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3. Find, giving your answer to 3 significant figures where appropriate, the value of x for which

(a) $5^x = 10,$ (2)

(b) $\log_3(x - 2) = -1.$ (2)

Horizontal lines for writing answers.



5.

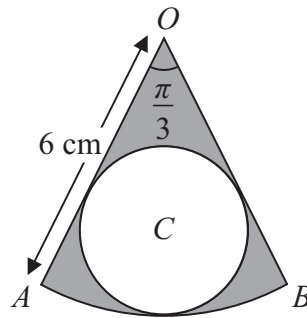


Figure 1

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

A series of horizontal lines for writing the answer to Question 5.

(Total 7 marks)

Q5



P 3 8 1 5 8 A 0 1 5 3 2

8.

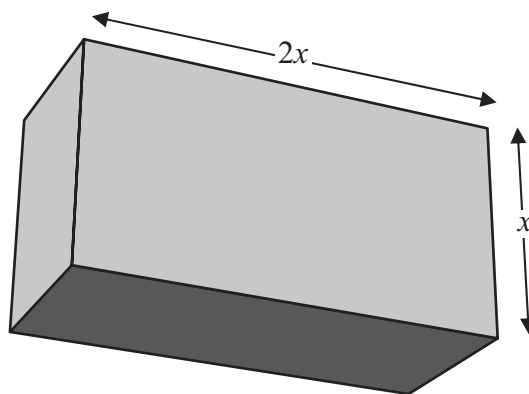


Figure 2

A cuboid has a rectangular cross-section where the length of the rectangle is equal to twice its width, x cm, as shown in Figure 2.

The volume of the cuboid is 81 cubic centimetres.

- (a) Show that the total length, L cm, of the twelve edges of the cuboid is given by

$$L = 12x + \frac{162}{x^2} \tag{3}$$

- (b) Use calculus to find the minimum value of L . (6)

- (c) Justify, by further differentiation, that the value of L that you have found is a minimum. (2)



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Question 8 continued

Ruled writing area with multiple horizontal lines.



9.

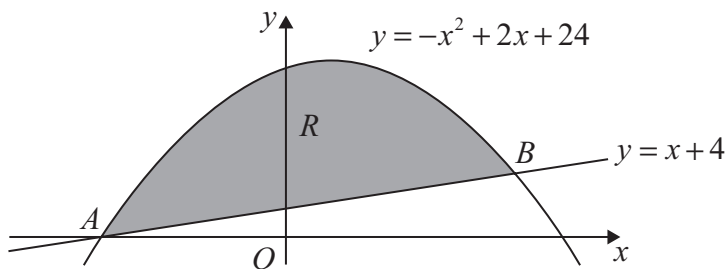


Figure 3

The straight line with equation $y = x + 4$ cuts the curve with equation $y = -x^2 + 2x + 24$ at the points A and B , as shown in Figure 3.

(a) Use algebra to find the coordinates of the points A and B . (4)

The finite region R is bounded by the straight line and the curve and is shown shaded in Figure 3.

(b) Use calculus to find the exact area of R . (7)



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Question 9 continued

Lined area for student response.



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Question 9 continued

Lined area for writing the answer to Question 9 continued.

Q9

(Total 11 marks)

TOTAL FOR PAPER: 75 MARKS

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