

Quadratics Review

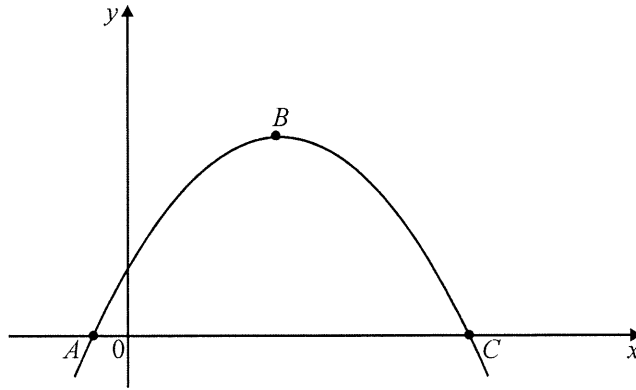
84 min
87 marks

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

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

(Total 4 marks)

2. 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 .

<p><i>Working:</i></p>
<p><i>Answer:</i></p> <p>.....</p>

(Total 4 marks)

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

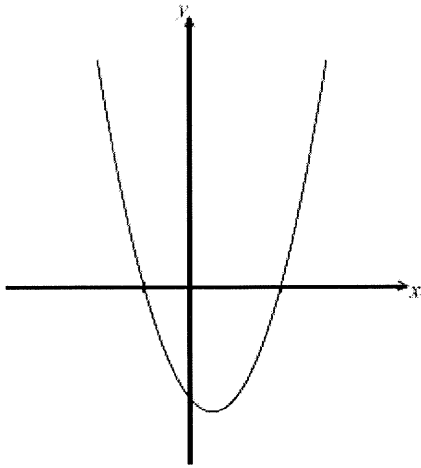
Working:

Answer:

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(Total 6 marks)

4. The following diagram shows part of the graph of f , where $f(x) = x^2 - x - 2$.



- (a) Find both x -intercepts.

(4)

- (b) Find the x -coordinate of the vertex.

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(2)

(Total 6 marks)

5. Let $f(x) = 3(x + 1)^2 - 12$.

(a) Show that $f(x) = 3x^2 + 6x - 9$. (2)

(b) For the graph of f

(i) write down the coordinates of the vertex;

(ii) write down the **equation** of the axis of symmetry;

(iii) write down the y -intercept;

(iv) find both x -intercepts. (8)

(c) **Hence** sketch the graph of f . (2)

(d) Let $g(x) = x^2$. The graph of f may be obtained from the graph of g by the two transformations:

a stretch of scale factor t in the y -direction

followed by

a translation of $\begin{pmatrix} p \\ q \end{pmatrix}$.

Find $\begin{pmatrix} p \\ q \end{pmatrix}$ and the value of t .

(3)
(Total 15 marks)

6. (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 .

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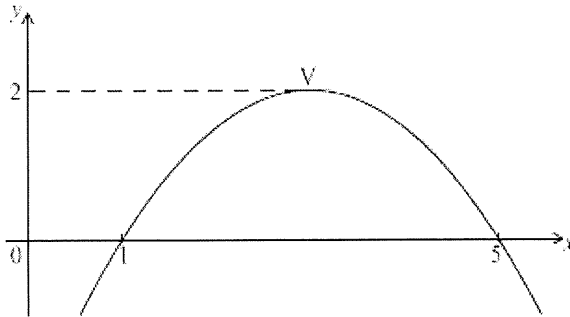
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(Total 6 marks)

7. 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 .

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(Total 6 marks)

8. 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.

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(Total 6 marks)

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 .

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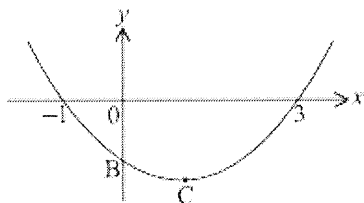
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(Total 6 marks)

10. 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.

<p><i>Working:</i></p>	<p><i>Answers:</i></p> <p>(a)</p> <p>(b)</p> <p>(c)</p>
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(Total 6 marks)

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

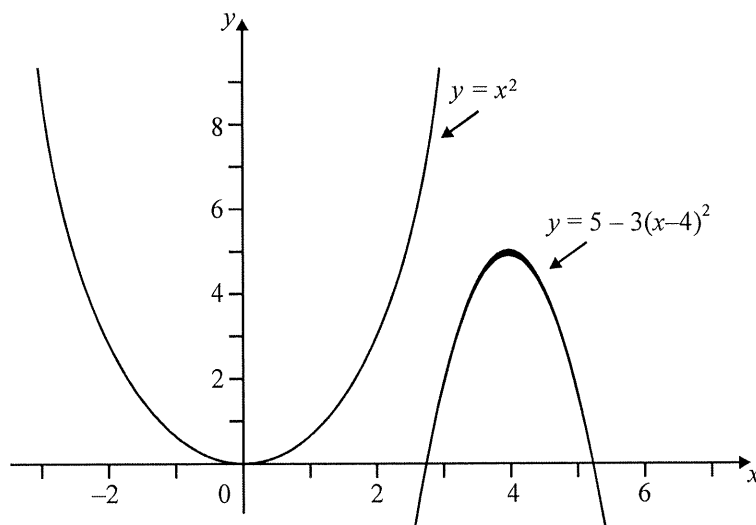
Working:

Answer:

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(Total 6 marks)

12. The diagram shows parts of the graphs of $y = x^2$ and $y = 5 - 3(x - 4)^2$.



The graph of $y = x^2$ may be transformed into the graph of $y = 5 - 3(x - 4)^2$ by these transformations.

A reflection in the line $y = 0$ **followed by**
a vertical stretch with scale factor k **followed by**
a horizontal translation of p units **followed by**
a vertical translation of q units.

Write down the value of

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

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

13. (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 $y = x^2 - 6x + 14$.

Working:

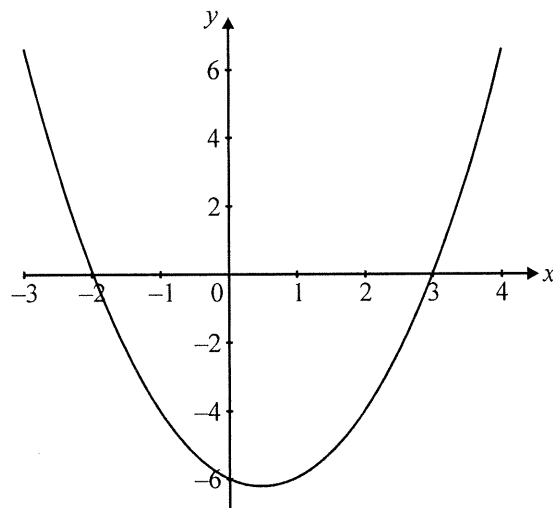
Answers:

(a)

(b)

(Total 4 marks)

14. 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

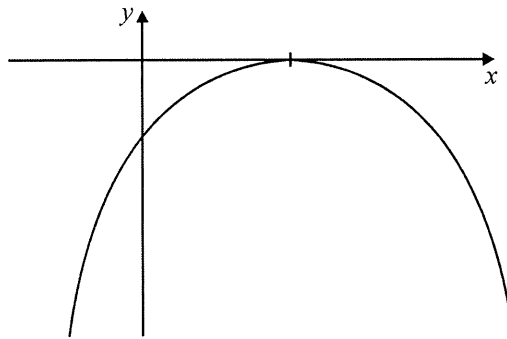
(a) p ;

(b) q .

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

(Total 4 marks)

15. 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)