

Quadratic functions 1

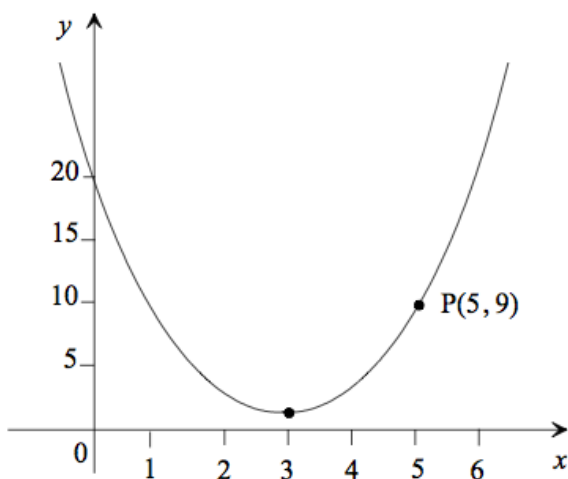
1)

Consider the function $f(x) = 2x^2 - 8x + 5$.

- (a) Express $f(x)$ in the form $a(x-p)^2 + q$, where $a, p, q \in \mathbb{Z}$.
- (b) Find the minimum value of $f(x)$.

2)

The diagram shows part of the graph of the curve $y = a(x-h)^2 + k$, where $a, h, k \in \mathbb{Z}$.



- (a) The vertex is at the point $(3, 1)$. Write down the value of h and of k . *[2 marks]*
- (b) The point $P(5, 9)$ is on the graph. Show that $a = 2$. *[3 marks]*
- (c) Hence show that the equation of the curve can be written as

$$y = 2x^2 - 12x + 19. \quad \text{[1 mark]}$$

3)

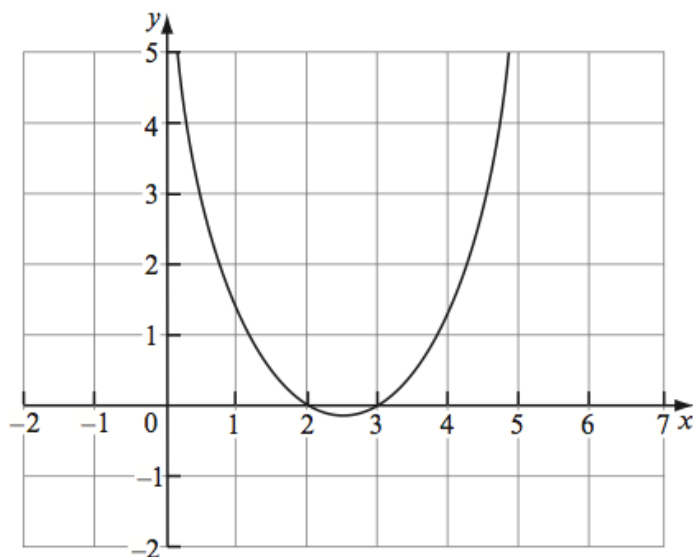
The equation $kx^2 + 3x + 1 = 0$ has exactly one solution. Find the value of k .

4)

The equation $x^2 - 2kx + 1 = 0$ has two distinct real roots. Find the set of all possible values of k .

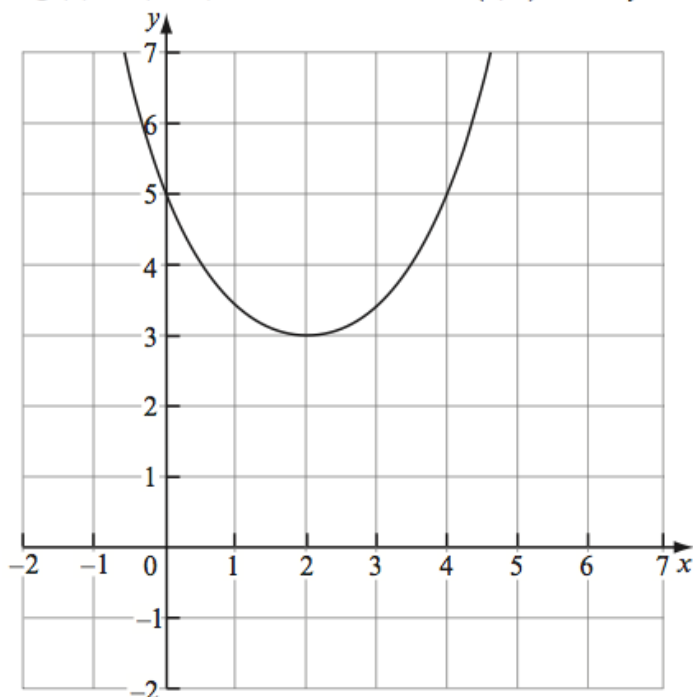
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- 5) (a) The diagram shows part of the graph of a quadratic function $f(x) = x^2 + bx + c$, which intersects the x -axis at $x = 2$ and at $x = 3$.



Find the value of b and of c .

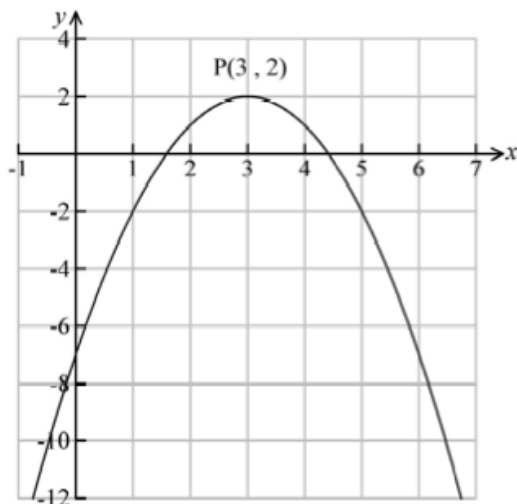
- (b) The diagram shows part of the graph of another quadratic function g . It can be written in the form $g(x) = a(x - h)^2 + 3$. Its vertex is at $(2, 3)$ and its y -intercept is 5.



- (i) Write down the value of h .
- (ii) Find the value of a .

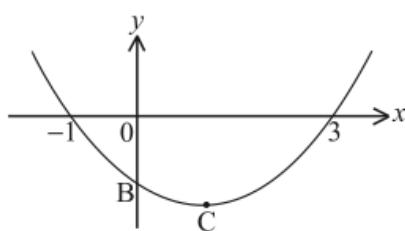
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- 6) The equation $x^2 + kx + 9 = 0$ has two distinct real roots. Find the set of all possible values of k .
- 7) The function $f(x)$ is defined as $f(x) = -(x-h)^2 + k$. The diagram below shows part of the graph of $f(x)$. The maximum point on the curve is $P(3, 2)$.



- (a) Write down the value of
- (i) h ;
 - (ii) k .
- [2 marks]*
- (b) Show that $f(x)$ can be written as $f(x) = -x^2 + 6x - 7$.
- [1 mark]*

- 8) Part of the graph of $f(x) = (x-p)(x-q)$ is shown below.



The vertex is at C. The graph crosses the y -axis at B.

- (a) Write down the value of p and of q .
- (b) Find the coordinates of C.
- (c) Write down the y -coordinate of B.

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9)

Let $f(x) = a(x-4)^2 + 8$.

- (a) Write down the coordinates of the vertex of the curve of f .
- (b) Given that $f(7) = -10$, find the value of a .
- (c) Hence find the y -intercept of the curve of f .