

LC 2018: PAPER 1**QUESTION 5 (25 MARKS)****Question 5 (a)**

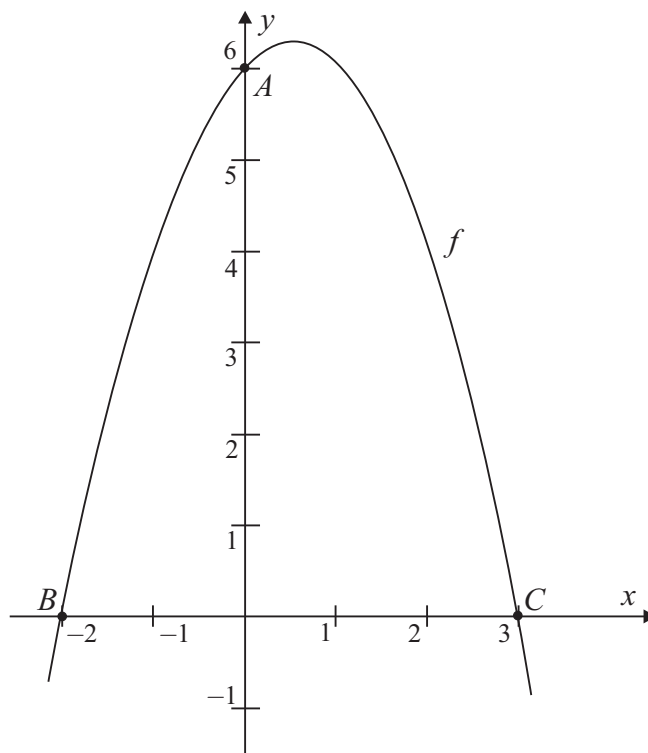
$$A = (0, 6)$$

$$B = (-2, 0)$$

$$C = (3, 0)$$

MARKING SCHEME NOTES**Question 5 (a) [Scale 5C (0, 3, 4, 5)]****3:** • 1 point correctly identified**4:** • 2 points correctly identified

- mixes up axes consistently for the 3 points

**Question 5 (b)**

As it is a quadratic, the three points where the quadratic cuts the axes should satisfy its equation.

$$f(x) = -x^2 + x + 6$$

$$f(0) = -(0)^2 + (0) + 6 = 6 \Rightarrow A(0, 6) \in f(x)$$

$$f(-2) = -(-2)^2 + (-2) + 6 = 0 \Rightarrow B(-2, 0) \in f(x)$$

$$f(3) = -(3)^2 + (3) + 6 = 0 \Rightarrow C(3, 0) \in f(x)$$

Or

$$x = -2 \Rightarrow (x + 2) \text{ is a factor}$$

$$x = 3 \Rightarrow (x - 3) \text{ is a factor}$$

$$f(x) = k(x + 2)(x - 3) = k(x^2 - x - 6)$$

$$f(0) = 6 \Rightarrow k(-6) = 6$$

$$\therefore k = -1$$

$$f(x) = -1(x^2 - x - 6) = -x^2 + x + 6$$

Question 5 (c)

$$f(x) = -x^2 + x + 6$$

$$f'(x) = -2x + 1$$

$$f'(x) = 0 \Rightarrow -2x + 1 = 0$$

$$\therefore x = 0.5$$

$$f''(x) = -2 < 0$$

$$\therefore \text{Maximum at } x = 0.5: f(0.5) = -(0.5)^2 + (0.5) + 6 = 6.25$$

Maximum point: (0.5, 6.25)

MARKING SCHEME NOTES**Question 5 (b) [Scale 10C (0, 3, 8, 10)]****3:** • $c = 6$

- substitution of A or B or C into given equation or $ax^2 + bx + c$

- 1 factor written

8: • substitution of any 2 of A , B , or C into

given equation worked out

- substitution of A , B , and C into

$$ax^2 + bx + c$$

- $\pm(x + 2)(x - 3)$

Note: A , B and C substituted into $-x^2 + x + 6$ and fully verified merits full marks**Question 5 (c) [Scale 10C (0, 3, 8, 10)]****3:** • any effort at differentiation

- states $f'(x) = 0$

8: • $x = \frac{1}{2}$