The form $f(x) = a(x - h)^2 + k$

Student name: _____ Score: _____

1. Let $f(x) = a(x - 3)^2 + 7$

(a) write down the coordinates of the vertex of the curve of f.

(b) Given that $f(8) = -43$, find the value of a.

(c) Hence find the y-intercept of the curve of f.

2. (a) Express $y = 3x^2 - 12x + 19$ in the form $y = 3(x - c)^2 + d$

(b) Write down the coordinates of the vertex

(c) Write down the equation of the axis of symmetry

(d) Write down the y-intercept

3. Let $f(x) = 2(x + 3)^2 - 8$

(a) Show that $f(x) = 2x^2 + 12x + 10$

(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) write down both x-intercepts.

(c) Hence sketch the graph of f.

4. Consider the graph of the function $f(x) = a(x - 10)^2 + 12$, $x \in \mathbb{R}$

(a) Write down the coordinates of the vertex.

(b) The graph of f has a y-intercept at -13. Find a.

(c) Point $(7, b)$ lies on the graph of f. Find b.

(d) Find both x-intercepts.

5. Consider the graph of the function $f(x) = a(x + 9)^2 + 16$, $x \in \mathbb{R}$

(a) Write down the coordinates of the vertex.

(b) The graph of f has a y-intercept at -16.4. Find a.

(c) Point $(3, m)$ lies on the graph of f. Find m.

6. Let $f(x) = 3x^2 - 6x - 7$.

(a) (i) Write down the coordinates of the vertex.

(ii) Hence and otherwise, express the function in the for $f(x) = 2(x - h) + k$

(b) Solve the equation $f(x) = 0$

7. Let $f(x) = 2x^2$. The graph of f is translated 5 unit to the right and 3 units down. The graph of g is the image of the graph of f after this translation.

(a) Write down the coordinates of the vertex of the graph of g.

(b) Express g in the form $g(x) = 2(x - p) + q$.

The graph of h is the reflection of the graph of g in the x-axis.

(c) Write down the coordinates of the vertex of the graph of h.

8. (a) Express $y = 4x^2 - 18x + 8$ in the form $y = 4(x - c)^2 + d$

(a) Write down the coordinates of the vertex

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

(c) Write down the y-intercept

The form $f(x) = a(x - h)^2 + k$

Student name: ANSWERS Score: _____

1. Let $f(x) = a(x - 3)^2 + 7$

(a) write down the coordinates of the vertex of the curve of f. $(3, 7)$

(b) Given that $f(8) = -43$, find the value of a. $a = -2$

(c) Hence find the y-intercept of the curve of f. $(0, -11)$

2. (a) Express $y = 3x^2 - 12x + 19$ in the form $y = 3(x - c)^2 + d$ $y = 3(x - 2)^2 + 7$

(a) Write down the coordinates of the vertex $(2, 7)$

(b) Write down the equation of the axis of symmetry $x = 2$

(c) Write down the y-intercept $(0, 19)$

3. Let $f(x) = 2(x + 3)^2 - 8$

(a) Show that $f(x) = 2x^2 + 12x + 10$

$f(x) = 2(x + 3)^2 - 8 = 2(x^2 + 6x + 9) - 8$

$= 2x^2 + 12x + 18 - 8$

(b) For the graph of f

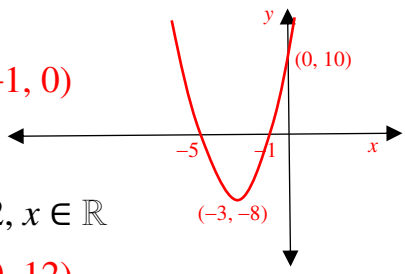
(i) write down the coordinates of the vertex; $(-3, -8)$

(ii) write down the equation of the axis of symmetry; $x = -3$

(iii) write down the y-intercept; $(0, 10)$

(iv) write down both x-intercepts. $(-5, 0)$, $(-1, 0)$

(c) Hence sketch the graph of f.



4. Consider the graph of the function $f(x) = a(x - 10)^2 + 12$, $x \in \mathbb{R}$

(a) Write down the coordinates of the vertex. $(10, 12)$

(b) The graph of f has a y-intercept at -13. Find a. -0.25

(c) Point $(7, b)$ lies on the graph of f. Find b. 9.75

(d) Find both x-intercepts. $(-5, 0)$, $(-1, 0)$

5. Consider the graph of the function $f(x) = a(x + 9)^2 + 16$, $x \in \mathbb{R}$

(a) Write down the coordinates of the vertex. $(-9, 16)$

(b) The graph of f has a y-intercept at -16.4. Find a. -0.4

(c) Point $(3, m)$ lies on the graph of f. Find m. -41.6

6. Let $f(x) = 3x^2 - 6x - 7$.

(a) (i) Write down the coordinates of the vertex. $(1, -10)$

(ii) Hence and otherwise, express the function in the for $f(x) = 2(x - h) + k$

$y = 3(x - 1)^2 - 10$

(b) Solve the equation $f(x) = 0$ $x = -0.826, 2.83$

7. Let $f(x) = 2x^2$. The graph of f is translated 5 unit to the right and 3 units down. The graph of g is the image of the graph of f after this translation.

(a) Write down the coordinates of the vertex of the graph of g. $(5, -3)$

(b) Express g in the form $g(x) = 2(x - p) + q$. $y = 2(x - 5)^2 - 3$

The graph of h is the reflection of the graph of g in the x-axis.

(c) Write down the coordinates of the vertex of the graph of h. $(5, 3)$

8. (a) Express $y = 4x^2 - 18x + 8$ in the form $y = 4(x - c)^2 + d$ $y = 4(x - 2.25)^2 + 12.25$

(b) Write down the coordinates of the vertex $(2.25, -12.25)$

(c) Write down the equation of the axis of symmetry $x = 2.25$

(d) Write down the y-intercept $(0, 8)$