

More revision on Quadratic functions

Example 12



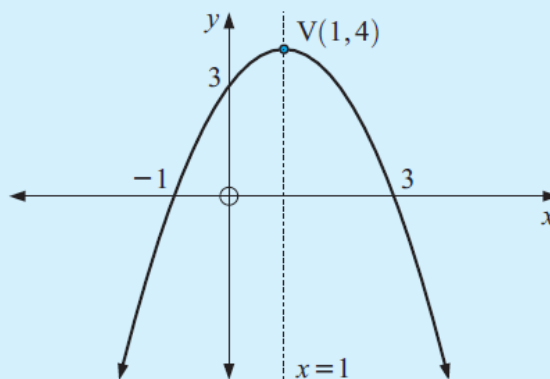
For $y = -(x + 1)(x - 3)$ find:

- a the x -intercepts
- b the equation of the axis of symmetry
- c the coordinates of the vertex
- d the y -intercept.

Hence, sketch the function.

$$y = -(x + 1)(x - 3)$$

- a The x -intercepts are -1 and 3 .
- b The axis of symmetry is $x = \frac{-1 + 3}{2}$
i.e., $x = 1$
- c When $x = 1$, $y = -(2)(-2) = 4$
 \therefore the vertex is at $(1, 4)$.
- d When $x = 0$, $y = -(1)(-3) = 3$
 \therefore the y -intercept is 3 .



Example 13



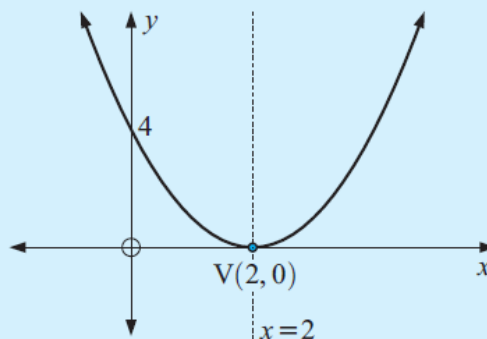
For $y = (x - 2)^2$ find:

- a the x -intercepts
- b the equation of the axis of symmetry
- c the coordinates of the vertex
- d the y -intercept.

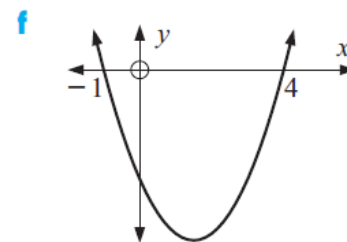
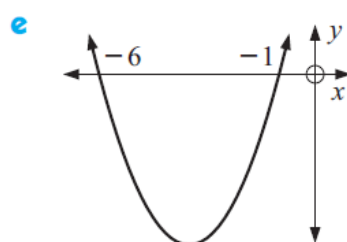
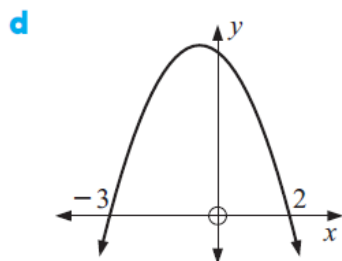
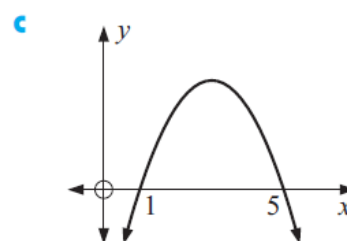
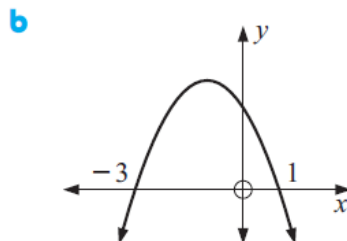
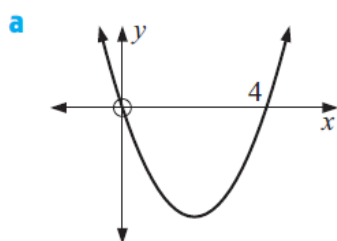
Hence, sketch the function.

$$y = (x - 2)^2$$

- a The x -intercept is 2 .
- b The axis of symmetry is $x = 2$.
- c When $x = 2$, $y = 0^2 = 0$
 \therefore the vertex is at $(2, 0)$.
- d When $x = 0$, $y = (-2)^2 = 4$
 \therefore the y -intercept is 4 .



1 Find the equation of the axis of symmetry of:



2 From the following quadratics, find:

- | | |
|--|--|
| i the x -intercepts | ii the equation of the axis of symmetry |
| iii the coordinates of the vertex | iv the y -intercept. |

Hence sketch graphs of the functions.

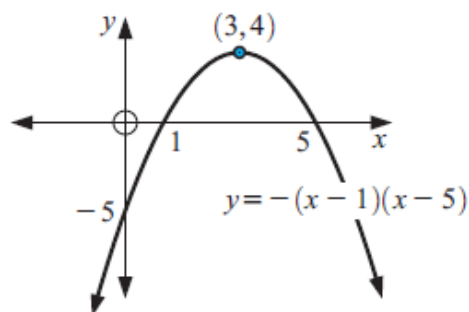
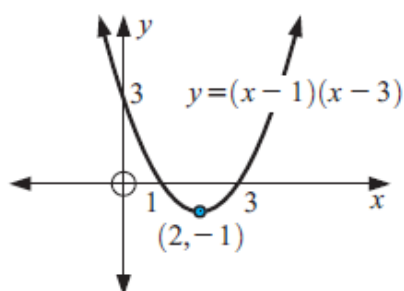
- | | | |
|--------------------------------|--------------------------------|------------------------------|
| a $y = (x - 1)(x - 3)$ | b $y = -(x - 1)(x - 5)$ | c $y = x(x - 4)$ |
| d $y = -x(x + 2)$ | e $y = (x + 2)(x - 4)$ | f $y = -(x - 1)^2$ |
| g $y = (x + 4)(x - 2)$ | h $y = -(x + 4)(x - 2)$ | i $y = (x + 3)^2$ |
| j $y = -(x + 1)(x - 2)$ | k $y = x^2 + 2x$ | l $y = -x^2 - 4x - 4$ |
| m $y = x^2 + 3x$ | n $y = x^2 - 3x - 10$ | o $y = -x^2 - 7x - 6$ |

Hint: In **k** to **o** you should start by factorising the quadratic.

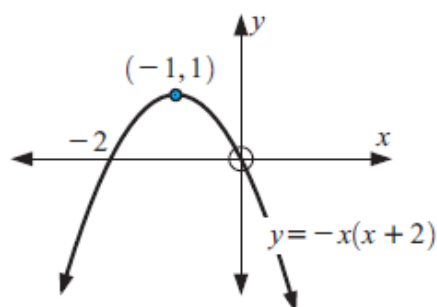
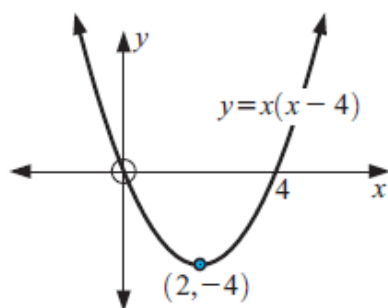
Answers

- 1** **a** $x = 2$ **b** $x = -1$ **c** $x = 3$ **d** $x = -\frac{1}{2}$
e $x = -\frac{7}{2}$ **f** $x = \frac{3}{2}$

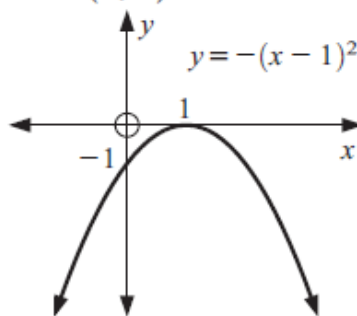
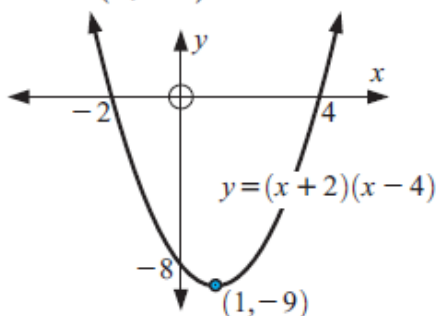
- 2** **a** **i** 1 and 3 **ii** $x = 2$ **b** **i** 1 and 5 **ii** $x = 3$
iii (2, -1) **iv** 3 **iii** (3, 4) **iv** -5



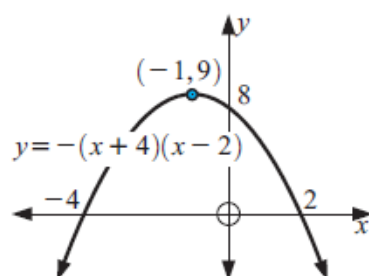
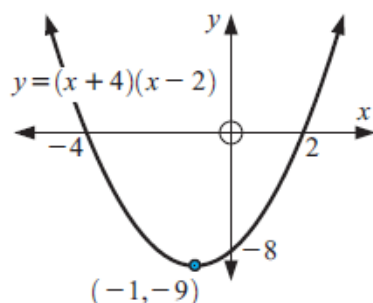
- c** **i** 0 and 4 **ii** $x = 2$ **d** **i** 0 and -2 **ii** $x = -1$
iii (2, -4) **iv** 0 **iii** (-1, 1) **iv** 0



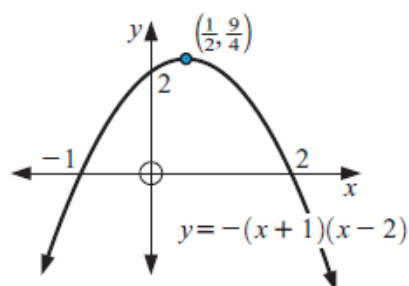
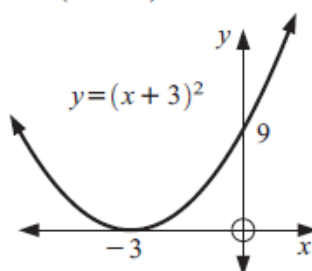
- e** **i** -2 and 4 **ii** $x = 1$ **f** **i** 1 **ii** $x = 1$
iii (1, -9) **iv** -8 **iii** (1, 0) **iv** -1



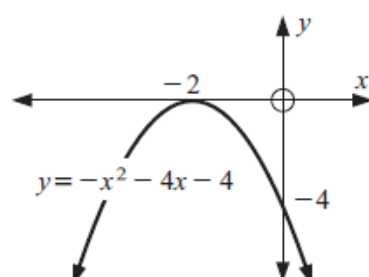
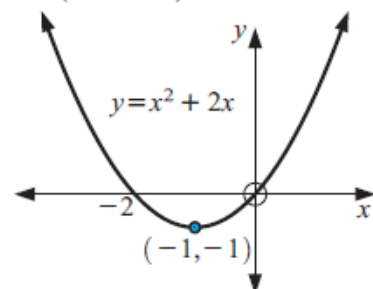
- g** **i** -4 and 2 **ii** $x = -1$ **h** **i** -4 and 2 **ii** $x = -1$
iii $(-1, -9)$ **iv** -8 **iii** $(-1, 9)$ **iv** 8



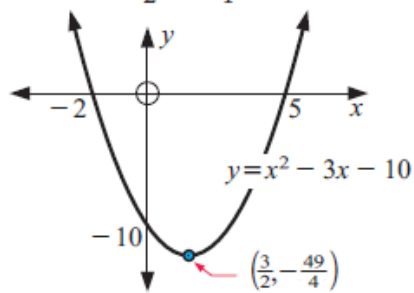
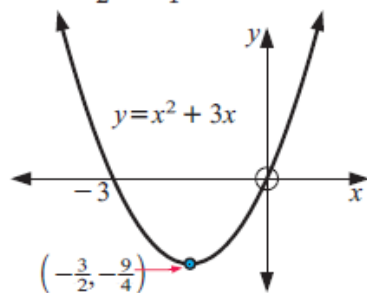
- i** **i** -3 **ii** $x = -3$ **j** **i** -1 and 2 **ii** $x = \frac{1}{2}$
iii $(-3, 0)$ **iv** 9 **iii** $(\frac{1}{2}, \frac{9}{4})$ **iv** 2



- k** **i** 0 and -2 **ii** $x = -1$ **l** **i** -2 **ii** $x = -2$
iii $(-1, -1)$ **iv** 0 **iii** $(-2, 0)$ **iv** -4



- m** **i** 0 and -3 **ii** $x = -\frac{3}{2}$ **n** **i** -2 and 5 **ii** $x = \frac{3}{2}$
iii $(-\frac{3}{2}, -\frac{9}{4})$ **iv** 0 **iii** $(\frac{3}{2}, -\frac{49}{4})$ **iv** -10



- o** **i** -6 and -1 **ii** $x = -\frac{7}{2}$ **iii** $(-\frac{7}{2}, \frac{25}{4})$ **iv** -6

