

QQQ – Pure Year 2 – Chapter 2 – Functions (Version 1)

Total Marks: 25

(25 = Platinum, 23 = Gold, 20 = Silver, 17 = Bronze)

1. It is given that

- $f(x) = \pm \frac{1}{\sqrt{x}}, x > 0$
- $g(x) = \frac{x}{x-3}, x > 3$
- $h(x) = x^2 + 2, x \in \mathbb{R}.$

(a) Explain why $f(x)$ is **not** a function. [1]

(b) Find $gh(x)$. [2]

(c) State the domain of $gh(x)$. [1]

(Total 4 marks)

2.

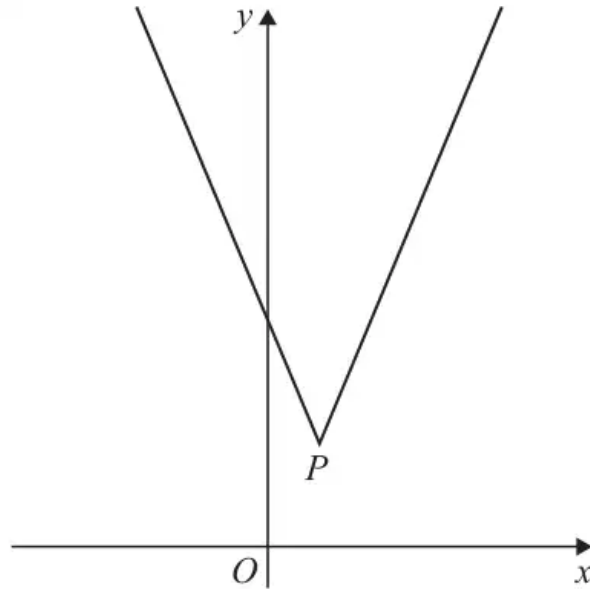


Figure 1

Figure 1 shows a sketch of the graph with equation

$$y = 3|x - 2| + 5$$

The vertex of the graph is at the point P , shown in Figure 1.

(a) Find the coordinates of P . (2)

(b) Solve the equation

$$16 - 4x = 3|x - 2| + 5$$

(2)

A line l has equation $y = kx + 4$ where k is a constant.

Given that l intersects $y = 3|x - 2| + 5$ at 2 distinct points,

(c) find the range of values of k . (2)

(Total 6 marks)

3.

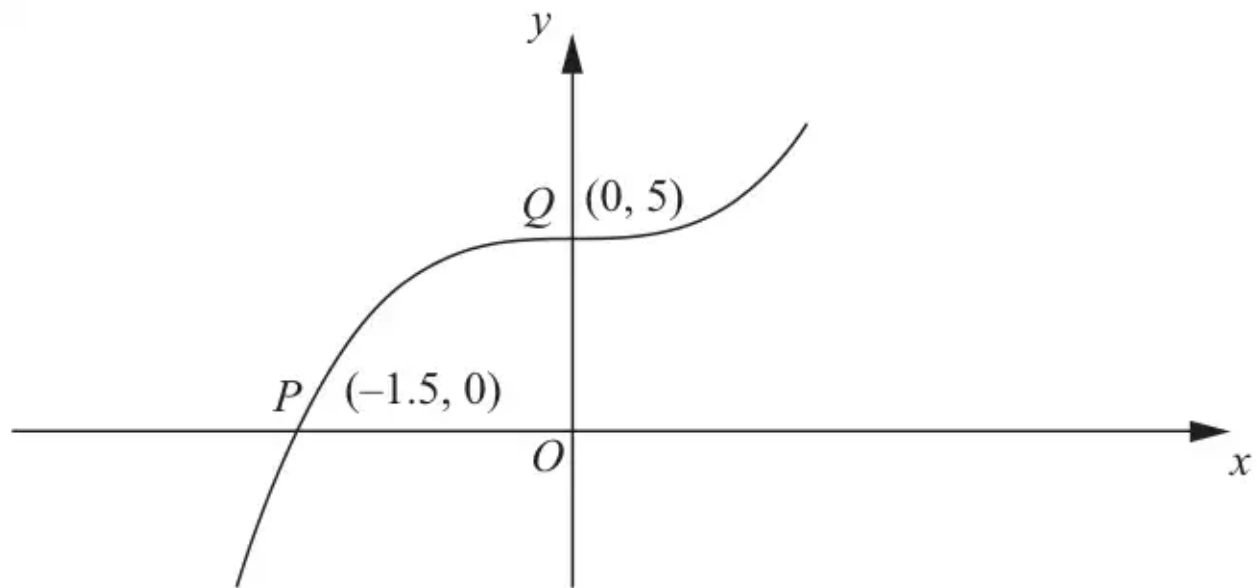


Figure 2

Figure 2 shows part of the curve with equation $y = f(x)$

The curve passes through the points $P(-1.5, 0)$ and $Q(0, 5)$ as shown.

On separate diagrams, sketch the curve with equation

(a) $y = |f(x)|$ **(2)**

(b) $y = f(|x|)$ **(2)**

(c) $y = 2f(3x)$ **(3)**

Indicate clearly on each sketch the coordinates of the points at which the curve crosses or meets the axes.

(Total 7 marks)

4. The function f is defined by

$$f(x) = 3 + \sqrt{x - 2} \quad x \in \mathbb{R} \quad x > 2$$

(a) State the range of f (1)

(b) Find f^{-1} (3)

The function g is defined by

$$g(x) = \frac{15}{x - 3} \quad x \in \mathbb{R} \quad x \neq 3$$

(c) Find $gf(6)$ (2)

(d) Find the exact value of the constant a for which

$$f(a^2 + 2) = g(a)$$

(2)

(Total 8 marks)