



eClassroom

GCSE Mathematics

Functions

Worked Solutions

Pearson Edexcel GCSE & iGCSE Mathematics



Section B — Higher — Worked Solutions

[Fluency] Question 1

$$(a) f(4) = 9 \quad (b) f(-3) = -5 \quad (c) 2x + 1 = 9 \Rightarrow x = 4$$

$$\therefore (a) 9 \quad (b) -5 \quad (c) x=4$$

[Fluency] Question 2

$$(a) g(2) = 1 \quad (b) g(-2) = 1 \quad (c) x^2 = 25 \Rightarrow x = \pm 5$$

$$\therefore (a) 1 \quad (b) 1 \quad (c) x=\pm 5$$

[Fluency] Question 3

$$(a) fg(x) = 2(x^2 - 3) + 1 = 2x^2 - 5$$

$$(b) gf(x) = (2x + 1)^2 - 3 = 4x^2 + 4x - 2$$

$$(c) fg(2) = 2(4) - 5 = 3$$

$$\therefore (a) 2x^2-5 \quad (b) 4x^2+4x-2 \quad (c) 3$$

[Fluency] Question 4

$$y = 3x - 5 \Rightarrow x = \frac{y+5}{3}$$

\therefore

[Fluency] Question 5

$$y = \frac{2x+1}{x-3} \Rightarrow y(x-3) = 2x+1 \Rightarrow yx-2x = 3y+1 \Rightarrow x = \frac{3y+1}{y-2}$$

\therefore

[Reasoning] Question 6

$$2x^2 - 5 = 4x^2 + 4x - 2 \Rightarrow 2x^2 + 4x + 3 = 0$$

$$\Delta = 16 - 24 = -8 < 0 \Rightarrow \text{no real solutions}$$

\therefore **No real solutions**





[Reasoning] Question 7

$$(a) ff(x) = f(2x + 1) = 2(2x + 1) + 1 = 4x + 3$$

$$(b) 4x + 3 = x \Rightarrow 3x = -3 \Rightarrow x = -1$$

$$\therefore (a) 4x+3 \quad (b) x=-1$$

[Reasoning] Question 8

$$(a) \text{Domain: } x \geq 2$$

$$(b) \text{Range: } f(x) \geq 0$$

$$(c) y = \sqrt{x - 2} \Rightarrow y^2 = x - 2 \Rightarrow f^{-1}(x) = x^2 + 2$$

$$\therefore (a) x \geq 2 \quad (b) f(x) \geq 0 \quad (c) f^{-1}(x) = x^2 + 2, x \geq 0$$

[Reasoning] Question 9

$$(x + 1)^2 - 1 - 3 = (x + 1)^2 - 4$$

$$(b) \text{Minimum} = -4 \text{ at } x = -1$$

$$(c) \text{Range: } f(x) \geq -4$$

$$\therefore (a) (x+1)^2-4 \quad (b) \text{min}=-4 \text{ at } x=-1 \quad (c) f(x) \geq -4$$

[Problem Solving] Question 10

$$(a) 2x + 3 = x^2 - 1 \Rightarrow x^2 - 2x - 4 = 0 \Rightarrow x = 1 \pm \sqrt{5}$$

$$(b) f^{-1}(x) = \frac{x-3}{2}, ff^{-1}(x) = 2 \cdot \frac{x-3}{2} + 3 = x - 3 + 3 = x \quad \checkmark$$

$$\therefore (a) x=1 \pm \sqrt{5} \quad (b) \text{shown } \checkmark$$

