

LC 2016 (SET A): PAPER 1

QUESTION 8 (50 MARKS)

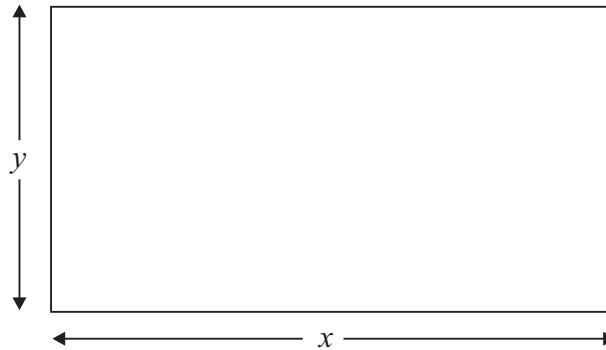
Question 8 (a)

$$\text{Perimeter } P = 2x + 2y$$

$$2x + 2y = 21$$

$$x + y = 10.5$$

$$y = 10.5 - x$$



Question 8 (b) (i)

$$x = 0: y = 10.5 - (0) = 10.5 \text{ m} \Rightarrow A = xy = (0)(10.5) = 0 \text{ m}^2$$

$$x = 1: y = 10.5 - (1) = 9.5 \text{ m} \Rightarrow A = xy = (1)(9.5) = 9.5 \text{ m}^2$$

$$x = 2: y = 10.5 - (2) = 8.5 \text{ m} \Rightarrow A = xy = (2)(8.5) = 17.0 \text{ m}^2$$

$$x = 3: y = 10.5 - (3) = 7.5 \text{ m} \Rightarrow A = xy = (3)(7.5) = 22.5 \text{ m}^2$$

$$x = 4: y = 10.5 - (4) = 6.5 \text{ m} \Rightarrow A = xy = (4)(6.5) = 26.0 \text{ m}^2$$

$$x = 5: y = 10.5 - (5) = 5.5 \text{ m} \Rightarrow A = xy = (5)(5.5) = 27.5 \text{ m}^2$$

$$x = 6: y = 10.5 - (6) = 4.5 \text{ m} \Rightarrow A = xy = (6)(4.5) = 27.0 \text{ m}^2$$

$$x = 7: y = 10.5 - (7) = 3.5 \text{ m} \Rightarrow A = xy = (7)(3.5) = 24.5 \text{ m}^2$$

$$x = 8: y = 10.5 - (8) = 2.5 \text{ m} \Rightarrow A = xy = (8)(2.5) = 20.0 \text{ m}^2$$

$$x = 9: y = 10.5 - (9) = 1.5 \text{ m} \Rightarrow A = xy = (9)(1.5) = 13.5 \text{ m}^2$$

$$x = 10: y = 10.5 - (10) = 0.5 \text{ m} \Rightarrow A = xy = (10)(0.5) = 5.0 \text{ m}^2$$

x (m)	0	1	2	3	4	5	6	7	8	9	10
y (m)	10.5	9.5	8.5	7.5	6.5	5.5	4.5	3.5	2.5	1.5	0.5
A (m ²)	0	9.5	17	22.5	26	27.5	27	24.5	20	13.5	5

MARKING SCHEME NOTES

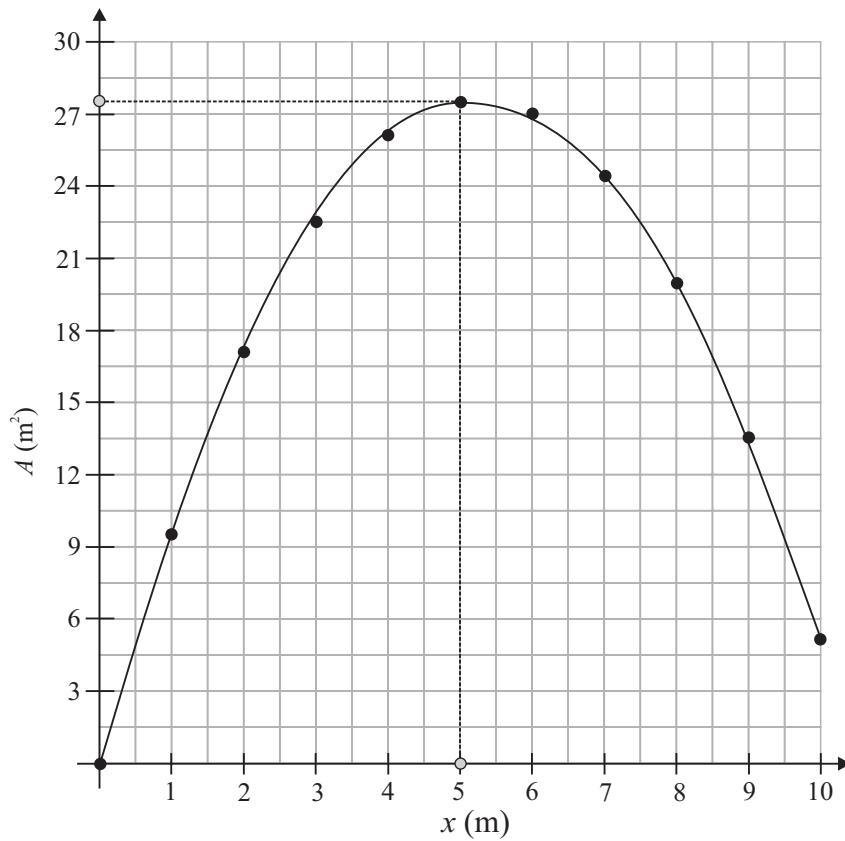
Question 8 (a) [Scale 5B (0, 2, 5)]

- 2: • Some correct work on perimeter
• Relevant work on diagram

Question 8 (b) (i) [Scale 5D (0, 2, 3, 4, 5)]

- 2: • relevant calculations without any correct entry
• 1, 2, 3 or 4 correct entries to table (y or A)
3: • 5 or 6 correct pairs of entries (y or A) or full y line correct
4: • 7, 8 or 9 correct pairs of entries (y or A)

Question 8 (b) (ii)



MARKING SCHEME NOTES

Question 8 (b) (ii) [Scale 5D (0, 2, 3, 4, 5)]

- 2: • 1, 2, 3 or 4 correct plots
• Graphs y only
- 3: • 5, 6, 7 or 8 correct plots
- 4: • 9, 10 or 11 correct plots but no joining or incorrect joining

Question 8 (c)

A: Maximum area (m²)	27.5
x (m)	5
y (m)	5.5

Question 8 (d)

(i) $y = 10.5 - x$
 Area $A = xy = x(10.5 - x)$
 $= 10.5x - x^2$

(ii) $A = 10.5x - x^2$
 $\frac{dA}{dx} = 10.5 - 2x$

(iii) $\frac{dA}{dx} = 0 \Rightarrow 10.5 - 2x = 0$
 $2x = 10.5$
 $x = \frac{10.5}{2} = 5.25 \text{ m}$

(iv) $A_{\text{Max}} = 10.5(5.25) - (5.25)^2$
 $= 27.5625 \text{ m}^2$

MARKING SCHEME NOTES

Question 8 (c) [Scale 5C (0, 2, 4, 5)]

- 2: • Maximum area identified from graph
4: • Area and one corresponding value

Question 8 (d) (i) [Scale 15C (0, 3, 7, 15)]

- 3: • Relevant area formula
7: • Correct substitution into area formula

Question 8 (d) (ii) [Scale 5B(0, 2, 5)]

- 2: • Any correct differentiation

Question 8 (d) (iii) [Scale 5C (0, 2, 4, 5)]

NOTE: Must have calculus in (d) (ii) to get any marks in this section

- 2: • Any use of answer to (d) (ii)
4: • Lets their derivative = 0

Question 8 (d) (iv) [Scale 5B (0, 2, 5)]

- 2: • Any substitution into area formula or equation given in (d) (i)
• Writes area formula
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