Edexcel Maths C2

Topic Questions from Papers

Sine and Cosine Rules

&

Radian Measure

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7. 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)

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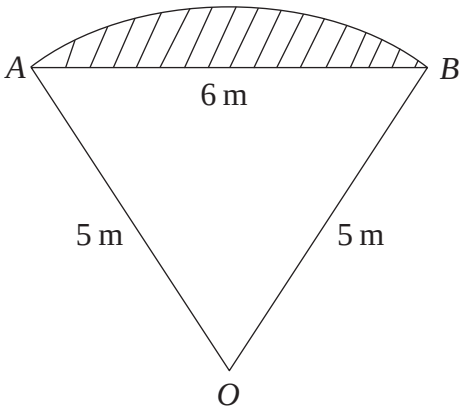
5. **Figure 2**



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

(a) Show that $\cos A\hat{O}B = \frac{7}{25}$.

(2)

(b) Hence find the angle $A\hat{O}B$ 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)

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Question 5 continued

Q5

(Total 8 marks)

Leave blank

8.

Figure 2

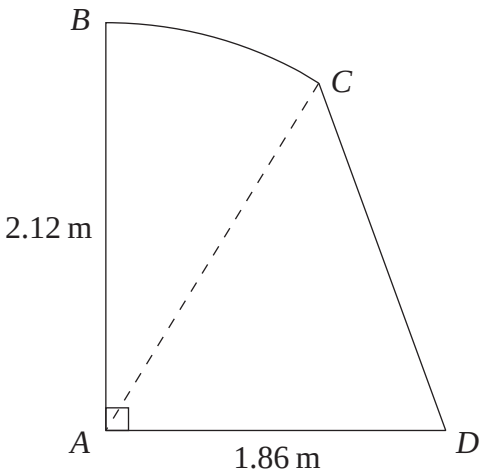

Figure 2 shows the cross section *ABCD* of a small shed.
The straight line *AB* is vertical and has length 2.12 m.
The straight line *AD* is horizontal and has length 1.86 m.
The curve *BC* is an arc of a circle with centre *A*, and *CD* is a straight line.
Given that the size of $\angle BAC$ is 0.65 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)

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Question 8 continued

Q8

(Total 9 marks)

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9.

Figure 2

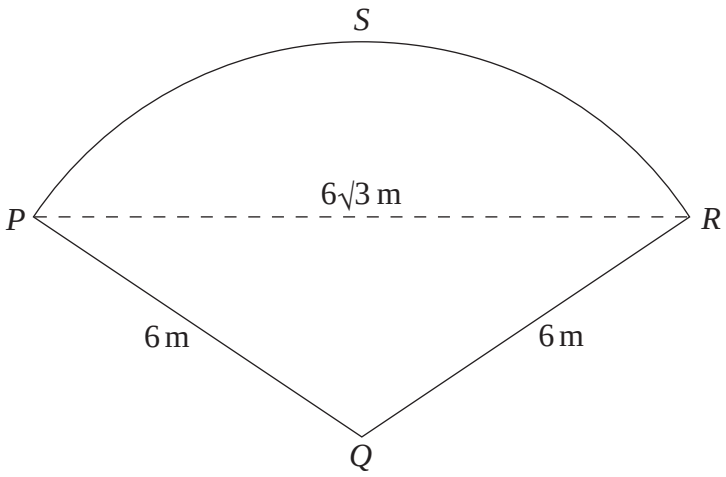

Figure 2 shows a plan of a patio. The patio *PQRS* is in the shape of a sector of a circle with centre *Q* and radius 6 m.

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 m^2.

(2)

(c) Find the exact area of the triangle *PQR*.

(2)

(d) Find, in m^2 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)

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Question 9 continued

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4.

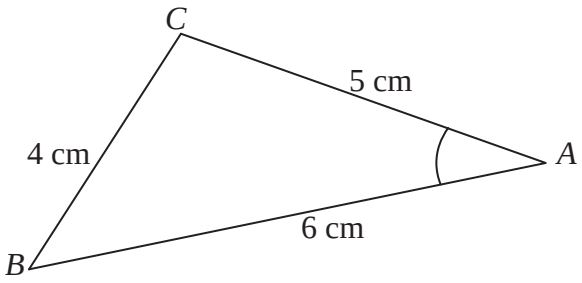

Figure 1

Figure 1 shows the triangle *ABC*, with *AB* = 6 cm, *BC* = 4 cm and *CA* = 5 cm.

(a) Show that $\cos A = \frac{3}{4}$.

(3)

(b) Hence, or otherwise, find the exact value of sin *A*.

(2)

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6.

Figure 1

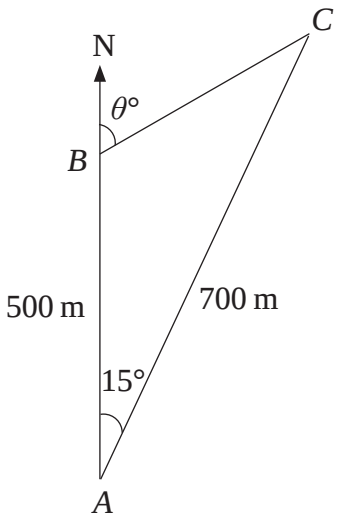

Figure 1 shows 3 yachts *A*, *B* and *C* which are assumed to be in the same horizontal plane. Yacht *B* is 500 m due north of yacht *A* and yacht *C* is 700 m from *A*. The bearing of *C* from *A* is 015°.

(a) Calculate the distance between yacht *B* and yacht *C*, in metres to 3 significant figures.

(3)

The bearing of yacht *C* from yacht *B* is $\theta°$, as shown in Figure 1.

(b) Calculate the value of θ.

(4)

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Question 6 continued

Q6

(Total 7 marks)

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

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

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

(2)

Figure 3

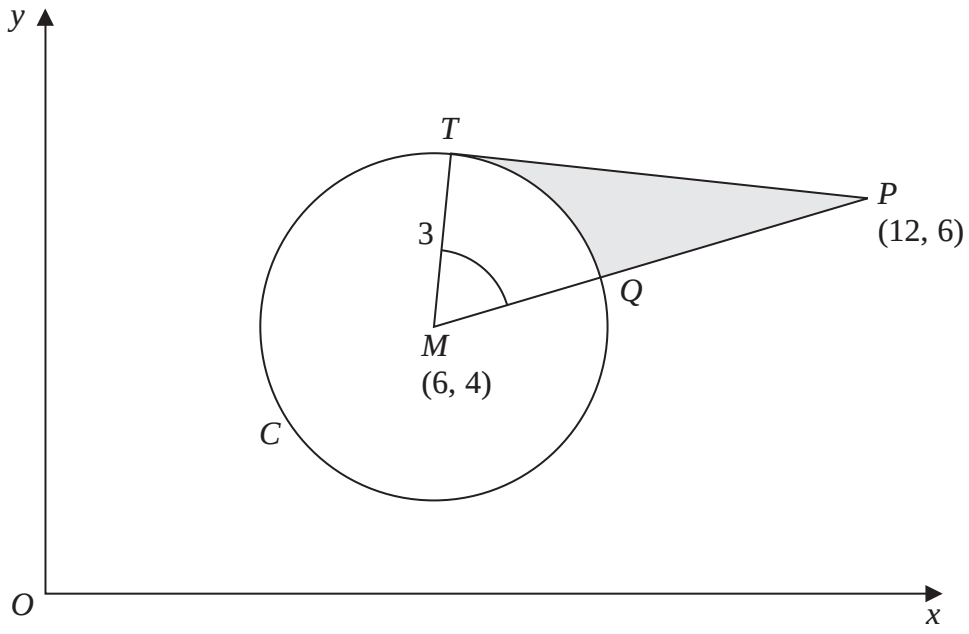

Figure 3 shows the circle C. The point T lies on the circle and the tangent at T passes through the point P (12, 6). The line MP cuts the circle at Q.

(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)

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Question 8 continued

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7.

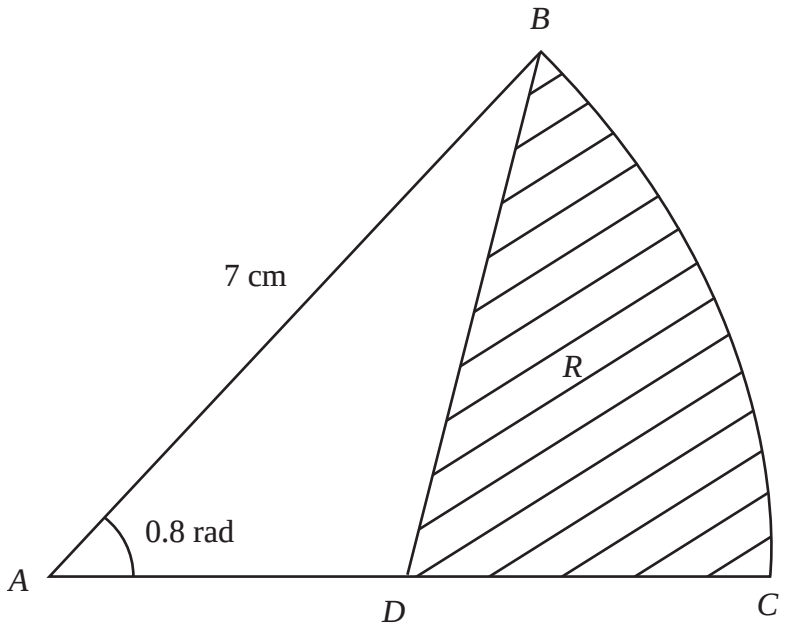

Figure 1

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)

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Question 7 continued

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7.

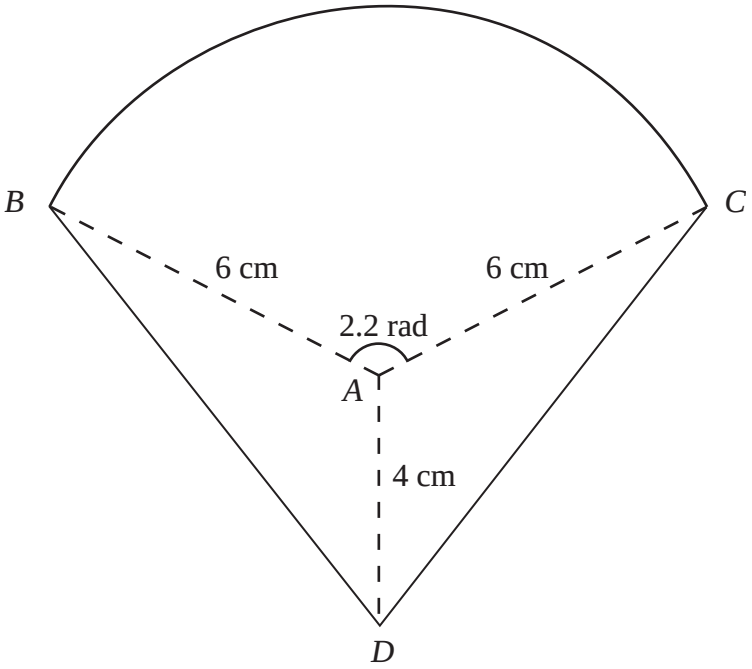

Figure 3

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)

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Question 7 continued

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4.

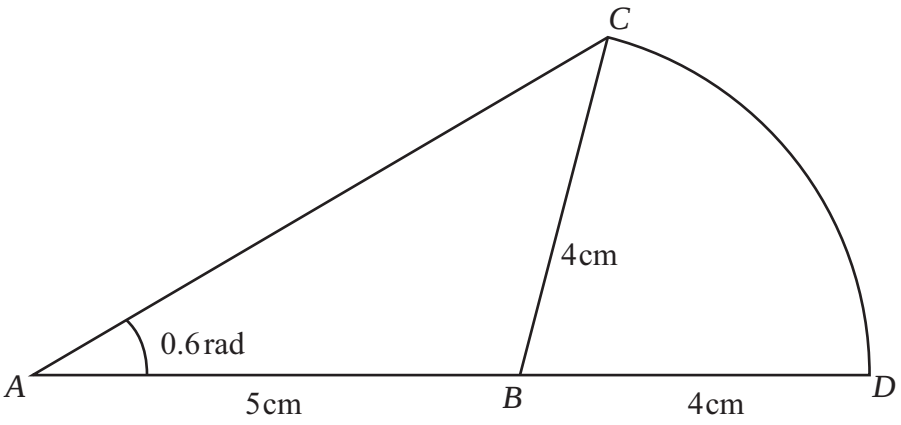

Figure 1

An emblem, as shown in Figure 1, consists of a triangle *ABC* oined 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 3 significant figures.

(4)

(b) Find the area of the emblem.

(3)

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6.

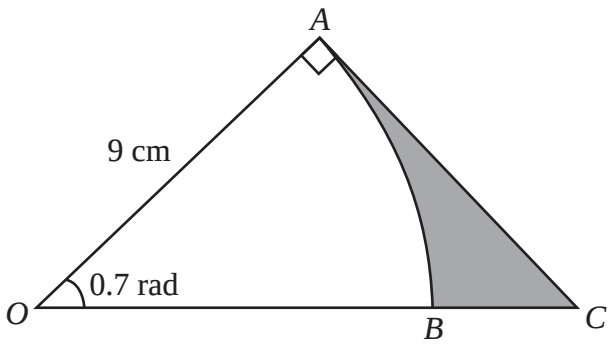

Figure 1

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 is bounded by the arc *AB* and the lines *AC* and *CB*.

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

(3)

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Question 6 continued

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2. 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)

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5.

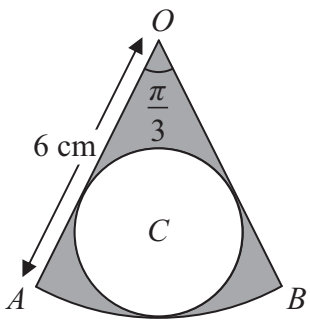

Figure 1

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)

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Question 5 continued

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7.

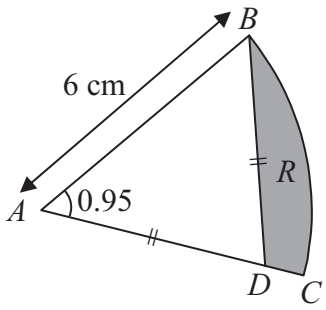

Figure 2

Figure 2 shows ABC, a sector of a circle of radius 6 cm with centre A. Given that the size of angle BAC is 0.95 radians, find

(a) the length of the arc BC,

(2)

(b) the area of the sector ABC.

(2)

The point D lies on the line AC and is such that $AD = BD$. The region R, shown shaded in Figure 2, is bounded by the lines CD, DB and the arc BC.

(c) Show that the length of AD is 5.16 cm to 3 significant figures.

(2)

Find

(d) the perimeter of R,

(2)

(e) the area of R, giving your answer to 2 significant figures.

(4)

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Question 7 continued

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7.

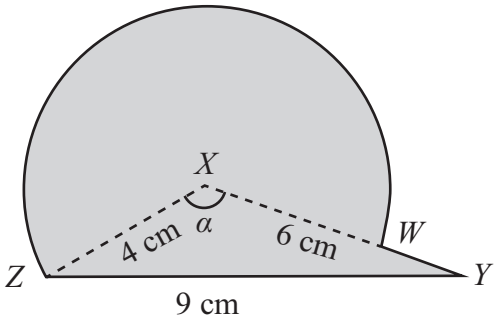

Figure 1

The triangle XYZ in Figure 1 has $XY = 6$ cm, $YZ = 9$ cm, $ZX = 4$ cm and angle $ZXY = \alpha$. The point W lies on the line XY.

The circular arc ZW, in Figure 1 is a major arc of the circle with centre X and radius 4 cm.

(a) Show that, to 3 significant figures, $\alpha = 2.22$ radians.

(2)

(b) Find the area, in cm^2, of the major sector $XZWX$.

(3)

The region enclosed by the major arc ZW of the circle and the lines WY and YZ is shown shaded in Figure 1.

Calculate

(c) the area of this shaded region,

(3)

(d) the perimeter $ZWYZ$ of this shaded region.

(4)

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Question 7 continued

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8.

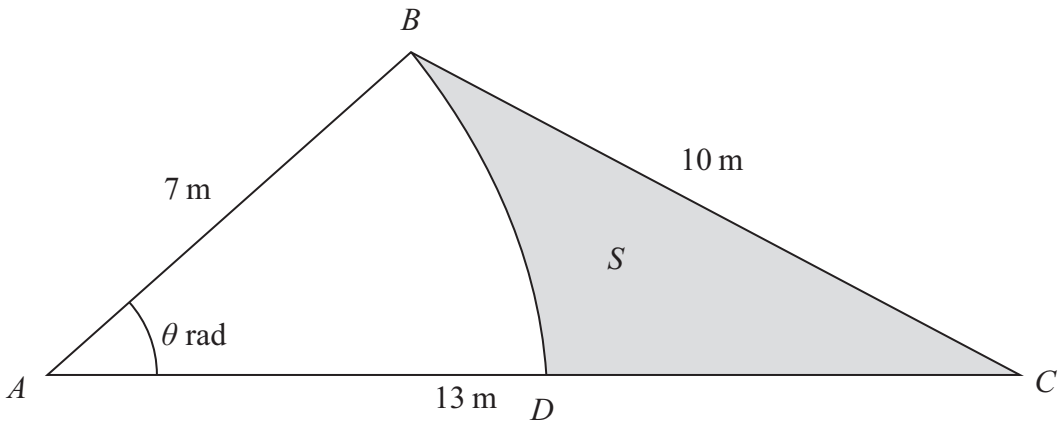

Figure 2

Figure 2 shows the design for a triangular garden ABC where $AB = 7$ m, $AC = 13$ m and $BC = 10$ m.

Given that angle $BAC = \theta$ radians,

(a) show that, to 3 decimal places, $\theta = 0.865$

(3)

The point D lies on AC such that BD is an arc of the circle centre A, radius 7 m.

The shaded region S is bounded by the arc BD and the lines BC and DC. The shaded region S will be sown with grass seed, to make a lawned area.

Given that 50 g of grass seed are needed for each square metre of lawn,

(b) find the amount of grass seed needed, giving your answer to the nearest 10 g.

(7)

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Question 8 continued

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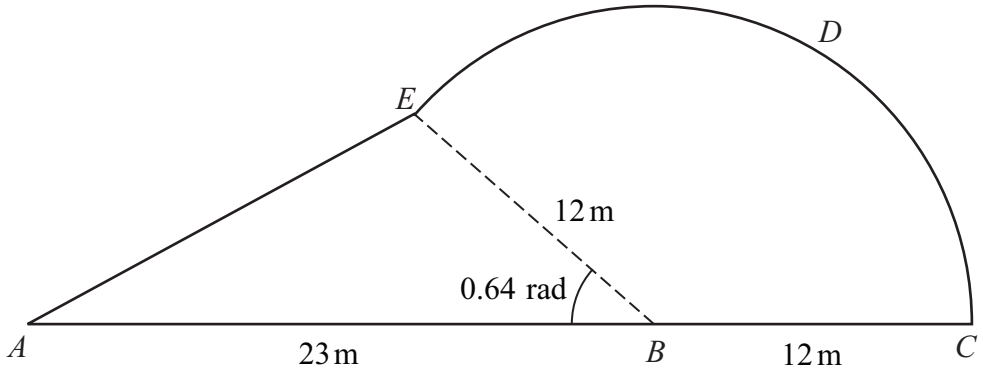

Figure 2

Figure 2 shows a plan view of a garden.
The plan of the garden *ABCDEA* consists of a triangle *ABE* joined to a sector *BCDE* of a circle with radius 12 m and centre *B*.
The points *A*, *B* and *C* lie on a straight line with $AB = 23$ m and $BC = 12$ m.

Given that the size of angle *ABE* is exactly 0.64 radians, find

(a) the area of the garden, giving your answer in m^2, to 1 decimal place,

(4)

(b) the perimeter of the garden, giving your answer in metres, to 1 decimal place.

(5)

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Question 5 continued

Core Mathematics C2

Candidates sitting C2 may also require those formulae listed under Core Mathematics C1.

Cosine rule

$$a^2 = b^2 + c^2 - 2bc\cos A$$

Binomial series

$$(a+b)^n = a^n + \binom{n}{1}a^{n-1}b + \binom{n}{2}a^{n-2}b^2 + \ldots + \binom{n}{r}a^{n-r}b^r + \ldots + b^n \quad (n \in \mathbb{N})$$

where $\binom{n}{r} = {}^n\mathrm{C}_r = \dfrac{n!}{r!(n-r)!}$

$$(1+x)^n = 1 + nx + \frac{n(n-1)}{1\times 2}x^2 + \ldots + \frac{n(n-1)\ldots(n-r+1)}{1\times 2\times\ldots\times r}x^r + \ldots \quad (|x| < 1, n \in \mathbb{R})$$

Logarithms and exponentials

$$\log_a x = \frac{\log_b x}{\log_b a}$$

Geometric series

$$u_n = ar^{n-1}$$

$$S_n = \frac{a(1-r^n)}{1-r}$$

$$S_\infty = \frac{a}{1-r} \text{ for } |r| < 1$$

Numerical integration

The trapezium rule: $\int_a^b y \ \mathrm{d}x \approx \frac{1}{2}h\{(y_0 + y_n) + 2(y_1 + y_2 + \ldots + y_{n-1})\}$, where $h = \dfrac{b-a}{n}$

Core Mathematics C1

Mensuration

Surface area of sphere = $4\pi r^2$

Area of curved surface of cone = $\pi r \times$ slant height

Arithmetic series

$u_n = a + (n - 1)d$

$S_n = \frac{1}{2}n(a + l) = \frac{1}{2}n[2a + (n - 1)d]$