

# Graphs & Equations Worked Solutions

- ① Consider  $(1, 5)$  and  $(2, 8)$  at  $x=0, y=2$   
 $y = mx + c$   $m = \frac{\Delta y}{\Delta x} = \frac{(8-5)}{(2-1)} = \frac{3}{1}$

$$\therefore y = 3x + 2 \quad \checkmark$$

- ② Consider  $(0, -2.5), (1, -3)$

$$y = mx + c \quad m = \frac{\Delta y}{\Delta x} = \frac{-3 - (-2.5)}{1 - 0} = \frac{-0.5}{1} = -\frac{1}{2}$$

$$\therefore y = -\frac{1}{2}x - 2.5 \quad \checkmark$$

- ③ Consider  $(2, 1), (4, 7), (0, -1)$

$$y = ax^2 + bx + c$$

$$(2, 1): 1 = a(2)^2 + b(2) - 1$$

$$1 = 4a + 2b - 1$$

$$b = 1 - 2a$$

$$(4, 7) \quad 7 = a(4)^2 + 4(1 - 2a) - 1$$

$$4 = 8a$$

$$a = \frac{1}{2} \quad \therefore b = 1 - 2\left(\frac{1}{2}\right) = 0$$

$$\therefore y = \frac{1}{2}x^2 - 1 \quad \checkmark$$

- ④ Consider  $(-3, 41), (3, 7), (2, -1), (1, -1), (0, -1)$   
 $y = ax^3 + bx^2 + cx + d$

$$\textcircled{1} (-3, 41): -41 = a(-3)^3 + b(-3)^2 + c(-3) - 1$$

$$-42 = -27a + 9b - 3c$$

$$\textcircled{2} (3, 7): 6 = 27a + 9b + 3c$$

$$\textcircled{3} (2, -1): -2 = 8a + 4b + 2c$$

$$\textcircled{4} (1, -1): -2 = a + b + c$$

$$\textcircled{3} - 4 \times \textcircled{4}: -2 = 8a + 4b + 2c$$

$$-8 = 4a + 4b + 4c -$$

$$6 = 4a - 2c$$

$$\therefore c = 2a - 3$$

② - ①:

$$6 = 27a + 9b + 3c$$

$$-42 = -27a + 9b + 3c$$

$$48 = 54a + 6c$$

$$48 = 54a + 6(2a - 3)$$

$$66 = 66a$$

$$\therefore \underline{a = 1}$$

if  $a = 1,$

$$\underline{c = 2(1) - 3 = -1}$$

if  $a = 1$  and  $c = -1$

$$\textcircled{3} \quad -2 = 8(1) + 4b + 2(-1)$$

$$-8 = 4b$$

$$b = -2$$

$\therefore$

$$\boxed{y = x^3 - 2x^2 - x + 1} \quad \checkmark$$