Exercise 1

1. Each of the following graphs represents a simple parabola of the form $y = kx^2$.
    Find k each time and hence write down the equation representing each parabola.

(a)

(b)

(c)

(d)

(e)

(f)
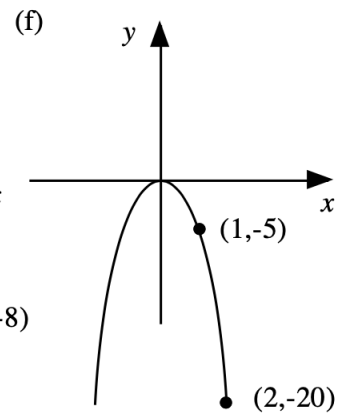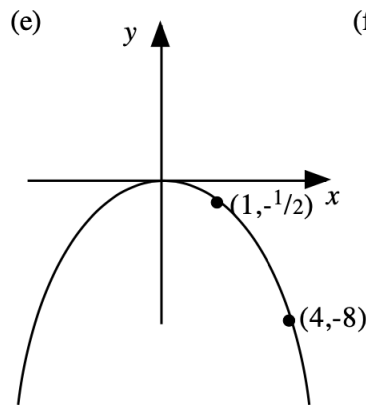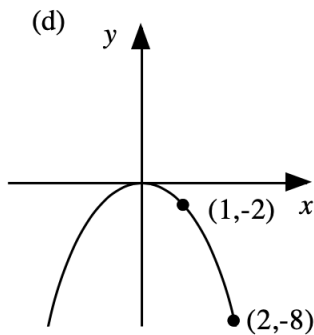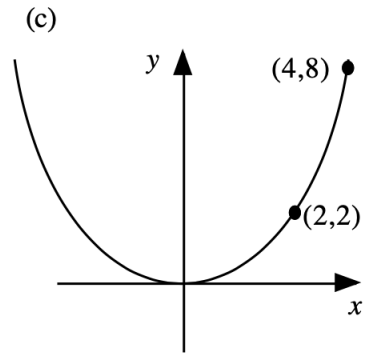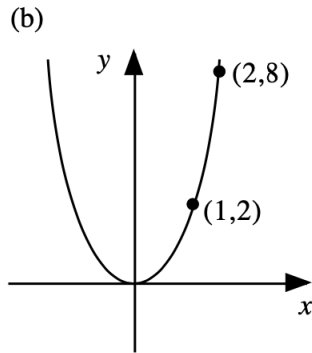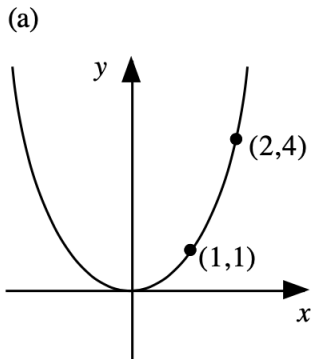
2. Each of the following parabolas can be represented by the equation
    $y = x^2 + b$ or $y = -x^2 + b$, where b is an integer. Write down their equations.

(a)

(b)

(c)

(d)

(0,4)

(e)

(0,1)

(f)

(0,-1)
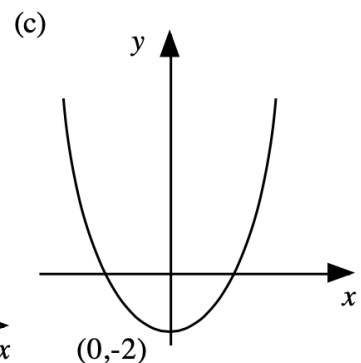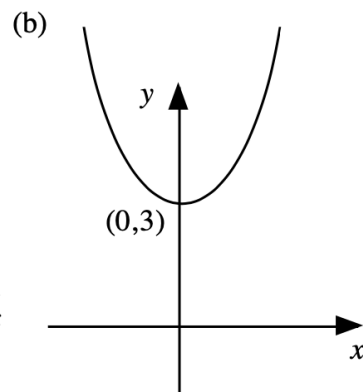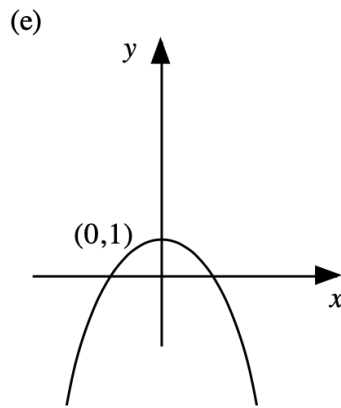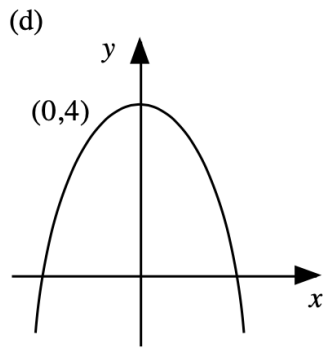
3. Each of the following parabolas can be represented by an equation of the form
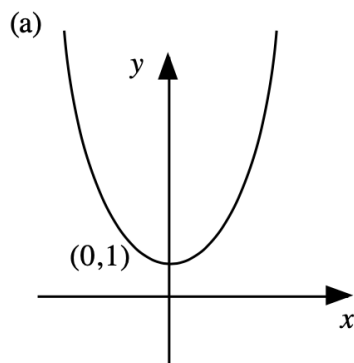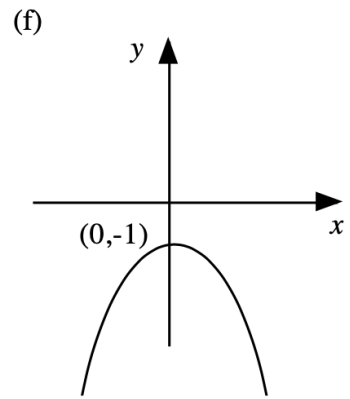 $y = (x + a)^2 + b$, (where a and b are integers). Write down the equation of each one.

(a)

(1,1)

(b)

(2,3)

(c)

(3,0)

(d)

(-3,2)

(e)

(-4,0)

(f)

(-5,-3)
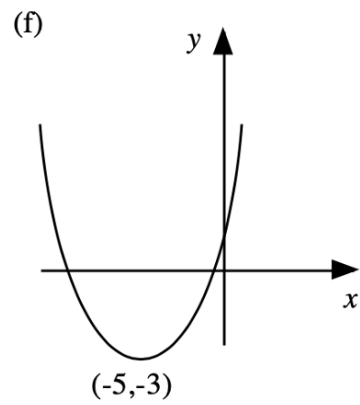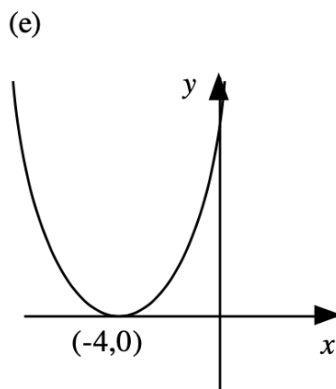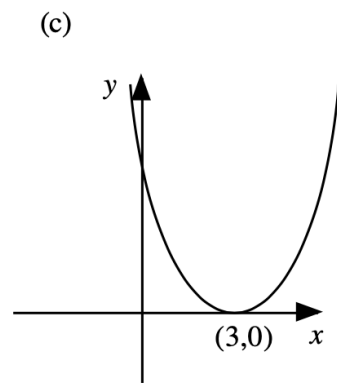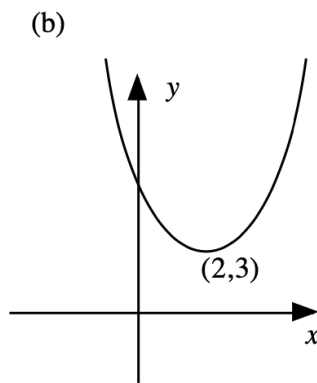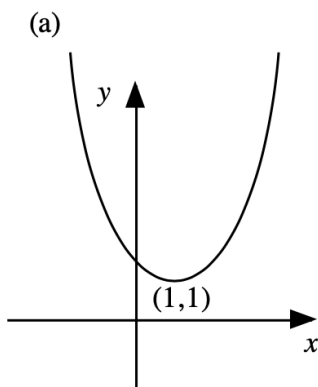
4.

Without making a sketch, write down the coordinates of the minimum turning points and the equation of the axes of symmetry of these parabolas.

(a) $y = (x - 4)^2 + 1$

(b) $y = (x - 2)^2 + 7$

(c) $y = (x - 8)^2 + 3$

(d) $y = (x + 1)^2 + 2$

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

(f) $y = (x + 3)^2 - 7$

(g) $y = (x - 5)^2$

(h) $y = (x + 2)^2$

(i) $y = x^2 + 3$

5.

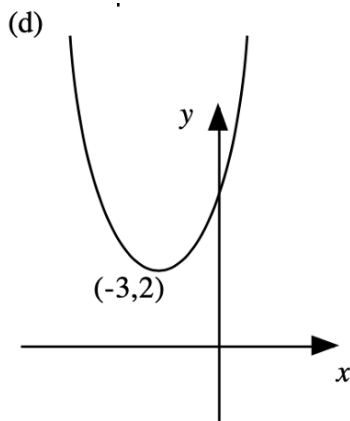Without a sketch, write down the coordinates of the maximum turning points and the equation of the axes of symmetry of these parabolas.

(a) $y = -(x - 2)^2 + 6$

(b) $y = -(x - 5)^2 + 1$

(c) $y = -(x - 6)^2 - 2$

(d) $y = -(x + 1)^2 + 7$

(e) $y = -(x + 4)^2 - 5$

(f) $y = -(x + 3)^2$

(g) $y = 7 - (x - 1)^2$

(h) $y = 1 - (x - 8)^2$

(i) $y = -2 - (x + 5)^2$

Answers

Exercise 1

1. (a) $y = x^2$
   (b) $y = 2x^2$
   (c) $y = \frac{1}{2}x^2$
   (d) $y = -2x^2$
   (e) $y = -\frac{1}{2}x^2$
   (f) $y = -5x^2$

2. (a) $y = x^2 + 1$
   (b) $y = x^2 + 3$
   (c) $y = x^2 - 2$
   (d) $y = -x^2 + 4$
   (e) $y = -x^2 + 1$
   (f) $y = -x^2 - 1$

3. (a) $y = (x - 1)^2 + 1$
   (b) $y = (x - 2)^2 + 3$
   (c) $y = (x - 3)^2$
   (d) $y = (x + 3)^2 + 2$
   (e) $y = (x + 4)^2$
   (f) $y = (x + 5)^2 - 3$

4.

(a) $(4, 1)$; $x = 4$

(b) $(2,7)$; $x = 2$

(c) $(8,3)$; $x = 8$

(d) $(-1,2)$; $x = -1$

(e) $(1,-3)$; $x = 1$

(f) $(-3,-7)$; $x = -3$

(g) $(5,0)$; $x = 5$

(h) $(-2,0)$; $x = -2$

(i) $(0,3)$; $x = 0$

5.

(a) $(2,6)$; $x = 2$

(b) $(5,1)$; $x = 5$

(c) $(6,-2)$; $x = 6$

(d) $(-1,7)$; $x = -1$

(e) $(-4,-5)$; $x = -4$

(f) $(-3,0)$; $x = -3$

(g) $(1,7)$; $x = 1$

(h) $(8,1)$; $x = 8$

(i) $(-5,-2)$; $x = -5$