

7.

Figure 1

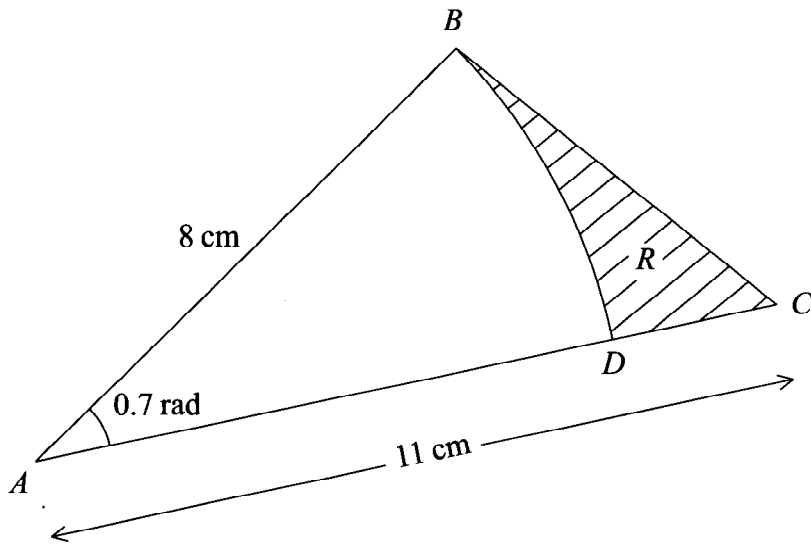


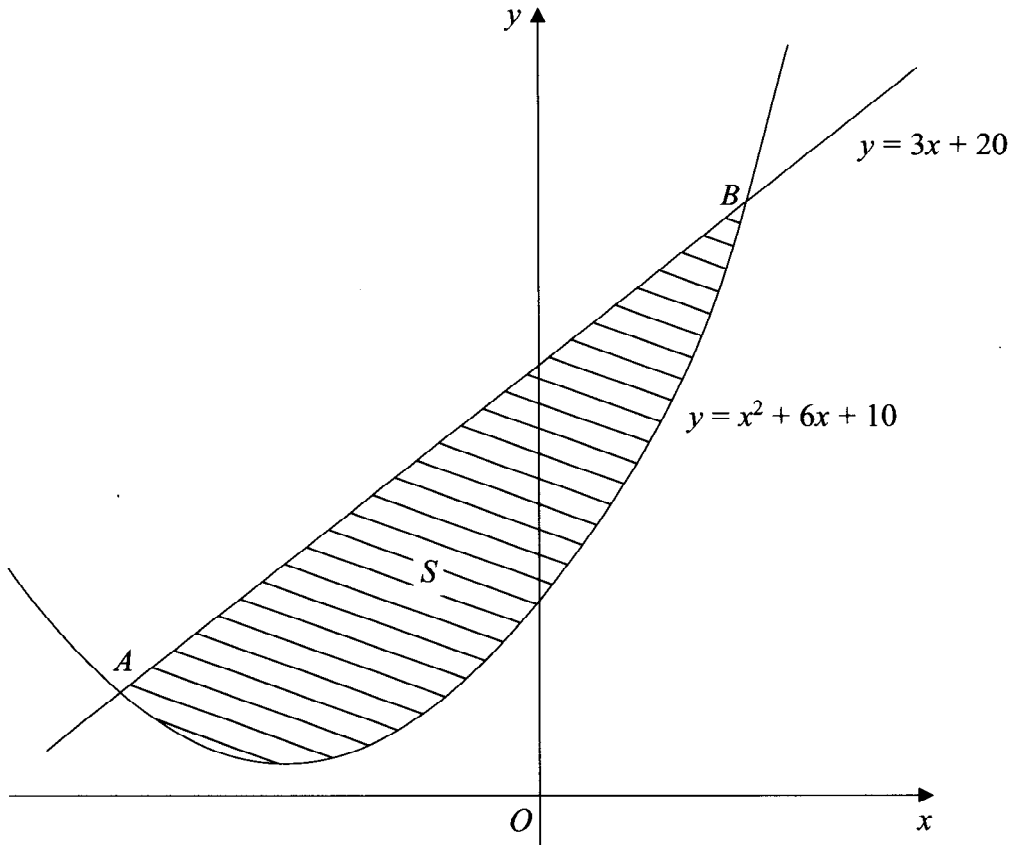
Figure 1 shows the triangle ABC , with $AB = 8$ cm, $AC = 11$ cm and $\angle BAC = 0.7$ radians. The arc BD , where D lies on AC , is an arc of a circle with centre A and radius 8 cm. The region R , shown shaded in Figure 1, is bounded by the straight lines BC and CD and the arc BD .

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)

8.

Figure 2



The line with equation $y = 3x + 20$ cuts the curve with equation $y = x^2 + 6x + 10$ at the points A and B , as shown in Figure 2.

(a) Use algebra to find the coordinates of A and the coordinates of B . (5)

The shaded region S is bounded by the line and the curve, as shown in Figure 2.

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

9.

Figure 3

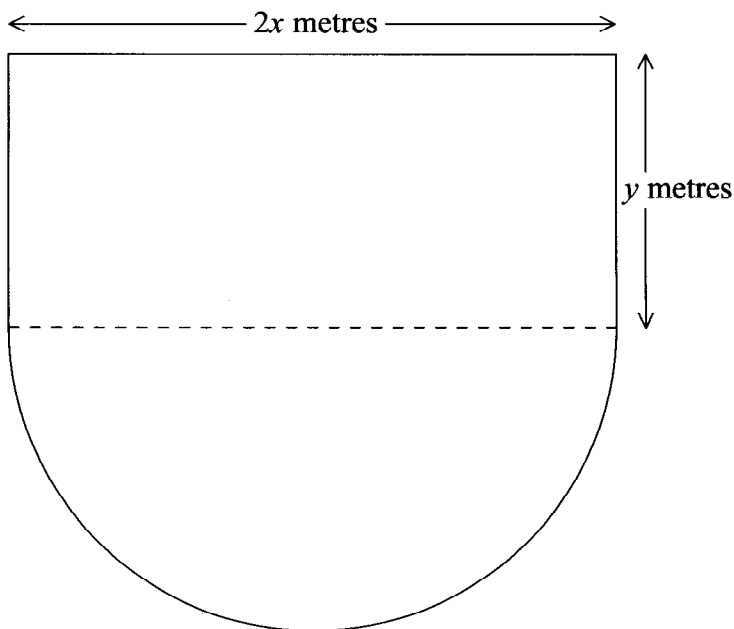


Figure 3 shows the plan of a stage in the shape of a rectangle joined to a semicircle. The length of the rectangular part is $2x$ metres and the width is y metres. The diameter of the semicircular part is $2x$ metres. The perimeter of the stage is 80 m.

(a) Show that the area, A m², of the stage is given by

$$A = 80x - \left(2 + \frac{\pi}{2}\right)x^2. \tag{4}$$

(b) Use calculus to find the value of x at which A has a stationary value. (4)

(c) Prove that the value of x you found in part (b) gives the maximum value of A . (2)

(d) Calculate, to the nearest m², the maximum area of the stage. (2)

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Question 9 continued

A large area of horizontal lines provided for writing the answer to Question 9.

(Total 12 marks)

Q9

TOTAL FOR PAPER: 75 MARKS

END