

Radians: Arc Length and Areas of Sectors - Edexcel Past Exam Questions

1.

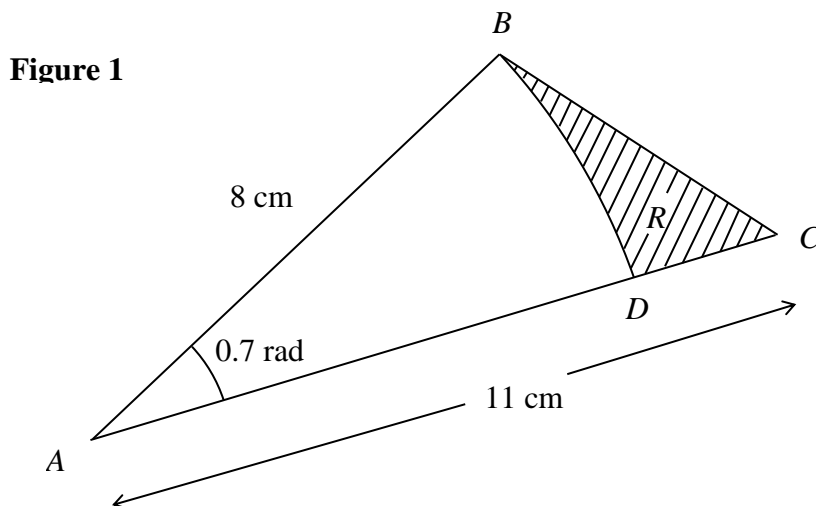


Figure 1 shows the triangle ABC , with $AB = 8$ cm, $AC = 11$ cm and $\angle BAC = 0.7$ radians. The arc BD , where D lies on AC , is an arc of a circle with centre A and radius 8 cm. The region R , shown shaded in Figure 1, is bounded by the straight lines BC and CD and the arc BD .

Find

- (a) the length of the arc BD , (2)
- (b) the perimeter of R , giving your answer to 3 significant figures, (4)
- (c) the area of R , giving your answer to 3 significant figures. (5)

Jan 05 Q7

2. In the triangle ABC , $AB = 8$ cm, $AC = 7$ cm, $\angle ABC = 0.5$ radians and $\angle ACB = x$ radians.
 - (a) Use the sine rule to find the value of $\sin x$, giving your answer to 3 decimal places. (3)

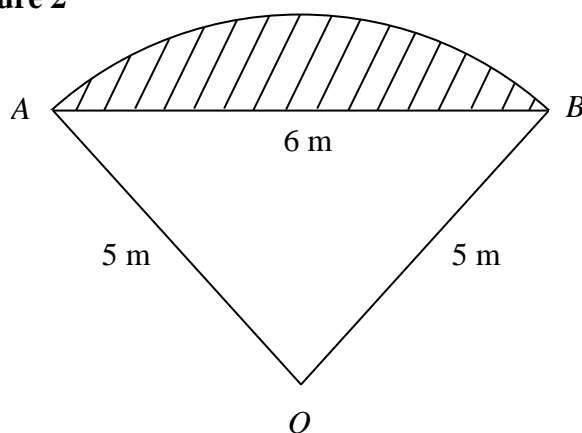
Given that there are two possible values of x ,

 - (b) find these values of x , giving your answers to 2 decimal places. (3)

June 05 Q7

3.

Figure 2



In Figure 2 OAB is a sector of a circle, radius 5 m. The chord AB is 6 m long.

(a) Show that $\cos \hat{AOB} = \frac{7}{25}$. (2)

(b) Hence find the angle \hat{AOB} in radians, giving your answer to 3 decimal places. (1)

(c) Calculate the area of the sector OAB . (2)

(d) Hence calculate the shaded area. (3)

Jan 06 Q5

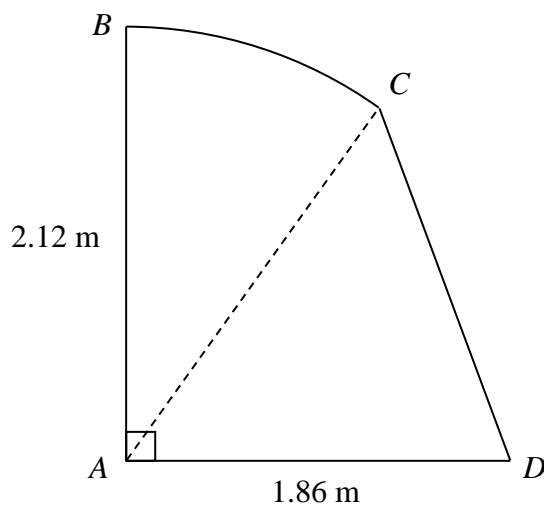
4. **Figure 2**

Figure 2 shows the cross-section $ABCD$ of a small shed.

The straight line AB is vertical and has length 2.12 m.

The straight line AD is horizontal and has length 1.86 m.

The curve BC is an arc of a circle with centre A , and CD is a straight line.

Given that the size of $\angle BAC$ is 0.65 radians, find

- (a) the length of the arc BC , in m, to 2 decimal places, (2)
- (b) the area of the sector BAC , in m^2 , to 2 decimal places, (2)
- (c) the size of $\angle CAD$, in radians, to 2 decimal places, (2)
- (d) the area of the cross-section $ABCD$ of the shed, in m^2 , to 2 decimal places. (3)

June 06 Q8

5.

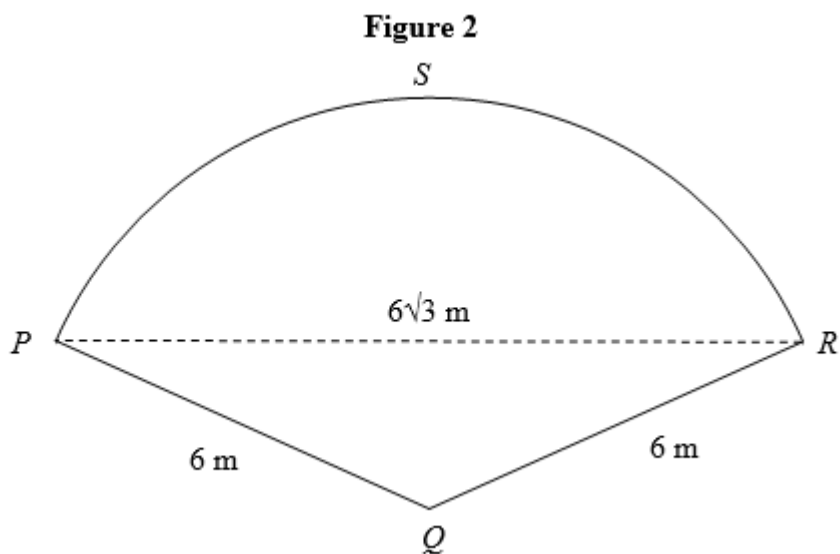


Figure 2 shows a plan of a patio. The patio $PQRS$ is in the shape of a sector of a circle with centre Q and radius 6 m.

Given that the length of the straight line PR is $6\sqrt{3}$ m,

- (a) find the exact size of angle PQR in radians. (3)
- (b) Show that the area of the patio $PQRS$ is 12π m². (2)
- (c) Find the exact area of the triangle PQR . (2)
- (d) Find, in m² to 1 decimal place, the area of the segment PRS . (2)
- (e) Find, in m to 1 decimal place, the perimeter of the patio $PQRS$. (2)

Jan 07 Q9

6. A circle C has centre $M(6, 4)$ and radius 3.

(a) Write down the equation of the circle in the form

$$(x - a)^2 + (y - b)^2 = r^2. \quad (2)$$

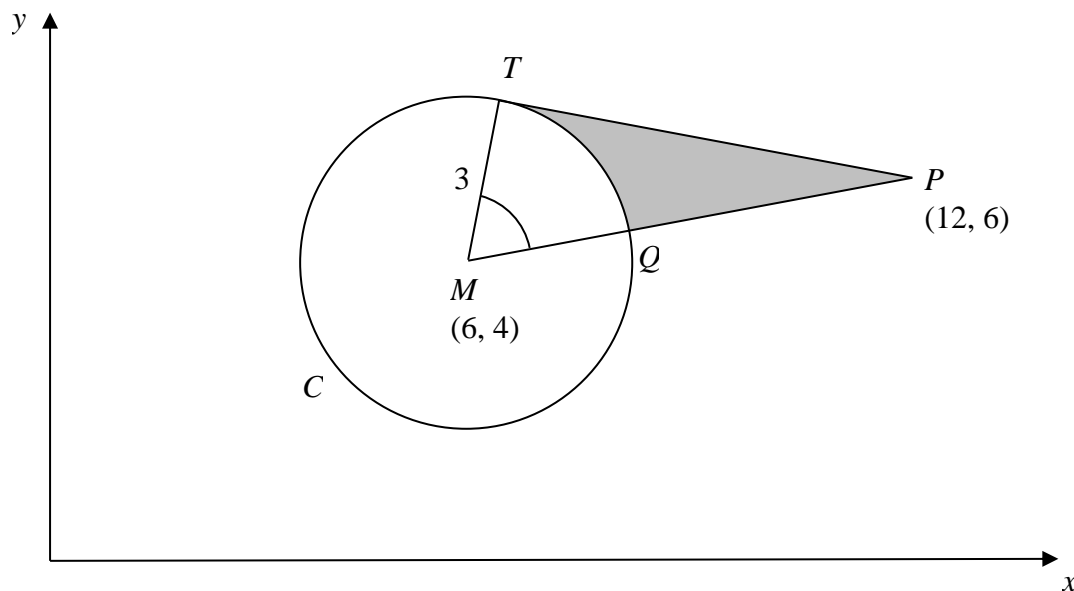


Figure 3 shows the circle C . The point T lies on the circle and the tangent at T passes through the point $P(12, 6)$. The line MP cuts the circle at Q .

(b) Show that the angle TMQ is 1.0766 radians to 4 decimal places. (4)

The shaded region TPQ is bounded by the straight lines TP , QP and the arc TQ , as shown in Figure 3.

(c) Find the area of the shaded region TPQ . Give your answer to 3 decimal places. (5)

Jan 08 Q8

7.

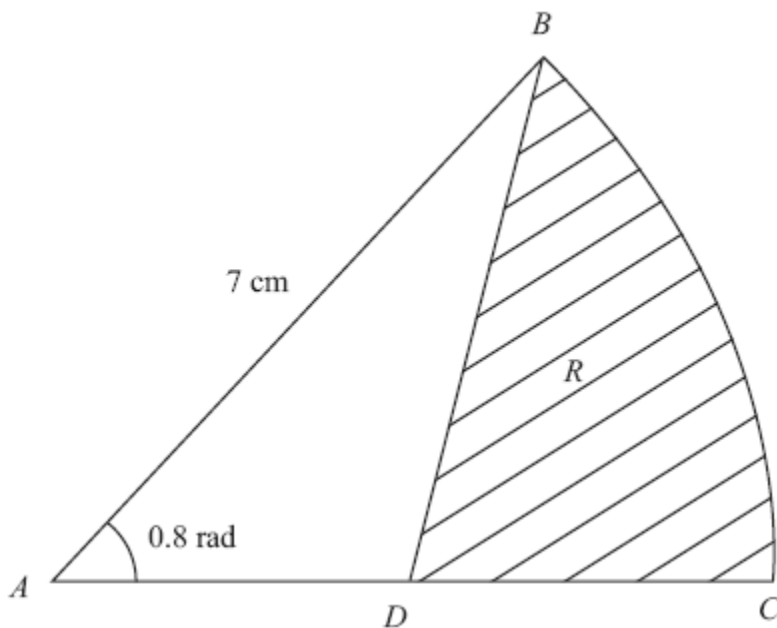
**Figure 1**

Figure 1 shows ABC , a sector of a circle with centre A and radius 7 cm.

Given that the size of $\angle BAC$ is exactly 0.8 radians, find

- (a) the length of the arc BC , (2)
- (b) the area of the sector ABC . (2)

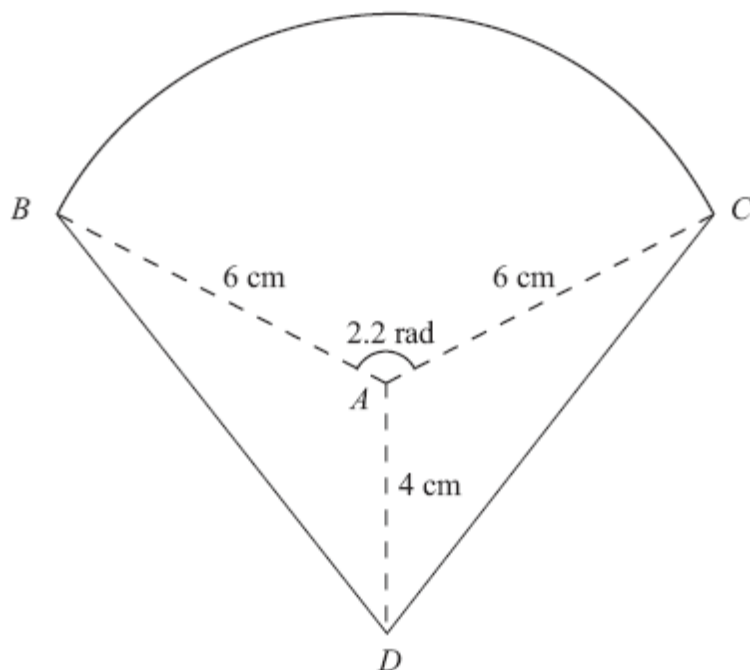
The point D is the mid-point of AC . The region R , shown shaded in Figure 1, is bounded by CD , DB and the arc BC .

Find

- (c) the perimeter of R , giving your answer to 3 significant figures, (4)
- (d) the area of R , giving your answer to 3 significant figures. (4)

June 08 Q7

8.


Figure 3

The shape BCD shown in Figure 3 is a design for a logo.

The straight lines DB and DC are equal in length. The curve BC is an arc of a circle with centre A and radius 6 cm. The size of $\angle BAC$ is 2.2 radians and $AD = 4$ cm.

Find

- (a) the area of the sector BAC , in cm^2 , (2)
- (b) the size of $\angle DAC$, in radians to 3 significant figures, (2)
- (c) the complete area of the logo design, to the nearest cm^2 . (4)

Jan 09 Q7

9.

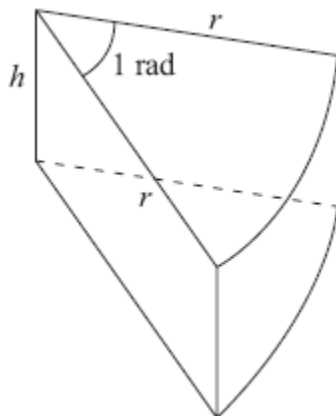

Figure 2

Figure 2 shows a closed box used by a shop for packing pieces of cake. The box is a right prism of height h cm. The cross section is a sector of a circle. The sector has radius r cm and angle 1 radian.

The volume of the box is 300 cm^3 .

(a) Show that the surface area of the box, $S \text{ cm}^2$, is given by

$$S = r^2 + \frac{1800}{r}. \quad (5)$$

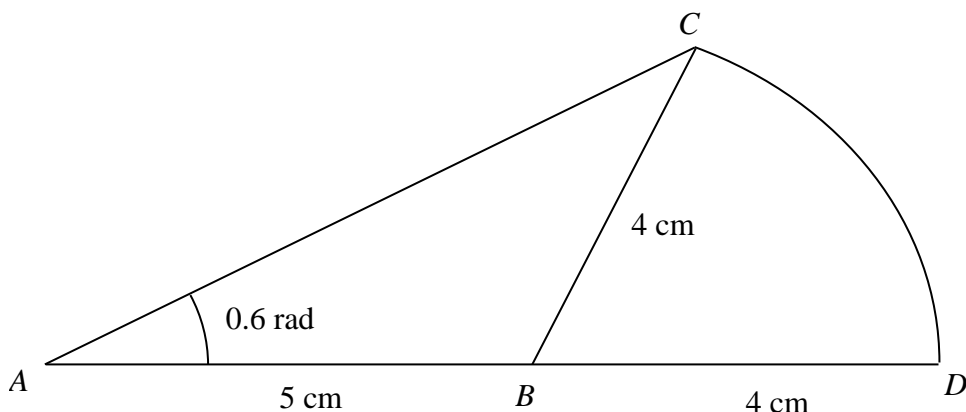
(b) Use calculus to find the value of r for which S is stationary. (4)

(c) Prove that this value of r gives a minimum value of S . (2)

(d) Find, to the nearest cm^2 , this minimum value of S . (2)

June 09 Q9

10.


Figure 1

An emblem, as shown in Figure 1, consists of a triangle ABC joined to a sector CBD of a circle with radius 4 cm and centre B . The points A , B and D lie on a straight line with $AB = 5$ cm and $BD = 4$ cm. Angle $BAC = 0.6$ radians and AC is the longest side of the triangle ABC .

- (a) Show that angle $ABC = 1.76$ radians, correct to three significant figures. (4)
- (b) Find the area of the emblem. (3)

Jan 10 Q4

11.

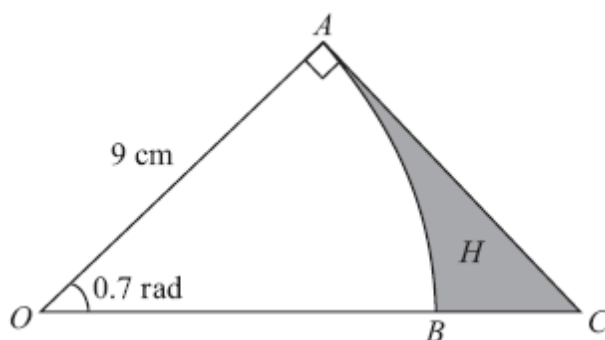

Figure 1

Figure 1 shows the sector OAB of a circle with centre O , radius 9 cm and angle 0.7 radians.

- (a) Find the length of the arc AB . (2)
- (b) Find the area of the sector OAB . (2)

The line AC shown in Figure 1 is perpendicular to OA , and OBC is a straight line.

- (c) Find the length of AC , giving your answer to 2 decimal places. (2)

The region H is bounded by the arc AB and the lines AC and CB .

- (d) Find the area of H , giving your answer to 2 decimal places. (3)

June 10 Q6

12. In the triangle ABC , $AB = 11$ cm, $BC = 7$ cm and $CA = 8$ cm.
- (a) Find the size of angle C , giving your answer in radians to 3 significant figures. (3)
- (b) Find the area of triangle ABC , giving your answer in cm^2 to 3 significant figures. (3)

Jan 11 Q2

13.

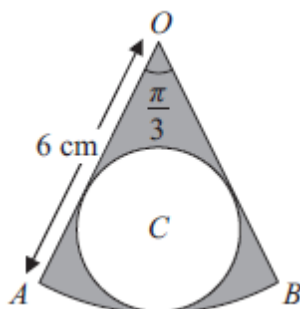


Figure 1

The shape shown in Figure 1 is a pattern for a pendant. It consists of a sector OAB of a circle centre O , of radius 6 cm, and angle $AOB = \frac{\pi}{3}$. The circle C , inside the sector, touches the two straight edges, OA and OB , and the arc AB as shown.

Find

- (a) the area of the sector OAB , (2)
- (b) the radius of the circle C . (3)

The region outside the circle C and inside the sector OAB is shown shaded in Figure 1.

- (c) Find the area of the shaded region. (2)

June 11 Q5