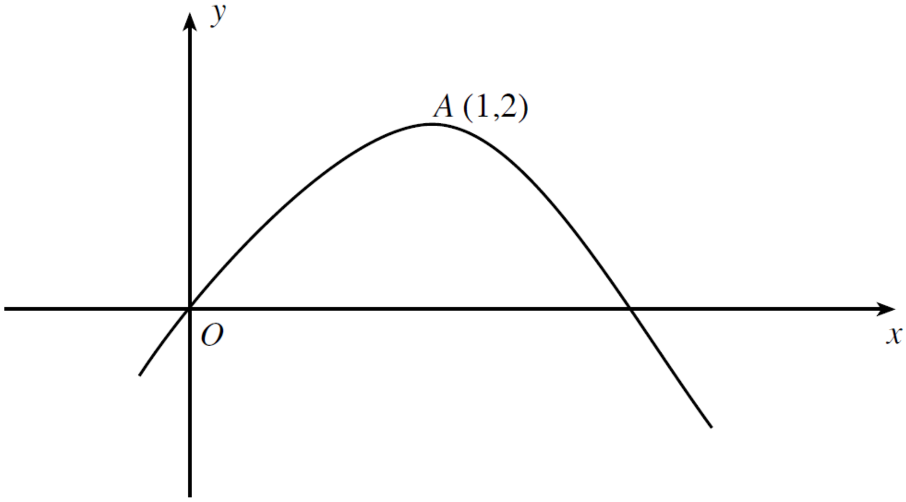
Hen Gwestiynau Arholiad

Graphs

(Gaeaf 2005)

9.



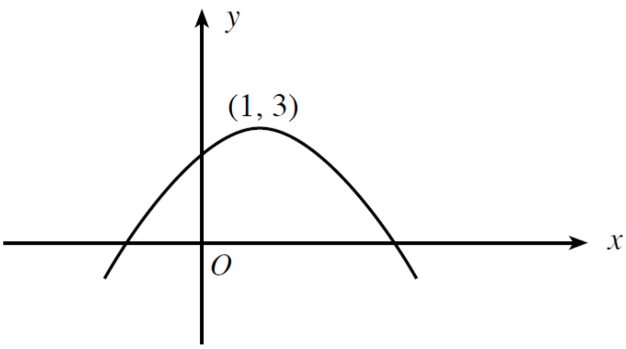
The diagram shows the graph of $y = f(x)$. The curve passes through the origin, and has a maximum point at (1, 2).
Sketch on separate diagrams the graphs of

(a) $y = f(x) + 4$, *(b)* $y = f(x + 3)$, *(c)* $y = f(2x)$,

giving the coordinates of the maximum point in each case. [2], [2], [2]

(Haf 2005)

10. The diagram shows the graph of $y = f(x)$. The graph has a maximum point at (1, 3).

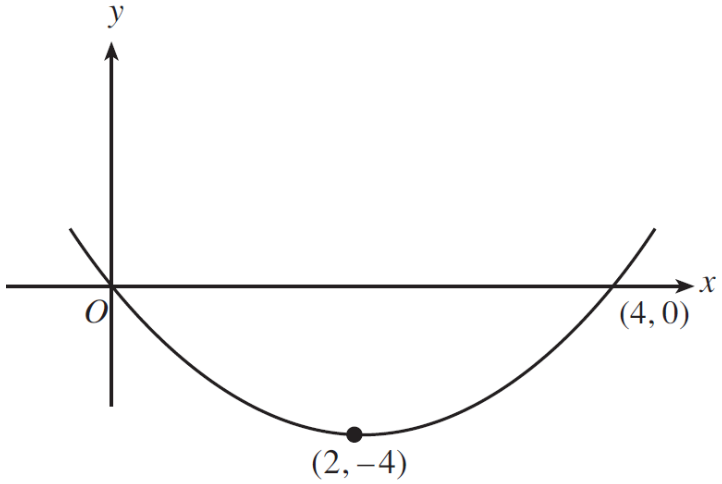


Sketch the following graphs, using a separate set of axes for each graph and indicating the coordinates of the stationary point in each case.

(a) $y = 4f(x)$ *(b)* $y = f(x - 2)$ *(c)* $y = f\left(\frac{x}{2}\right)$ [2], [2], [2]

(Gaeaf 2006)

4.



The diagram shows the graph of $y = f(x)$. The curve passes through the origin, the point (4, 0) and has a mimimum point at (2, –4). Sketch on separate diagrams the graphs of

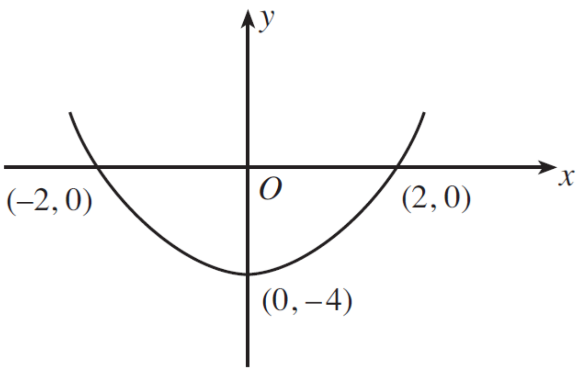
(a) $y = -f(x)$, [2]

(b) $y = f(x-2)$, [3]

in each case giving the coordinates of the points of intersection of the graph with the x-axis and the coordinates of the stationary point.

(Haf 2006)

9.



The diagram shows the graph of $y = f(x)$. The curve passes through the points (2, 0) and (–2, 0), and has a minimum point at (0, –4).

Sketch on separate diagrams the graphs of

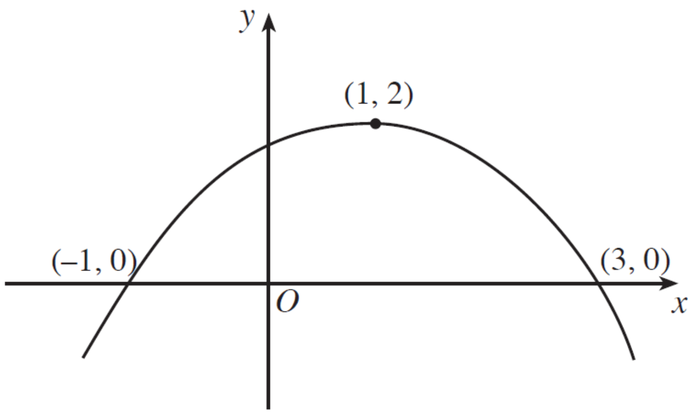
(a) $y = f(x) + 4$, [2]

(b) $y = f(x + 2)$, [3]

indicating the coordinates of the points of intersection with the x-axis and the coordinates of the stationary points.

(Haf 2007)

9.



The diagram shows the graph of $y = f(x)$. The graph passes through the points (–1, 0) and (3, 0) and has a maximum point at (1, 2).

Sketch, on separate diagrams, the graphs of

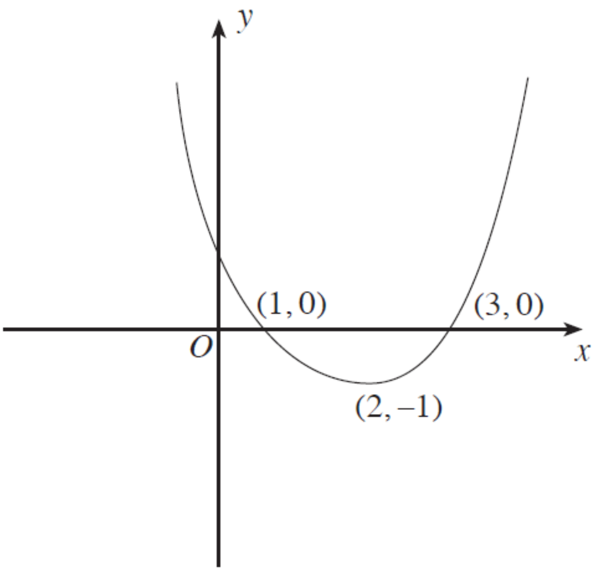
(a) $y = f(x - 3)$, [3]

(b) $y = f\left(\frac{x}{2}\right)$, [3]

showing the stationary points and the points of intersection of the graphs with the x-axis.

(Gaeaf 2008)

9. The diagram shows the graph of $y = f(x)$. The graph has a minimum point at (2, –1) and intersects the x-axis at the points (1, 0) and (3, 0).

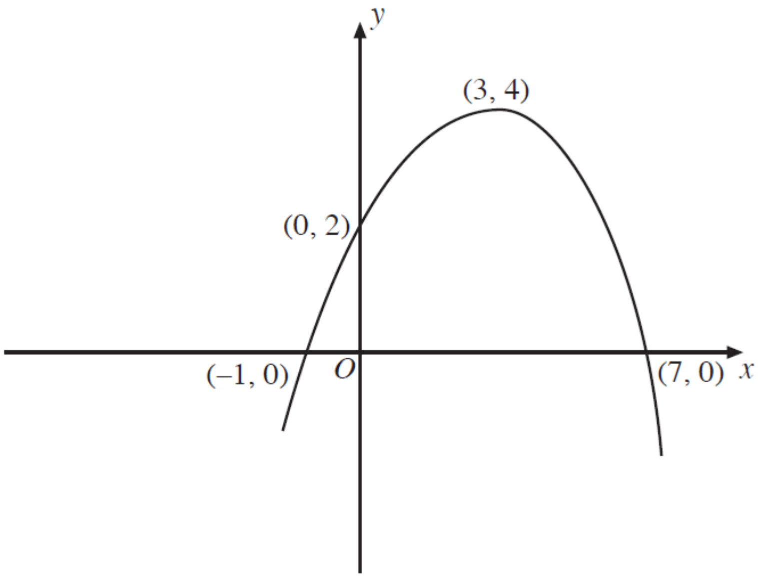


Sketch the following graphs, using a separate set of axes for each graph. In each case you should indicate the coordinates of the stationary point and the coordinates of the points of intersection of the graph with the x-axis.

(a) $y = 3f(x)$ *(b)* $y = f(x + 5)$ [3], [3]

(Haf 2008)

8. The diagram shows a sketch of the graph of $y = f(x)$. The graph has a maximum point at (3, 4) and intersects the x-axis at the points (–1, 0) and (7, 0) and the y-axis at the point (0, 2).

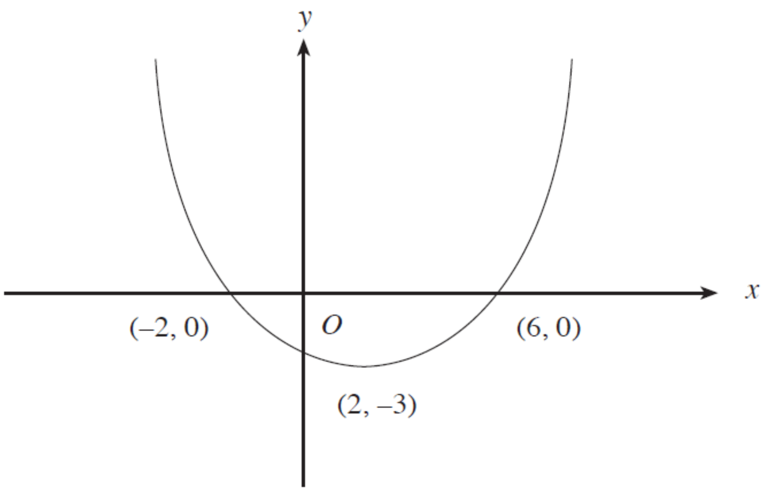


(a) Sketch the graph of $y = f(x + 2)$, indicating the coordinates of the stationary point and the coordinates of the points of intersection of the graph with the x-axis. [3]

(b) Sketch the graph of $y = f(x) + 3$, indicating the coordinates of the stationary point and the coordinates of the point of intersection of the graph with the y-axis. [3]

(Gaeaf 2009)

9. The diagram shows a sketch of the graph of $y = f(x)$. The graph passes through the points (–2, 0) and (6, 0) and has a minimum point at (2, –3).



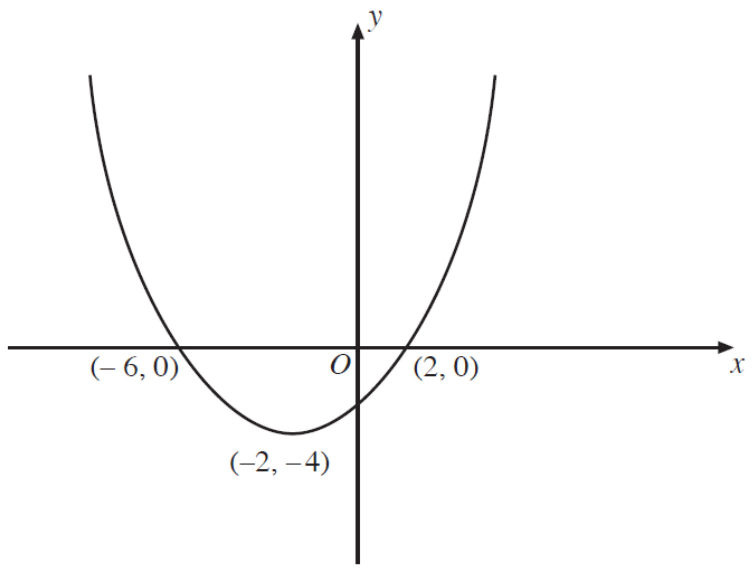
Sketch the following graphs, using a separate set of axes for each graph. In each case, you should indicate the coordinates of the stationary point and the coordinates of the points of intersection of the graph with the x-axis.

(a) $y = f(x - 3)$, [3]

(b) $y = -2f(x)$. [3]

(Haf 2009)

9. The diagram shows a sketch of the graph of $y = f(x)$. The graph passes through the points $(-6, 0)$ and $(2, 0)$, and has a minimum point at $(-2, -4)$.



Sketch the following graphs, using a separate set of axes for each graph. In each case, you should indicate the coordinates of the stationary point and the coordinates of the points of intersection of the graph with the x-axis.

(a) $y = f(x + 1)$ [3]

(b) $y = f(2x)$ [3]

(Gaeaf 2010)

9. Figure 1 shows a sketch of the graph of $y = f(x)$. The graph has a maximum point at $(2, 5)$ and intersects the x-axis at the points $(-2, 0)$ and $(6, 0)$.

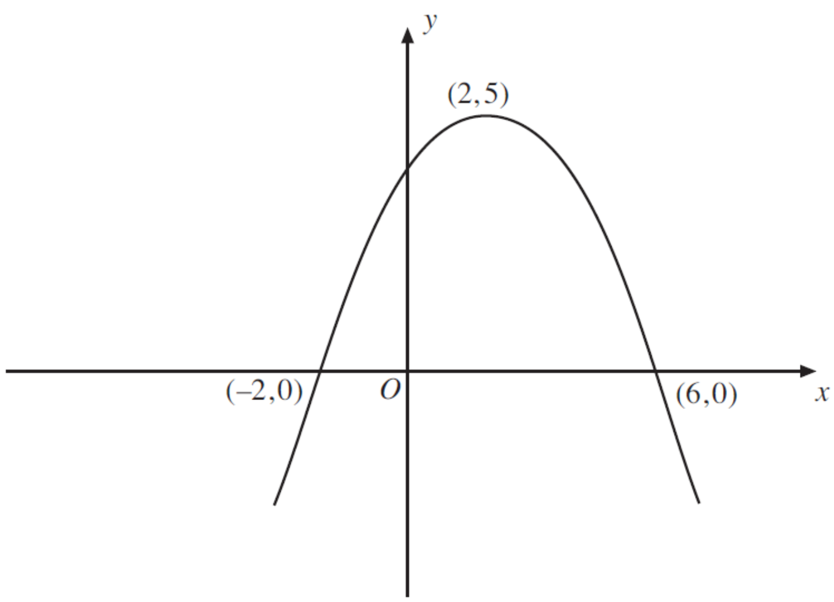


Figure 1

(a) Sketch the graph of $y = f\left(\frac{x}{2}\right)$, indicating the coordinates of the stationary point and the coordinates of the points of intersection of the graph with the x-axis. [3]

(*b*) Figure 2 shows a sketch of the graph having **one** of the following equations with an appropriate value of either p, q or r.

$y = f(x + p)$, where p is a constant
$y = f(x) + q$, where q is a constant
$y = rf(x)$, where r is a constant

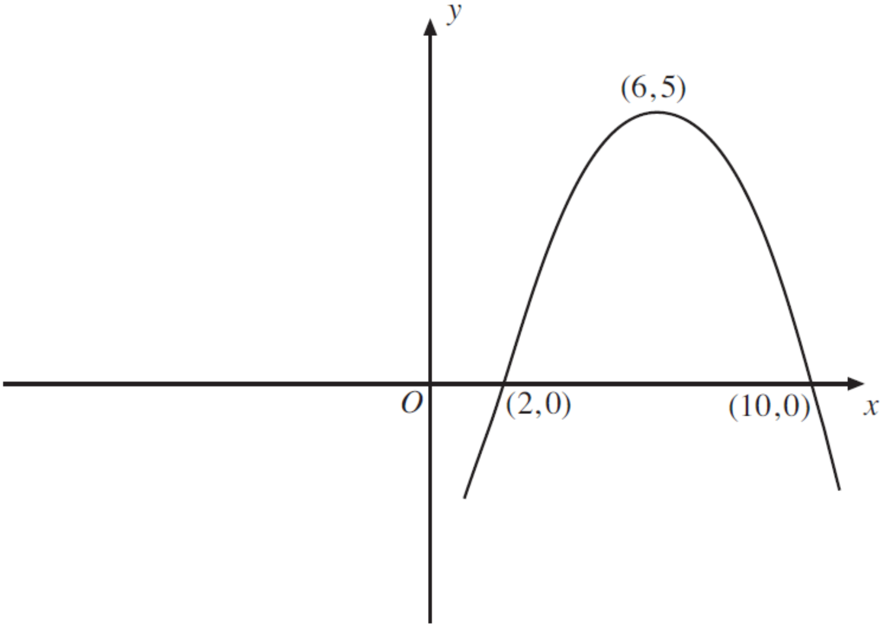
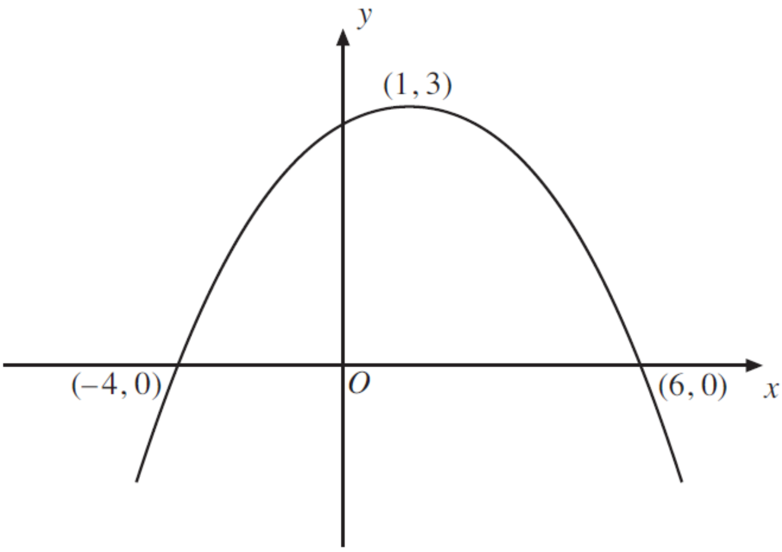


Figure 2

Write down the equation of the graph sketched in Figure 2, together with the value of the corresponding constant. [2]

(Haf 2010)

9. The diagram shows a sketch of the graph of $y = f(x)$. The graph passes through the points $(-4, 0)$ and $(6, 0)$ and has a maximum point at $(1, 3)$.



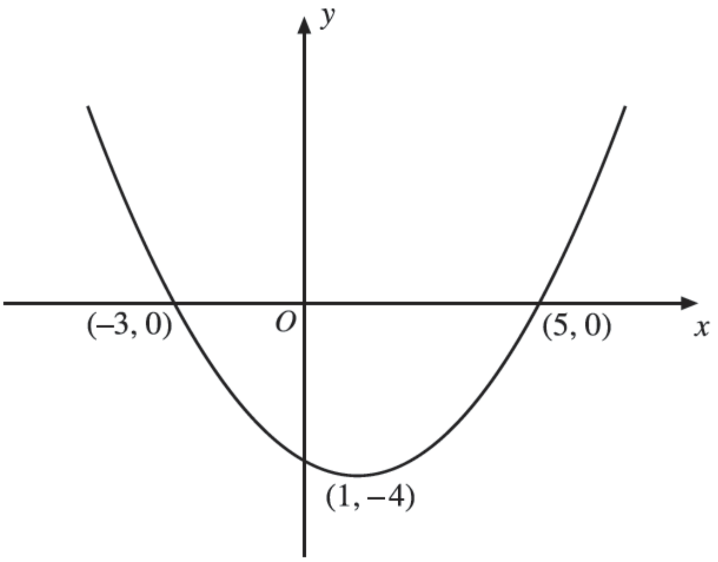
Sketch the following graphs, using a separate set of axes for each graph. In each case, you should indicate the coordinates of the stationary point and the coordinates of the points of intersection of the graph with the x-axis.

(*a*) $y = 2f(x)$ [3]

(*b*) $y = f(-x)$ [3]

(Gaeaf 2011)

9. The diagram shows a sketch of the graph of $y = f(x)$. The graph passes through the points $(-3, 0)$ and $(5, 0)$ and has a minimum point at $(1, -4)$.



Sketch the following graphs, using a separate set of axes for each graph. In each case, you should indicate the coordinates of the stationary point and the coordinates of the points of intersection of the graph with the x-axis.

(a) $y = f(x + 3)$, [3]

(b) $y = -f(x)$. [3]

(Haf 2011)

9. Figure 1 shows a sketch of the graph of $y = f(x)$. The graph has a minimum point at $(-3, -4)$ and intersects the x-axis at the points $(-8, 0)$ and $(2, 0)$.

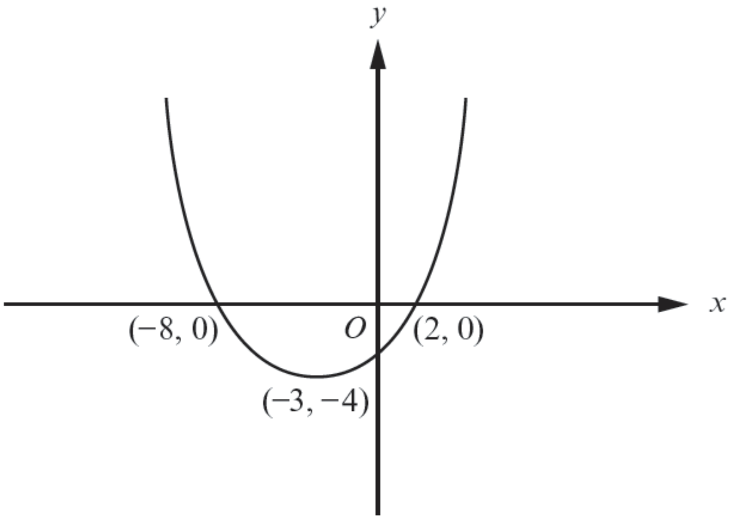


Figure 1

(a) Sketch the graph of $y = f(x + 3)$, indicating the coordinates of the stationary point and the coordinates of the points of intersection of the graph with the x-axis. [3]

(b) Figure 2 shows a sketch of the graph having **one** of the following equations with an appropriate value of either p, q or r.

$y = f(px)$, where p is a constant
$y = f(x) + q$, where q is a constant
$y = rf(x)$, where r is a constant.

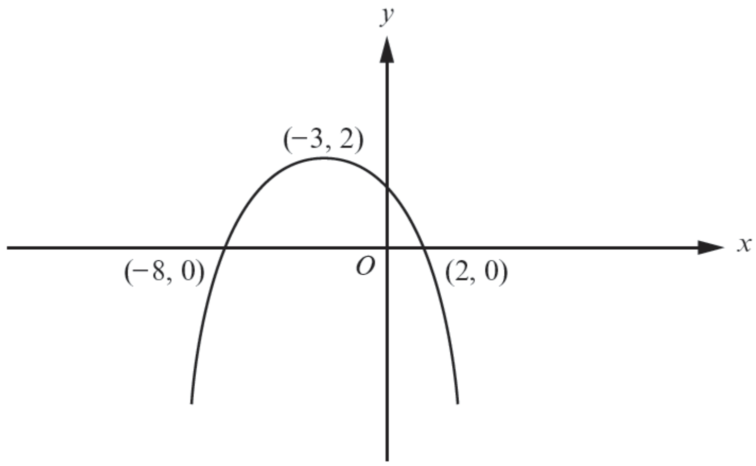
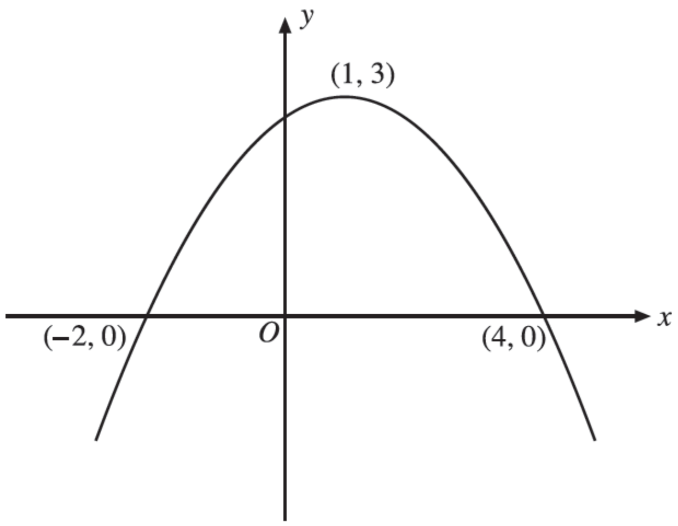


Figure 2

Write down the equation of the graph sketched in Figure 2, together with the value of the corresponding constant. [2]

(Gaeaf 2012)

9. The diagram shows a sketch of the graph of $y = f(x)$. The graph has a maximum point at (1, 3) and intersects the x-axis at the points (–2, 0) and (4, 0).



(a) Sketch the graph of $y = f(2x)$, indicating the coordinates of the stationary point and the coordinates of the points of intersection of the graph with the x-axis. [3]

(b) (i) Sketch the graph of $y = f(x) – 5$, indicating the coordinates of the stationary point.

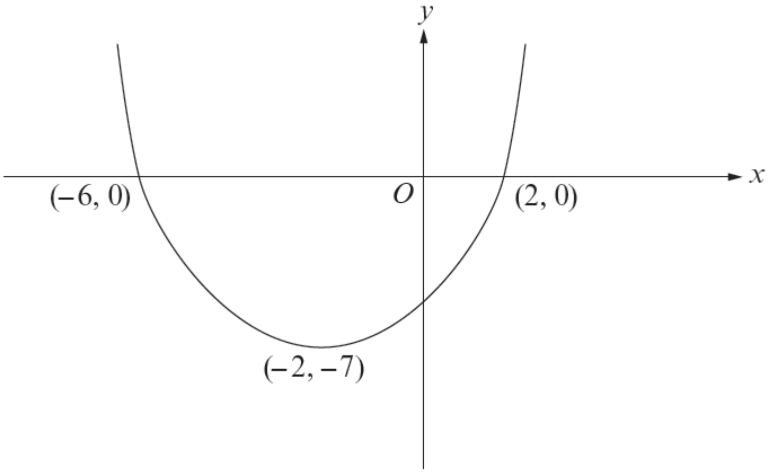
(ii) Given that f is a quadratic function, use the graph you have drawn in part (i) to write down the number of real roots of the equation

$$f(x) – 5 = 0.$$

[3]

(Haf 2012)

9. The diagram shows a sketch of the graph of $y = f(x)$. The graph passes through the points $(-6, 0)$ and $(2, 0)$ and has a minimum point at $(-2, -7)$.



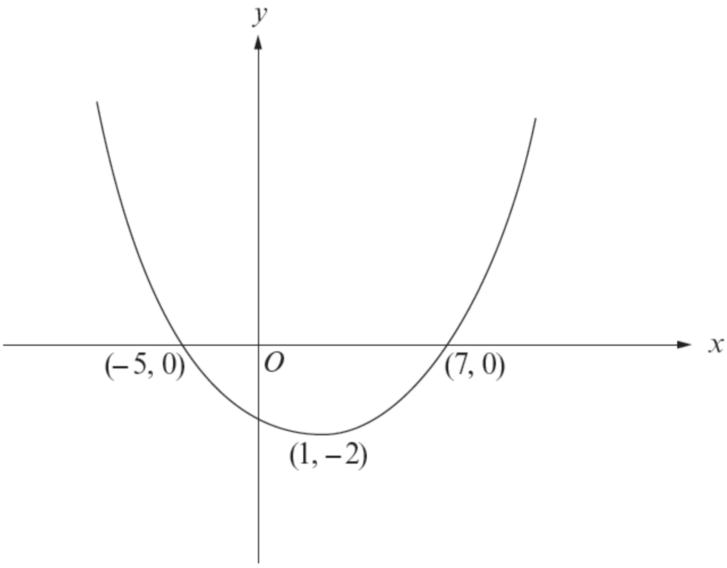
Sketch the following graphs, using a separate set of axes for each graph. In each case, you should indicate the coordinates of the stationary point and the coordinates of the points of intersection of the graph with the x-axis.

(a) $y = f(x - 5)$ [3]

(b) $y = f\left(\frac{x}{2}\right)$ [3]

(Gaeaf 2013)

9. The diagram shows a sketch of the graph of $y = f(x)$. The graph passes through the points $(-5, 0)$ and $(7, 0)$ and has a minimum point at $(1, -2)$.



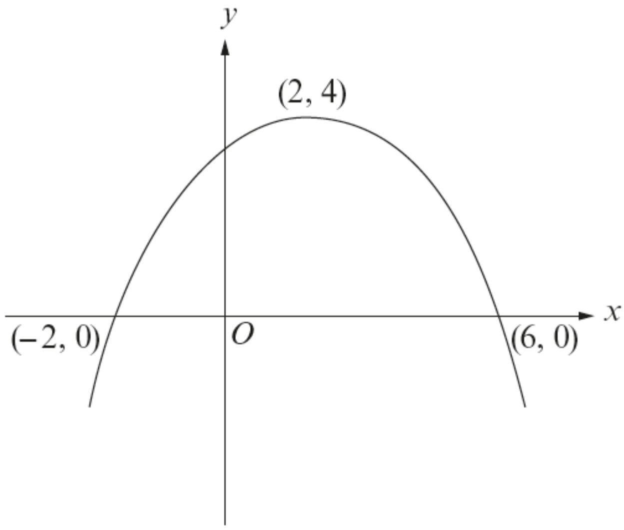
Sketch the following graphs, using a separate set of axes for each graph. In each case, you should indicate the coordinates of the stationary point and the coordinates of the points of intersection of the graph with the x-axis.

(a) $y = 3f(x)$ [3]

(b) $y = f(-x)$ [3]

(Haf 2013)

9. The diagram shows a sketch of the graph of $y = f(x)$. The graph passes through the points $(-2, 0)$ and $(6, 0)$ and has a maximum point at $(2, 4)$.



Sketch the following graphs, using a separate set of axes for each graph. In each case, you should indicate the coordinates of the stationary point and the coordinates of the points of intersection of the graph with the x-axis.

(a) $y = f(x + 5)$ [3]

(b) $y = f(-2x)$ [3]

(Gaeaf 2014)

7. **Figure 1** shows a sketch of the graph of $y = f(x)$. The graph has a maximum point at $(2, 6)$ and intersects the x-axis at the points $(-4, 0)$ and $(8, 0)$.

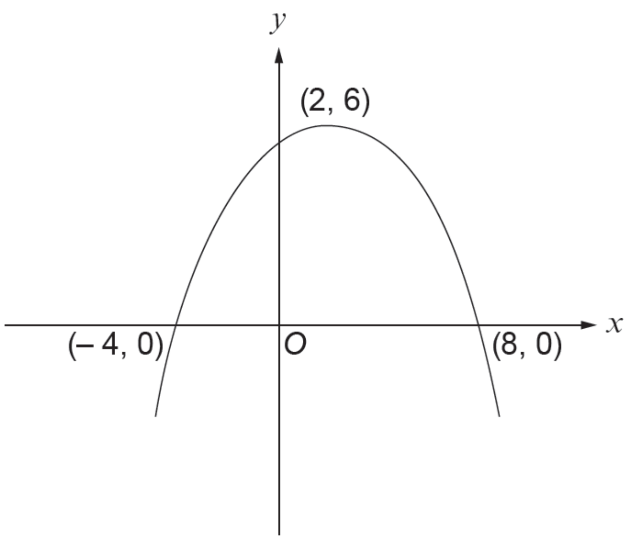


Figure 1

(a) Sketch the graph of $y = f(x - 3)$, indicating the coordinates of the stationary point and the coordinates of the points of intersection of the graph with the x-axis. [3]

(b) **Figure 2** shows a sketch of the graph having **one** of the following equations with an appropriate value of p, q or r.

$y = f(x) + p$, where p is a constant
$y = f(qx)$, where q is a constant
$y = rf(x)$, where r is a constant

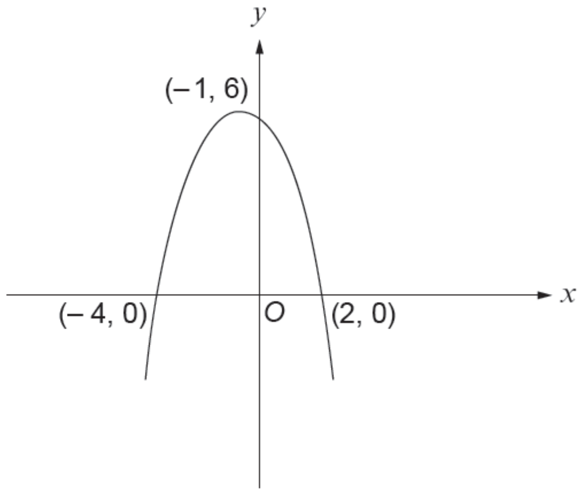
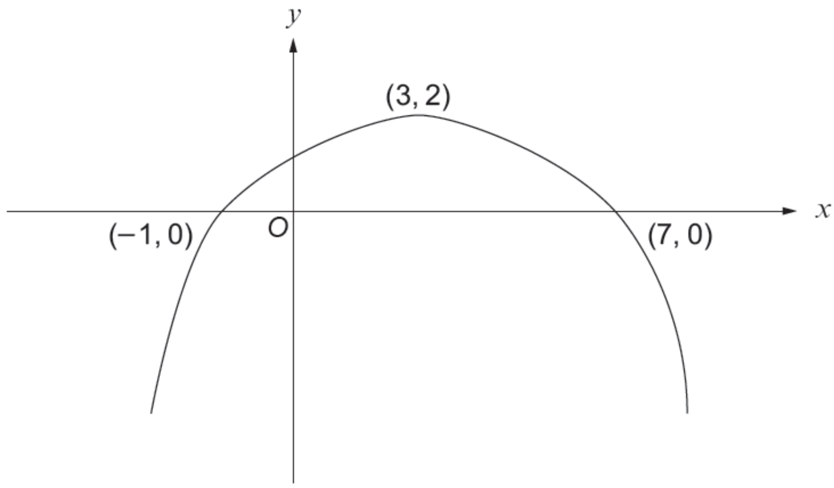


Figure 2

Write down the equation of the graph sketched in **Figure 2**, together with the value of the corresponding constant. [2]

(Haf 2014)

9. The diagram shows a sketch of the graph of $y = f(x)$. The graph passes through the points $(-1, 0)$ and $(7, 0)$ and has a maximum point at $(3, 2)$.



(a) Sketch the following graphs, using a separate set of axes for each graph. In each case, you should indicate the coordinates of the stationary point and the coordinates of the points of intersection of the graph with the x-axis.

(i) $y = f(x + 4)$

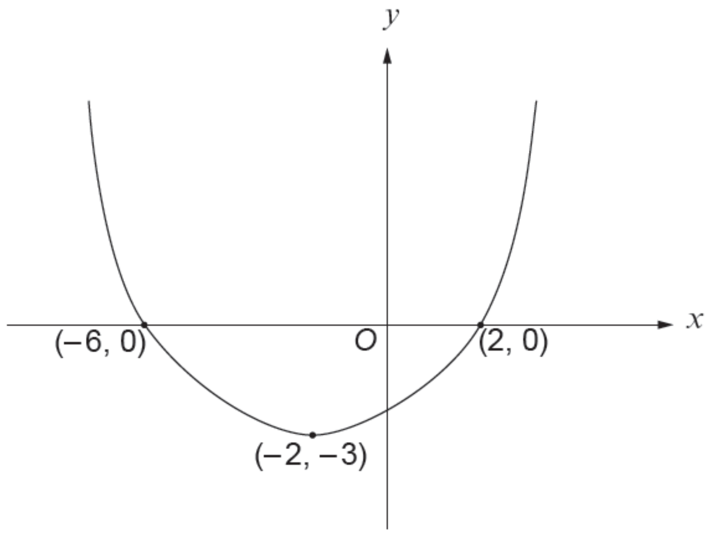
(ii) $y = -2f(x)$ [6]

(b) Hence write down one root of the equation

$$f(x + 4) = -2f(x) + 4.$$ [1]

(Haf 2015)

9. The diagram shows a sketch of the graph of $y = f(x)$. The graph passes through the points $(-6, 0)$ and $(2, 0)$ and has a minimum point at $(-2, -3)$.



(a) Sketch the graph of $y = f(\frac{1}{2}x)$, indicating the coordinates of the stationary point and the coordinates of the points of intersection of the graph with the x-axis. [3]

(b) Angharad is asked by her teacher to draw the graph of $y = af(x)$ for various non-zero values of the constant a. One of Angharad's graphs passes through the origin *O*. Explain why this cannot possibly be correct. [1]

(Haf 2016)

7. Figure 1 shows a sketch of the graph of $y = f(x)$. The graph has a minimum point at $(1, -3)$ and intersects the x-axis at the points $(-4, 0)$ and $(6, 0)$.

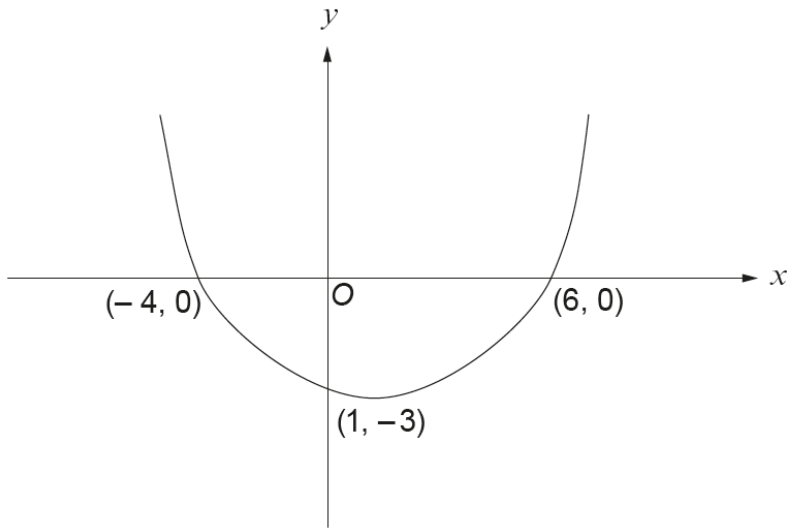


Figure 1

(a) Sketch the graph of $y = -3f(x)$, indicating the coordinates of the stationary point and the coordinates of the points of intersection of the graph with the x-axis. [3]

(b) Figure 2 shows a sketch of the graph of $y = g(x)$, where

$g(x) = f(x) + p$, where p is a constant,
or $g(x) = f(qx)$, where q is a constant,
or $g(x) = rf(x)$, where r is a constant,
or $g(x) = f(x + s)$, where s is a constant.

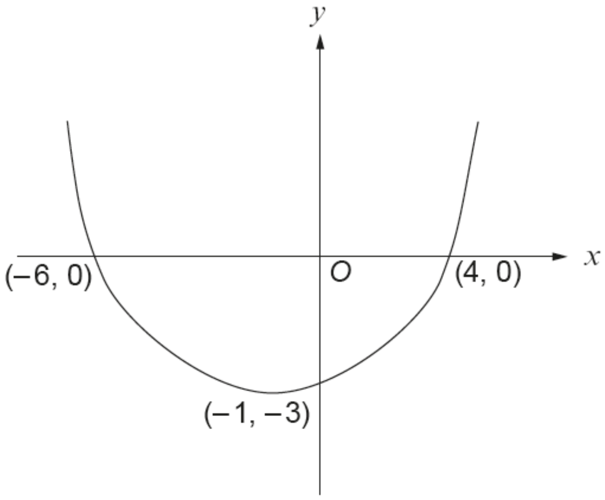
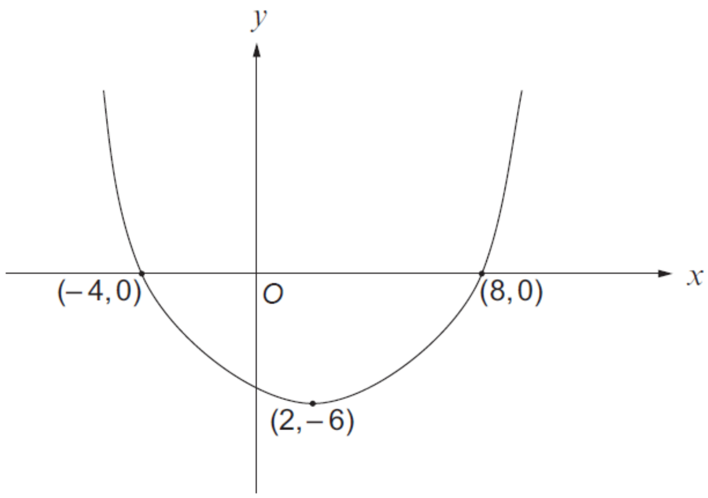


Figure 2

The function g can in fact be any one of **two** of the above functions. In each of these two cases, write down the expression for $g(x)$, including the value of the corresponding constant. [2]

(Haf 2017)

8. The diagram shows a sketch of the graph of $y = f(x)$. The graph passes through the points $(-4, 0)$ and $(8, 0)$ and has a minimum point at $(2, -6)$.

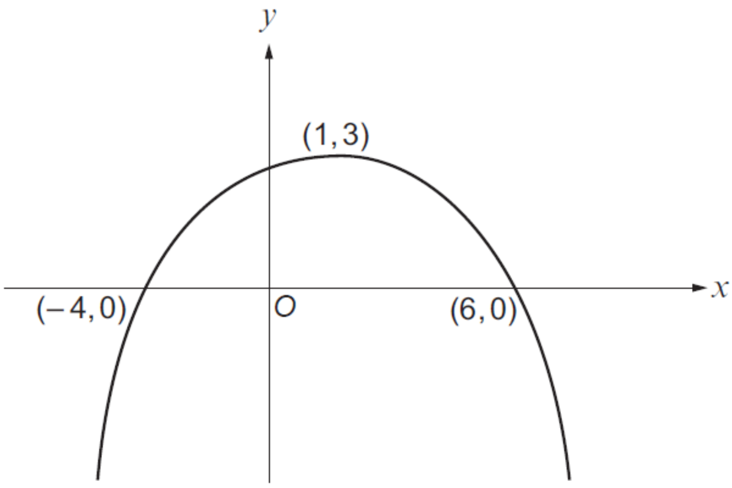


(a) Sketch the graph of $y = -\frac{1}{2}f(x)$, indicating the coordinates of the stationary point and the coordinates of the points of intersection of the graph with the x-axis. [3]

(b) Siân is asked by her teacher to draw the graph of $y = f(ax)$ for various non-zero values of the constant a. Write down two facts about the stationary point on Siân's graph which will always be true whatever her choice of a. [2]

(Haf 2018)

9. The diagram shows a sketch of the graph of $y = f(x)$. The graph passes through the points $(-4, 0)$ and $(6, 0)$ and has a maximum point at $(1, 3)$.



(a) Sketch the graph of $y = f(x + 3)$, indicating the coordinates of the stationary point and the coordinates of the points of intersection of the graph with the x-axis. [3]

(b) Gwen is asked by her teacher to draw the graph of $y = f(ax)$ for various values of the constant a. Two of Gwen's graphs pass through the point $(2, 0)$.
Find the value of a corresponding to each of these two graphs. [2]

(Haf 2019)

9. Figure 1 shows a sketch of the graph of $y = f(x)$. The graph has a minimum point at $(-1, -4)$ and intersects the x-axis at the points $(-3, 0)$ and $(1, 0)$.

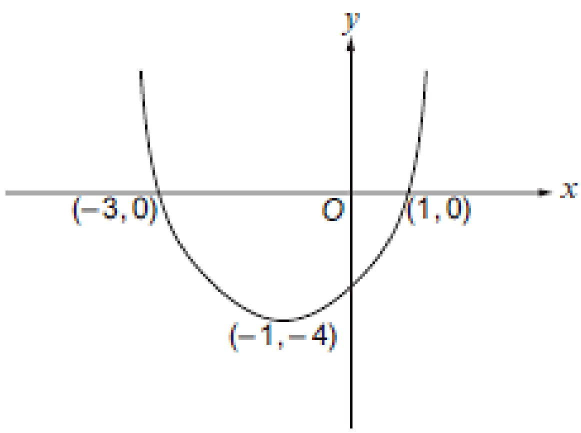


Figure 1

(a) Sketch the graph of $y = -\frac{3}{2}f(x)$, indicating the coordinates of the stationary point and the coordinates of the points of intersection of the graph with the x-axis. [3]

(b) Figure 2 shows a sketch of the graph having **one** of the following equations with an appropriate value of p, q, r or s.

$y = f(x) + p$, where p is a constant

$y = f(qx)$, where q is a constant

$y = rf(x)$, where r is a constant

$y = f(x + s)$, where s is a constant

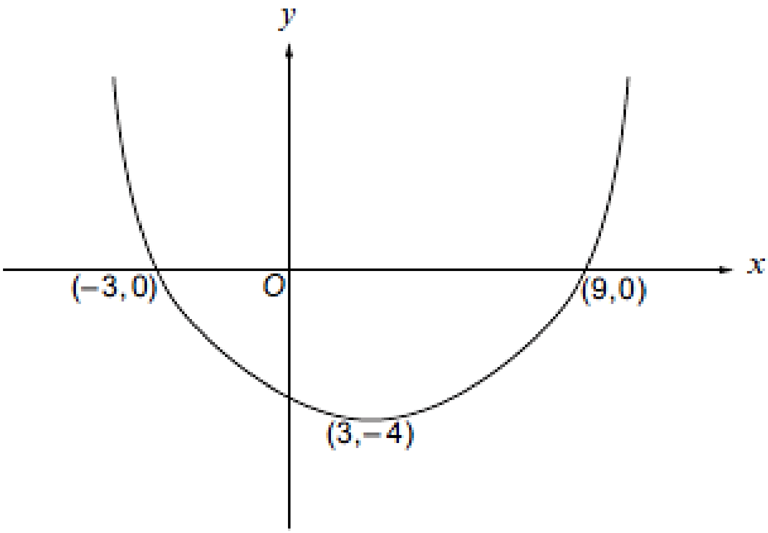


Figure 2

Write down the equation of the graph sketched in Figure 2, together with the value of the corresponding constant. [2]