal places.

c Show that the area of the shaded region enclosed by the three circles is 1.86 cm^2 to 3 significant figures.
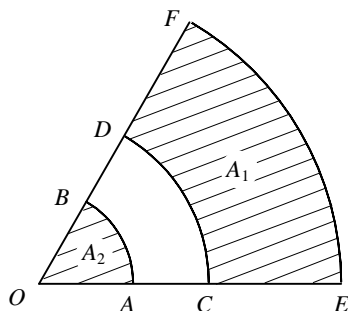
5

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.

a Find the length of the chord of the circle AB.

b Show that the perimeter of the logo is 42.5 cm to 3 significant figures.

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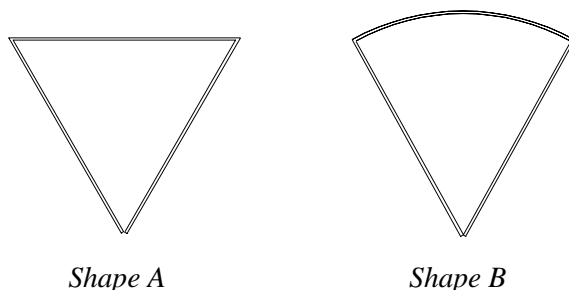
Given that $OA = r$ cm, $AC = 2$ cm, $OE = 8$ cm and $\angle AOB = \theta$ radians,

a find an expression for A_1 in terms of r and θ.

Given also that $A_1 = 7A_2$,

b 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.