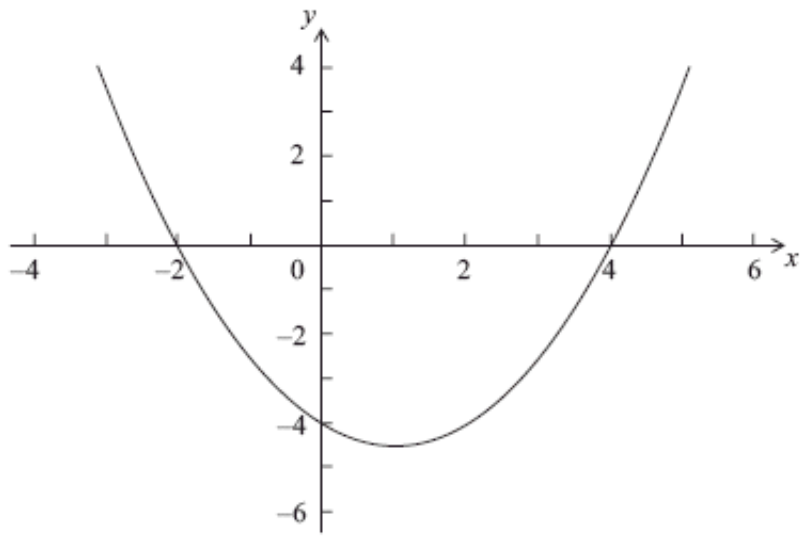


Quadratic Functions Review Paper 1

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



The graph passes through the points $(-2, 0)$, $(0, -4)$ and $(4, 0)$.

- (a) Write down the value of q and of r .

(2)

- (b) Write down the **equation** of the axis of symmetry.

(1)

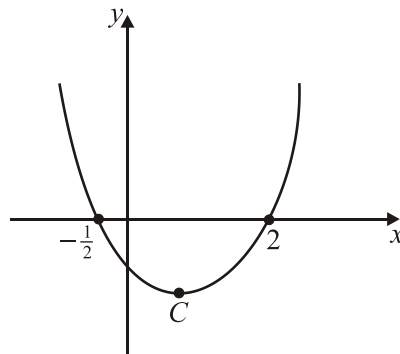
- (c) Find the value of p .

(3)
(Total 6 marks)

Quadratic Functions Review Paper 1

2. The diagram represents the graph of the function

$$f: x \mapsto (x - p)(x - q).$$



- (a) Write down the values of p and q .
- (b) The function has a minimum value at the point C . Find the x -coordinate of C .

Working:

Answers:

- (a)
- (b)

(Total 4 marks)

Quadratic Functions Review Paper 1

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

(a) Express $f(x)$ in the form $a(x - p)^2 + q$, where $a, p, q \in \mathbb{R}$.

(b) Find the minimum value of $f(x)$.

Working:

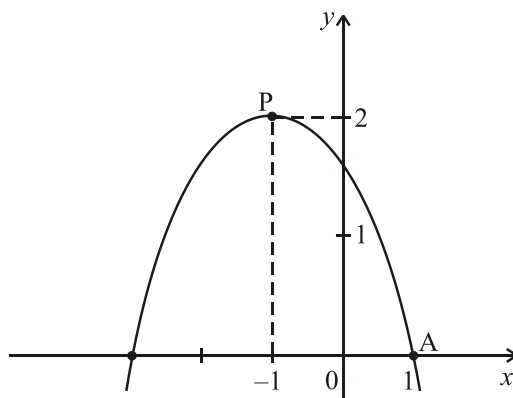
Answers:

(a)

(b)

(Total 6 marks)

4. The diagram shows part of the graph of $y = a(x - h)^2 + k$. The graph has its vertex at P, and passes through the point A with coordinates (1, 0).



(a) Write down the value of

(i) h ;

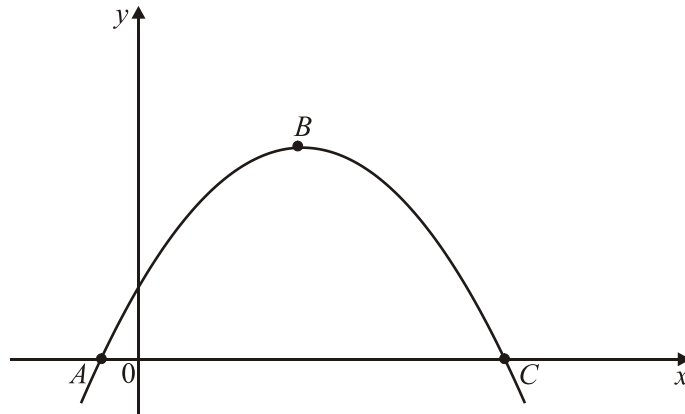
(ii) k .

(b) Calculate the value of a .

(Total 6 marks)

Quadratic Functions Review Paper 1

5. The diagram shows the parabola $y = (7 - x)(1 + x)$. The points A and C are the x -intercepts and the point B is the maximum point.



Find the coordinates of A , B and C .

Working:

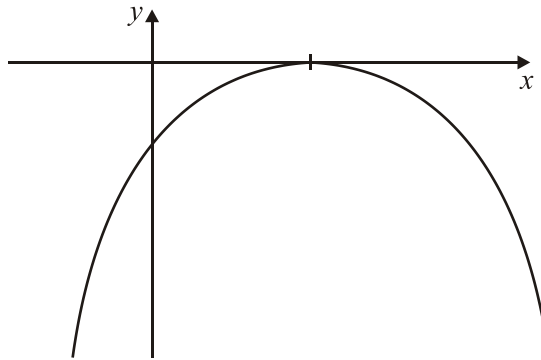
Answer:

.....

(Total 4 marks)

Quadratic Functions Review Paper 1

6. The diagram shows the graph of the function $y = ax^2 + bx + c$.



Complete the table below to show whether each expression is positive, negative or zero.

Expression	positive	negative	zero
a			
c			
$b^2 - 4ac$			
b			

Working:

(Total 4 marks)

Quadratic Functions Review Paper 1

7. (a) Factorize $x^2 - 3x - 10$.
(b) Solve the equation $x^2 - 3x - 10 = 0$.

Working:

Answers:

- (a)
(b)

(Total 4 marks)

8. The quadratic equation $4x^2 + 4kx + 9 = 0$, $k > 0$ has exactly one solution for x .
Find the value of k .

Working:

Answer:

.....

(Total 4 marks)

Quadratic Functions Review Paper 1

9. (a) Express $f(x) = x^2 - 6x + 14$ in the form $f(x) = (x - h)^2 + k$, where h and k are to be determined.
- (b) Hence, or otherwise, write down the coordinates of the vertex of the parabola with equation $y = x^2 - 6x + 14$.

<p><i>Working:</i></p>	<p><i>Answers:</i></p> <p>(a)</p> <p>(b)</p>
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(Total 4 marks)

10. The quadratic function f is defined by $f(x) = 3x^2 - 12x + 11$.

- (a) Write f in the form $f(x) = 3(x - h)^2 - k$.

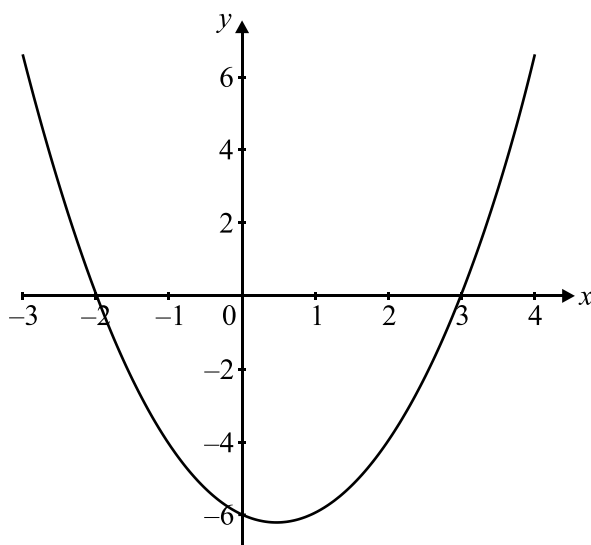
(3)

- (b) The graph of f is translated 3 units in the positive x -direction and 5 units in the positive y -direction. Find the function g for the translated graph, giving your answer in the form $g(x) = 3(x - p)^2 + q$.

(3)
(Total 6 marks)

Quadratic Functions Review Paper 1

11. The diagram shows part of the graph with equation $y = x^2 + px + q$. The graph cuts the x -axis at -2 and 3 .



Find the value of

- (a) p ;
- (b) q .

Working:

Answers:

(a)

(b)

(Total 4 marks)

12. Consider two different quadratic functions of the form $f(x) = 4x^2 - qx + 25$. The graph of each function has its vertex on the x -axis.

- (a) Find both values of q .
- (b) For the greater value of q , solve $f(x) = 0$.
- (c) Find the coordinates of the point of intersection of the two graphs.

(Total 6 marks)

Quadratic Functions Review Paper 1

13. 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 .

(Total 6 marks)

14. (a) Express $y = 2x^2 - 12x + 23$ in the form $y = 2(x - c)^2 + d$.

The graph of $y = x^2$ is transformed into the graph of $y = 2x^2 - 12x + 23$ by the transformations

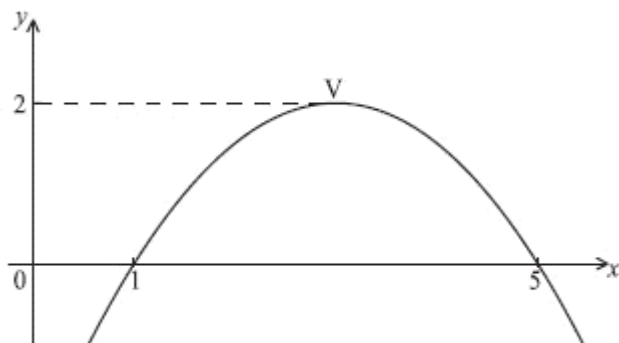
a vertical stretch with scale factor k **followed by**
a horizontal translation of p units **followed by**
a vertical translation of q units.

- (b) Write down the value of

- (i) k ;
- (ii) p ;
- (iii) q .

(Total 6 marks)

15. Part of the graph of the function $y = d(x - m)^2 + p$ is given in the diagram below. The x -intercepts are $(1, 0)$ and $(5, 0)$. The vertex is $V(m, 2)$.



- (a) Write down the value of

- (i) m ;
- (ii) p .

- (b) Find d .

(Total 6 marks)

Quadratic Functions Review Paper 1

16. The function f is given by $f(x) = x^2 - 6x + 13$, for $x \geq 3$.

(a) Write $f(x)$ in the form $(x - a)^2 + b$.

(b) Find the inverse function f^{-1} .

(c) State the domain of f^{-1} .

Working:

Answers:

(a)

(b)

(c)

(Total 6 marks)

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

Working:

Answer:

.....

(Total 6 marks)

Quadratic Functions Review Paper 1

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

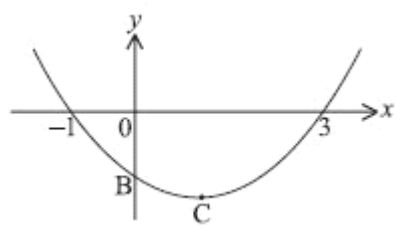
Working:

Answer:

.....

(Total 6 marks)

19. 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.

Working:

Answers:

(a)

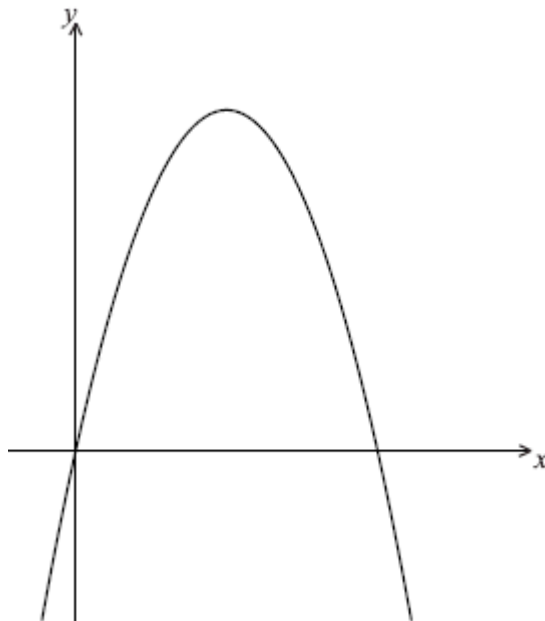
(b)

(c)

(Total 6 marks)

Quadratic Functions Review Paper 1

20. Let $f(x) = 8x - 2x^2$. Part of the graph of f is shown below.



(a) Find the x -intercepts of the graph.

(4)

(b) (i) Write down the equation of the axis of symmetry.

(ii) Find the y -coordinate of the vertex.

(3)

(Total 7 marks)

21. Let $f(x) = 2x^2 - 12x + 5$.

(a) Express $f(x)$ in the form $f(x) = 2(x - h)^2 - k$.

(3)

(b) Write down the vertex of the graph of f .

(2)

(c) Write down the equation of the axis of symmetry of the graph of f .

(1)

(d) Find the y -intercept of the graph of f .

(2)

(e) The x -intercepts of f can be written as $\frac{p \pm \sqrt{q}}{r}$, where $p, q, r \in \mathbb{R}$.
Find the value of p , of q , and of r .

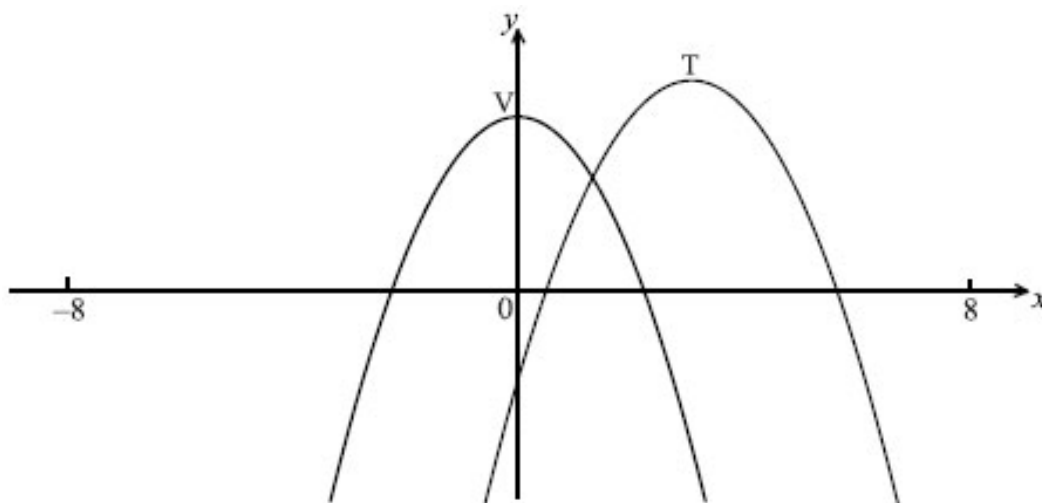
(7)

(Total 15 marks)

Quadratic Functions Review Paper 1

22. The following diagram shows part of the graph of $f(x) = 5 - x^2$ with vertex $V(0, 5)$.

Its image $y = g(x)$ after a translation with vector $\begin{pmatrix} h \\ k \end{pmatrix}$ has vertex $T(3, 6)$.



(a) Write down the value of

(i) h ;

(ii) k .

(2)

(b) Write down an expression for $g(x)$.

(2)

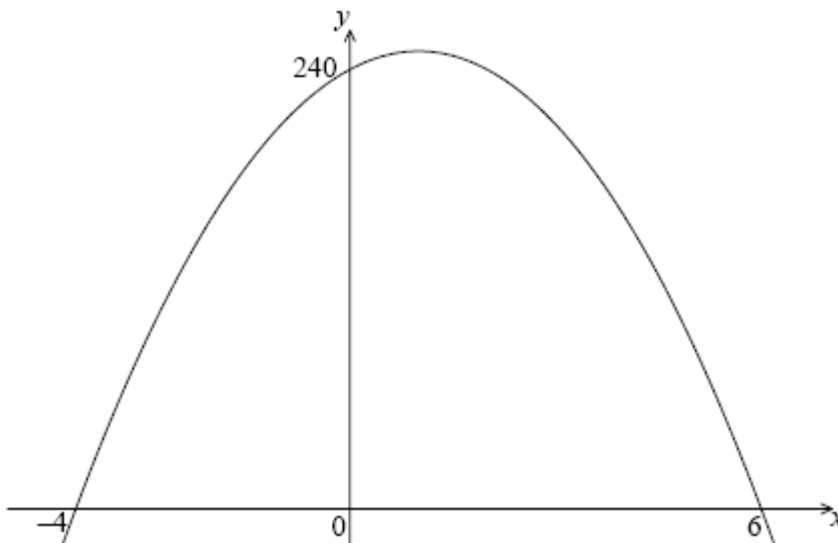
(c) On the same diagram, sketch the graph of $y = g(-x)$.

(2)

(Total 6 marks)

Quadratic Functions Review Paper 1

23. The following diagram shows part of the graph of a quadratic function f .



The x -intercepts are at $(-4, 0)$ and $(6, 0)$ and the y -intercept is at $(0, 240)$.

- (a) Write down $f(x)$ in the form $f(x) = -10(x - p)(x - q)$. (2)
- (b) Find another expression for $f(x)$ in the form $f(x) = -10(x - h)^2 + k$. (4)
- (c) Show that $f(x)$ can also be written in the form $f(x) = 240 + 20x - 10x^2$. (2)

A particle moves along a straight line so that its velocity, v m s⁻¹, at time t seconds is given by $v = 240 + 20t - 10t^2$, for $0 \leq t \leq 6$.

- (d) Find the value of t when the speed of the particle is greatest. (2)

(Total 10 marks)