

QQQ – Pure Year 2 – Chapter 2 – Functions (Version 2)

Total Marks: 24

(24 = Platinum, 22 = Gold, 19 = Silver, 16 = Bronze)

1. The point $P(6, -4)$ lies on the curve with equation $y = f(x)$, $x \in \mathbb{R}$

Find the point to which P is mapped when the curve with equation $y = f(x)$ is transformed to the curve with equation

(a) $y = f(x + 2)$ (1)

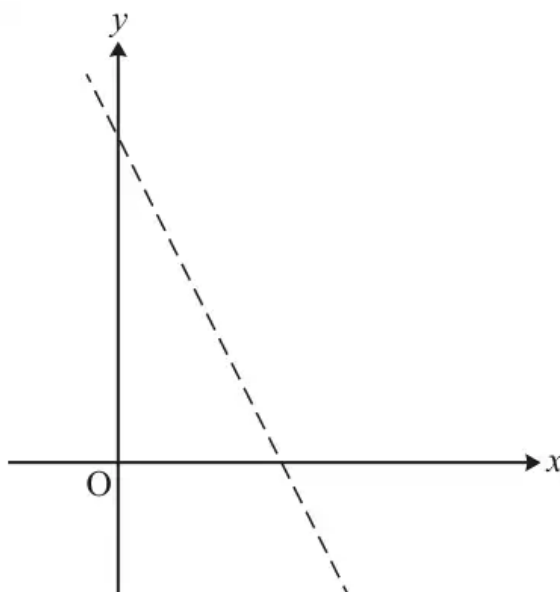
(b) $y = f^{-1}(x)$ (1)

(c) $y = 2|f(x)| - 3$ (2)

(Total 4 marks)

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2. The straight line $y = 5 - 2x$ is shown in the diagram.



- (a) On the copy of the diagram in the Printed Answer Booklet, sketch the graph of $y = |5 - 2x|$. [1]

- (b) Solve the inequality $|5 - 2x| < 3$. [3]

(Total 4 marks)

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3. The function f is defined by

$$f(x) = \frac{1}{2}(x^2 + 1), \quad x \geq 0$$

- (a) Find the range of f . [1 mark]
- (b) (i) Find $f^{-1}(x)$ [3 marks]
(ii) State the range of $f^{-1}(x)$ [1 mark]
- (c) State the transformation which maps the graph of $y = f(x)$ onto the graph of $y = f^{-1}(x)$ [1 mark]
- (d) Find the coordinates of the point of intersection of the graphs of $y = f(x)$ and $y = f^{-1}(x)$ [2 marks]

(Total 8 marks)

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4. In this question you must show detailed reasoning.

The functions f and g are defined for all real values of x by

$$f(x) = x^3 \quad \text{and} \quad g(x) = x^2 + 2.$$

- (i) Write down expressions for
- (a) $fg(x)$, [1]
(b) $gf(x)$. [1]
- (ii) Hence find the values of x for which $fg(x) - gf(x) = 24$. [6]

(Total 8 marks)

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