Parabolas 1

1. For each parabola below find

      (i)   the point of crossing the y-axis

      (ii)   the roots of the parabola

      (iii)   the minimum or maximum turning point

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

(b) $y = x^2 + 4x$

(c)

$y = 8x - x^2$

(d)

                      $y = x^2 - 9$

(e) $y = 2x^2 - 32$

(f)

$y = 25 - x^2$

(g) $y = x^2 - 6x + 8$

(h) $y = x^2 + 8x + 15$

(i) $y = x^2 + 2x - 15$

(j) $y = x^2 - 4x - 12$

(k)

(l) $y = 2x^2 + 5x - 3$

$y = -x^2 + 10x - 9$
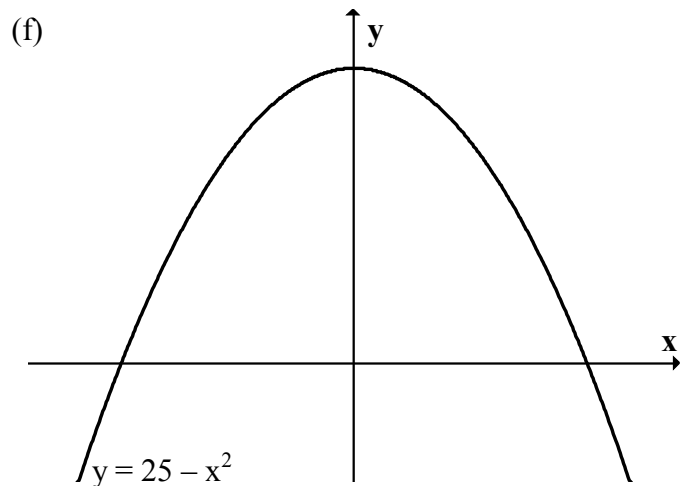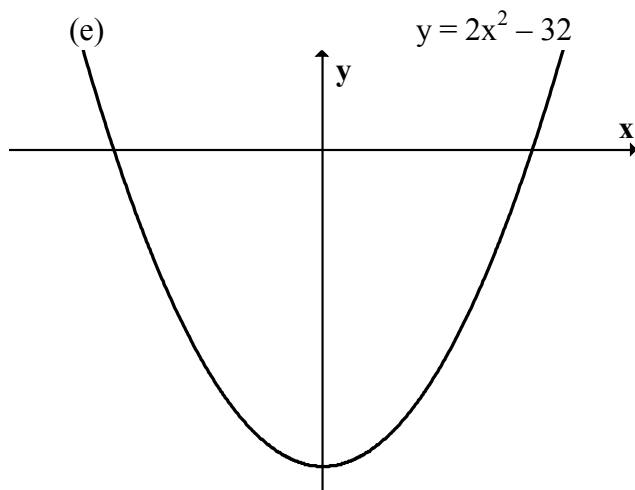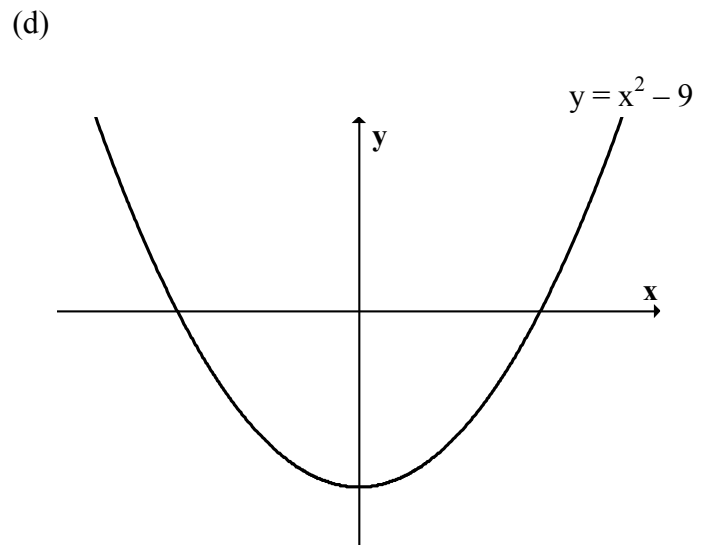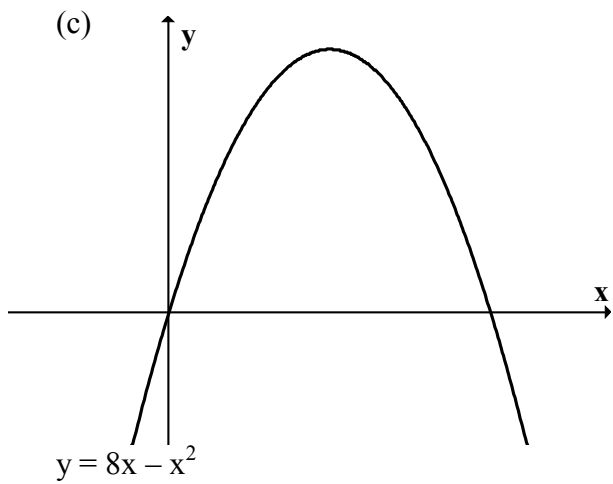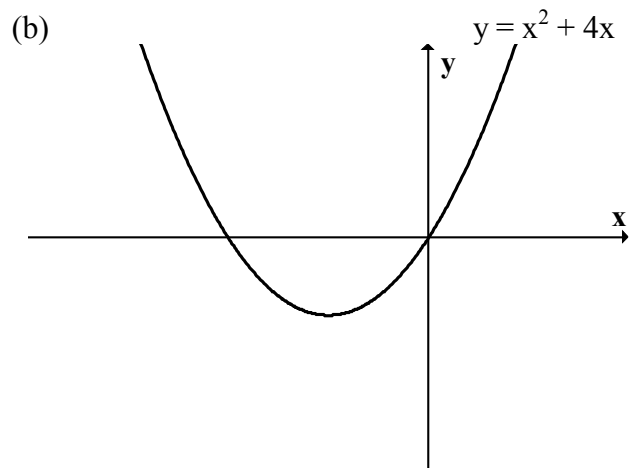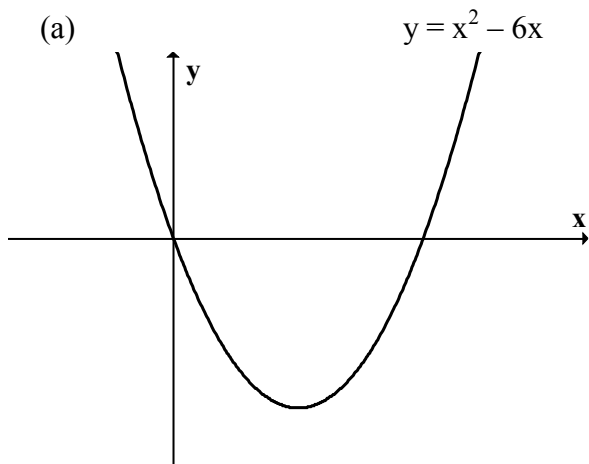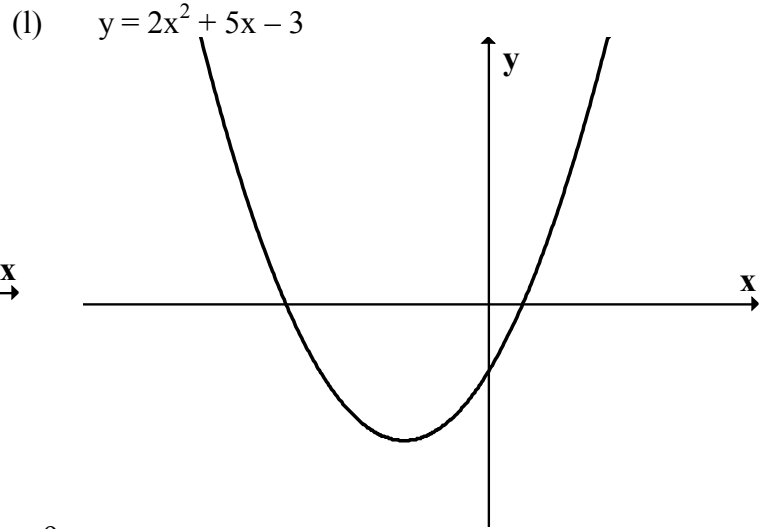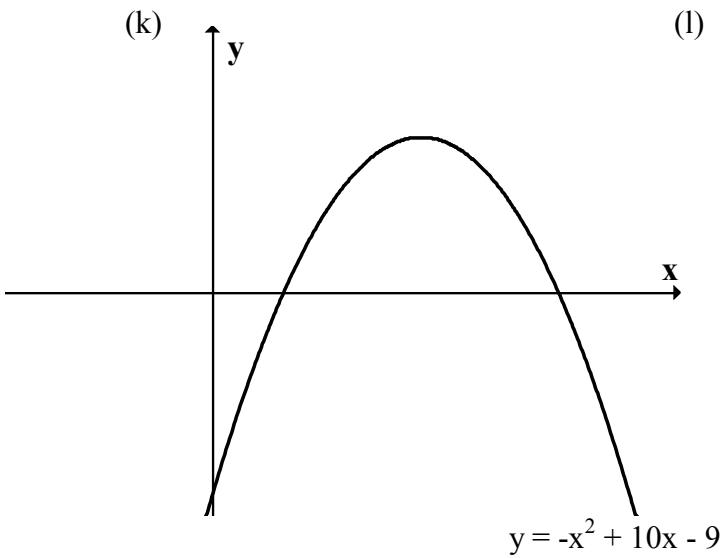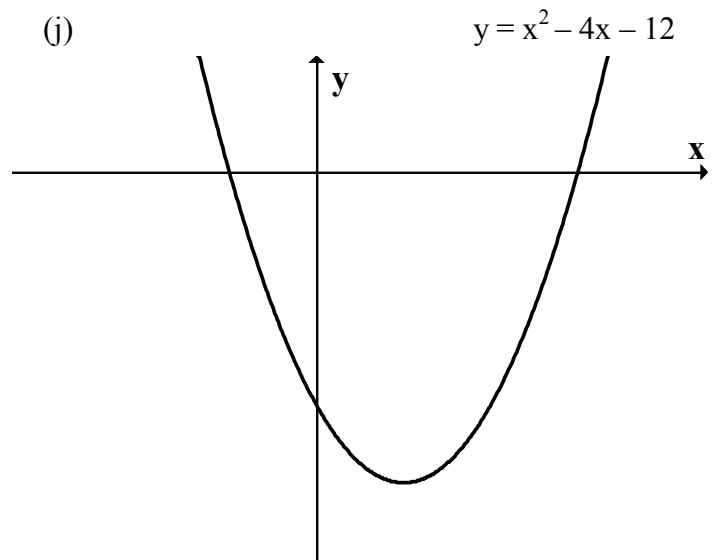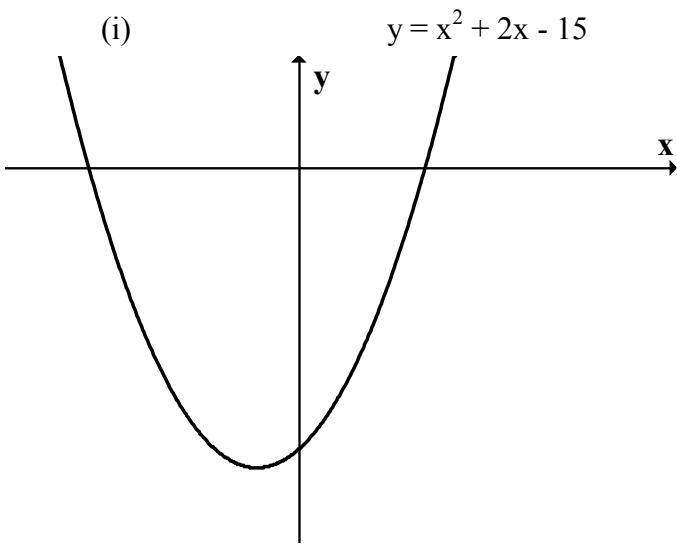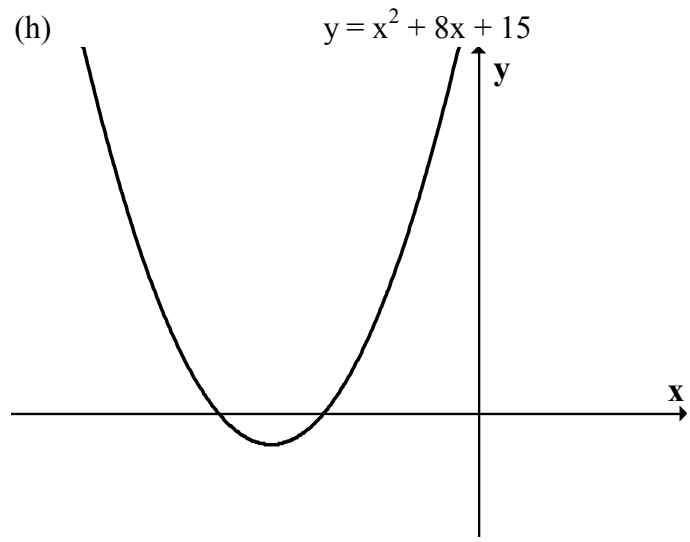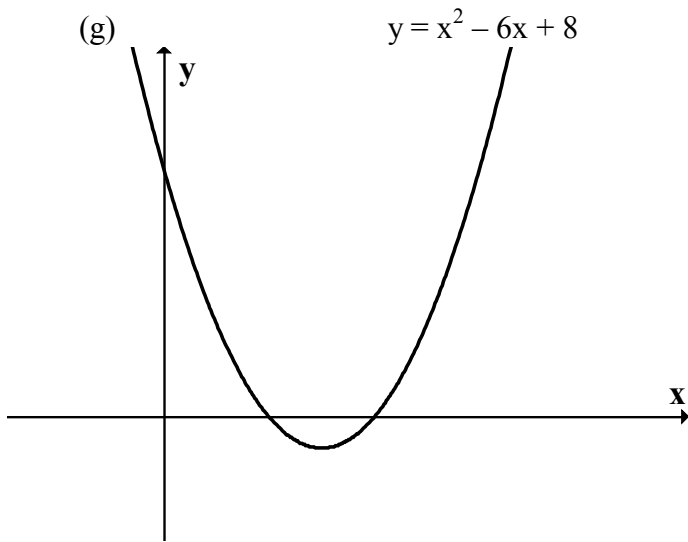
2. The diagram shows the parabola

$$y = x^2 + 2x.$$

(a) Find the coordinates of the point A.
(b) Find the coordinates of B, the minimum turning point of the parabola.

3. The diagram shows the parabola

$$y = 12x - 2x^2$$

(a) Find the coordinates of the point A.
(b) Find the coordinates of B, the maximum turning point of the parabola.

4. The parabola with equation

$$y = 4 - x^2$$

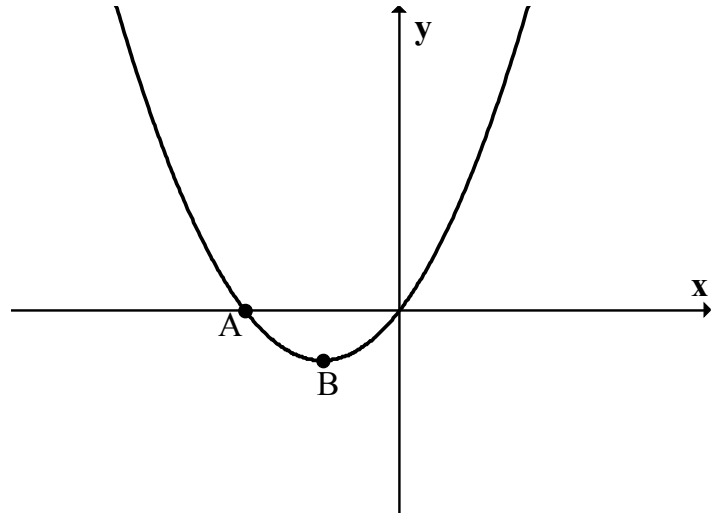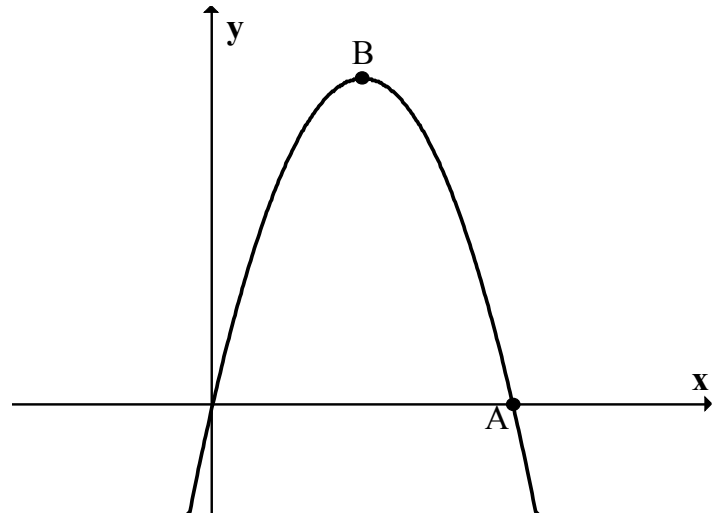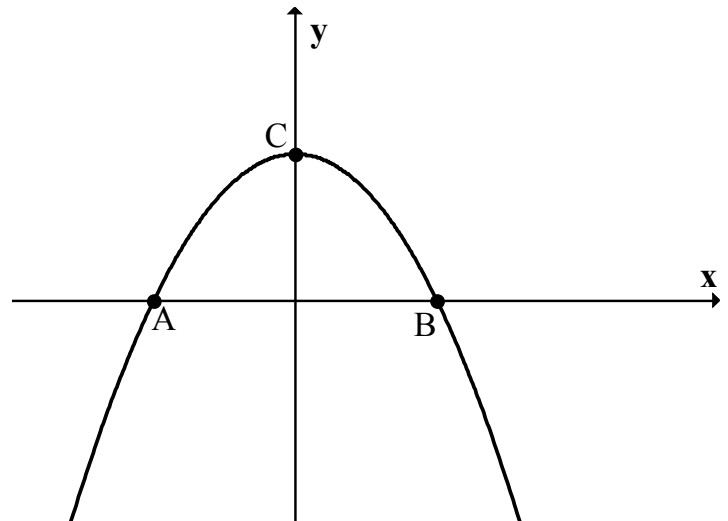is shown opposite.
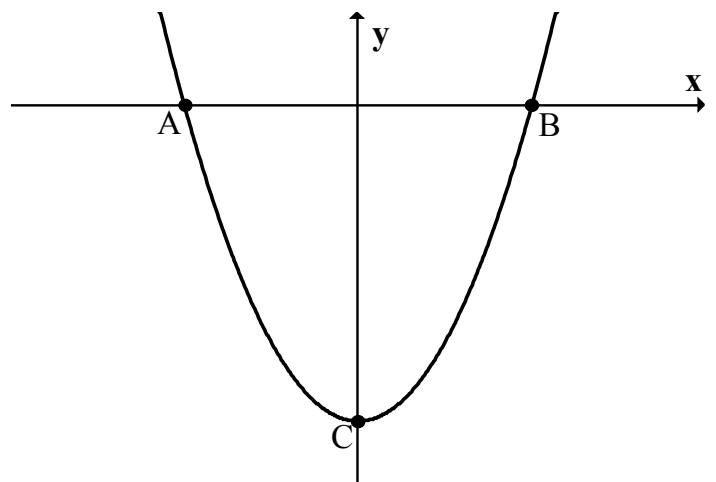
(a) Find the coordinates of A and B, the roots of the parabola.
(b) Find the coordinates of C.

5. The diagram shows the graph of

$$y = 3x^2 - 27$$

(a) Find A and B.
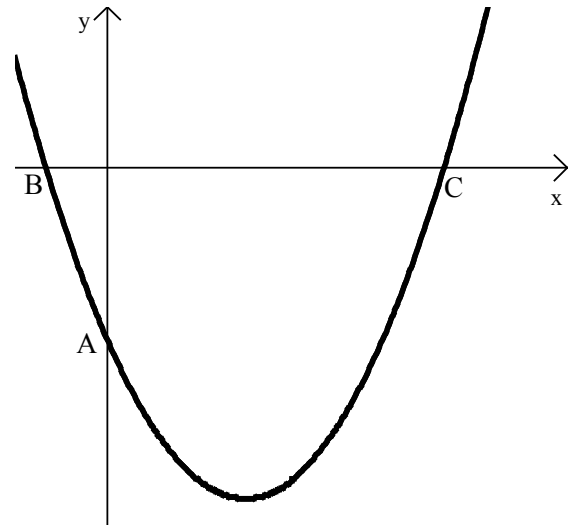(b) Find the coordinates of C, the minimum turning point.

6. The diagram opposite shows part of the graph of

$$y = x^2 - 8x - 9.$$

The graph cuts the y-axis at A and the x-axis at B and C.

(a) Write down the coordinates of A
(b) Find the coordinates of B and C
(c) Calculate the minimum value of $x^2 - 8x - 9$.

7. The diagram shows the parabola

$$y = x^2 - 10x + 16$$

(a) Write down the coordinates of E
(b) Find the coordinates of F and G
(c) Find the coordinates of H, the minimum turning point.
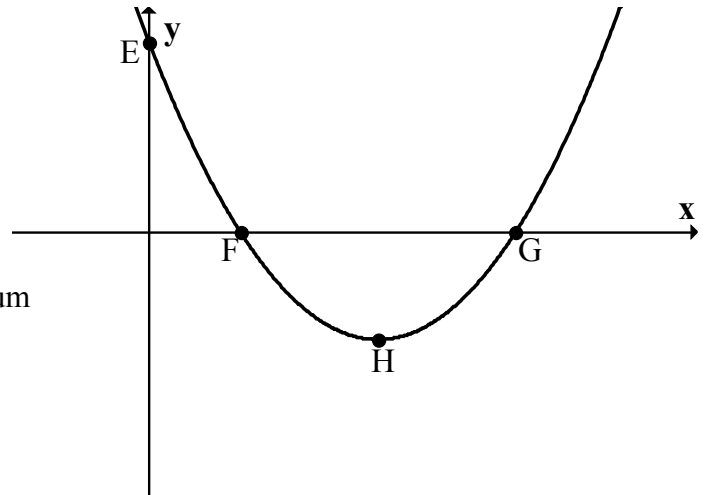
8. The parabola with equation

$$y = x^2 - 4x - 5$$

is shown opposite.

(a) Write down the coordinates of A
(b) Find the coordinates of B and C
(c) Find the coordinates of D, the minimum turning point.
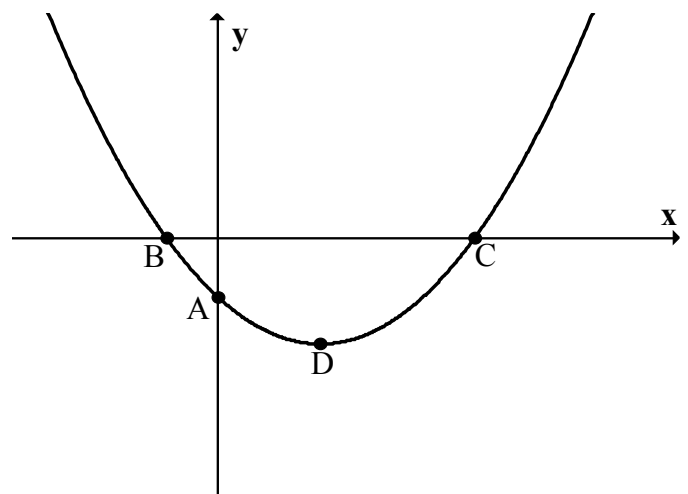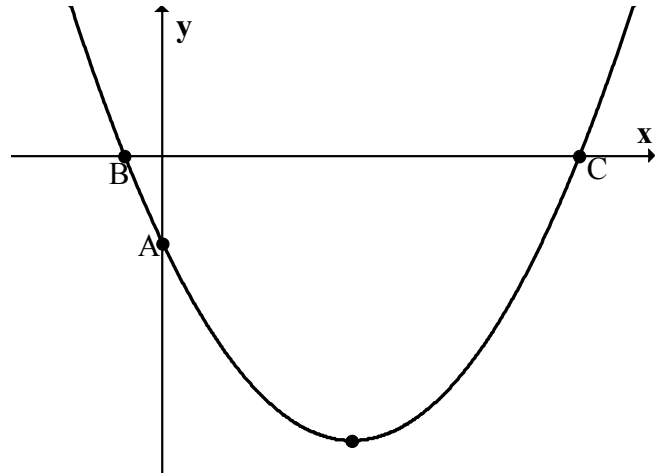
9. The diagram shows the parabola

$$y = x^2 - 10x - 11$$

(a) Write down the coordinates of A
(b) Find the coordinates of B and C
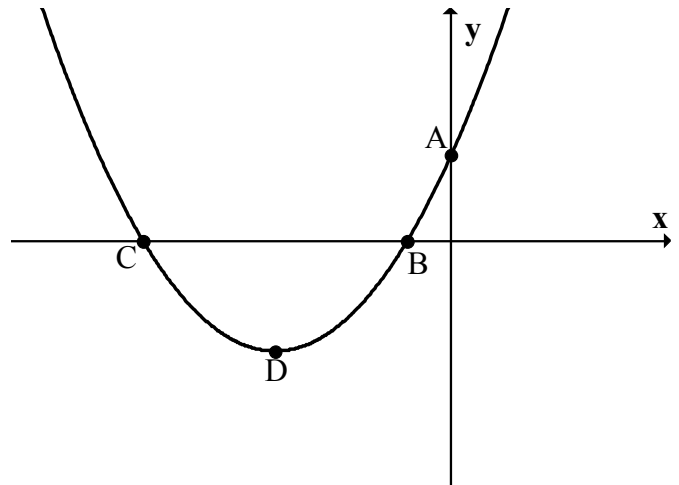(c) Find the minimum value of
   $y = x^2 - 10x - 11$.

10. The graph of

$$y = x^2 + 8x + 7$$

is shown opposite.

(a) Write down the coordinates of A
(b) Find the coordinates of B and C
(c) Find the coordinates of D, the minimum turning point.

11. The diagram shows the parabola

$$y = -x^2 - 2x + 15$$

(a) Write down the coordinates of N
(d) Find the coordinates of K and L
(e) Find the coordinates of M, the maximum turning point.

12. The diagram shows the parabola

$$y = -x^2 + 6x + 7$$

(a) Write down the coordinates of A
(b) Find the coordinates of B and C
(c) Find the maximum value of
   $y = -x^2 + 6x + 7$

13. The graph of
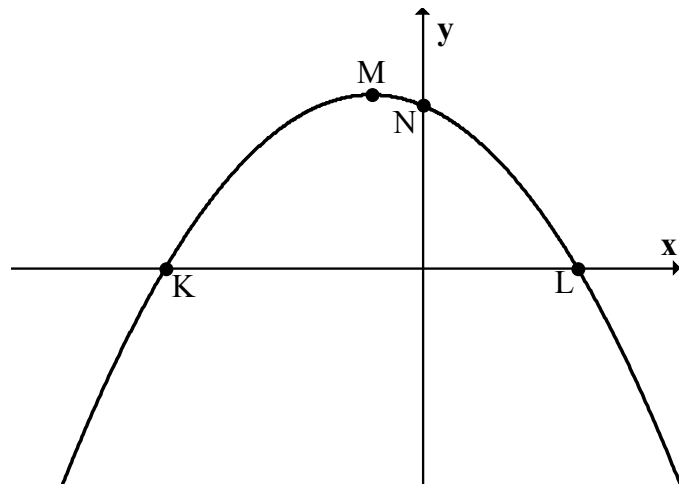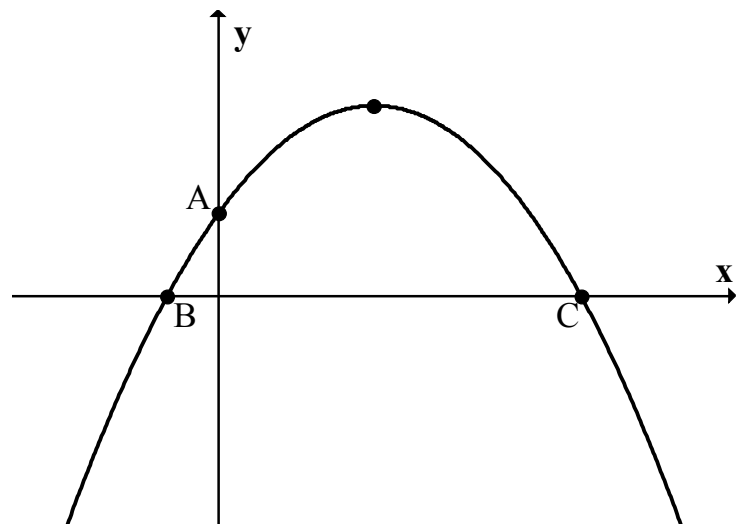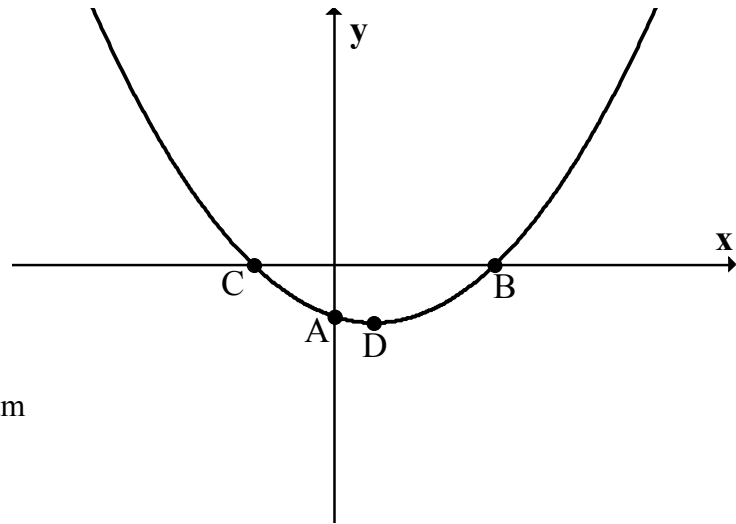
   $y = x^2 - x - 2$

   is shown opposite.
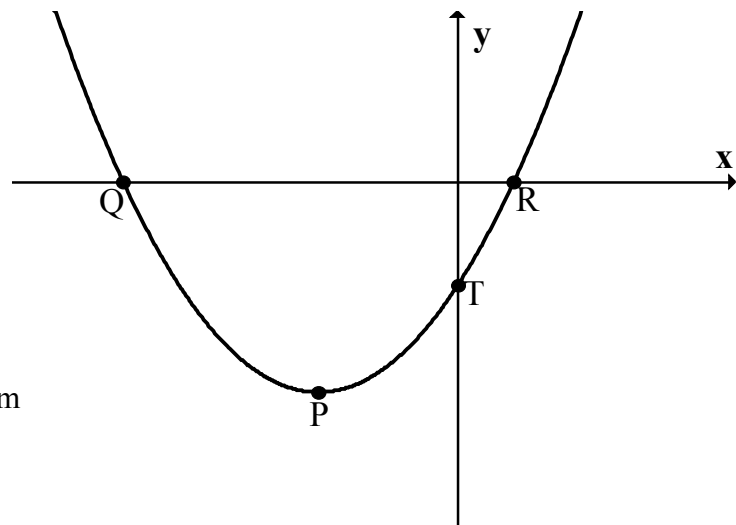
   (a) Write down the coordinates of A
   (b) Find the coordinates of B and C
   (c) Find the coordinates of D, the minimum
       turning point.

14. The graph of

   $y = x^2 + 5x - 6$

   is shown opposite.

   (a) Write down the coordinates of T
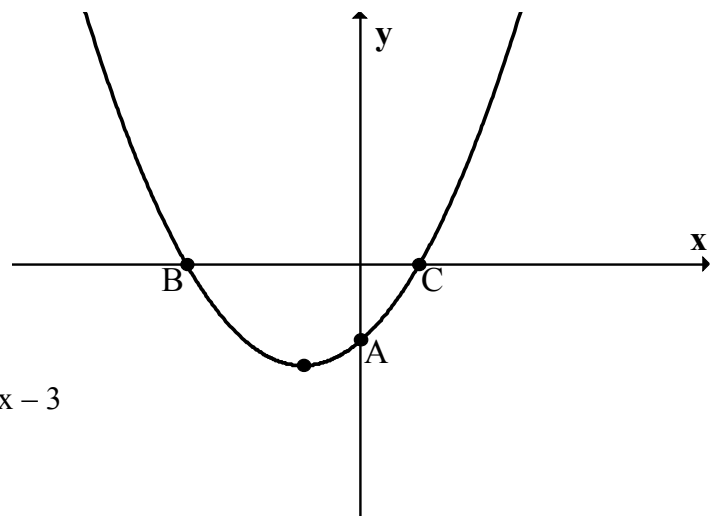   (b) Find the coordinates of Q and R
   (c) Find the coordinates of P, the minimum
       turning point.

15. The diagram opposite shows part of the
    graph of

   $y = 4x^2 + 4x - 3.$

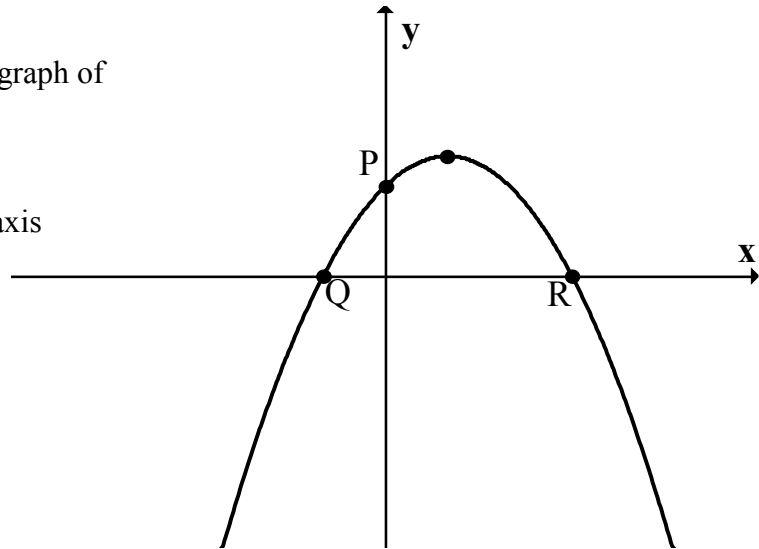   The graph cuts the y-axis at A and the
   x-axis at B and C.

   (a) Write down the coordinates of A
   (b) Find the coordinates of B and C.
   (c) Calculate the minimum value of $4x^2 + 4x - 3$

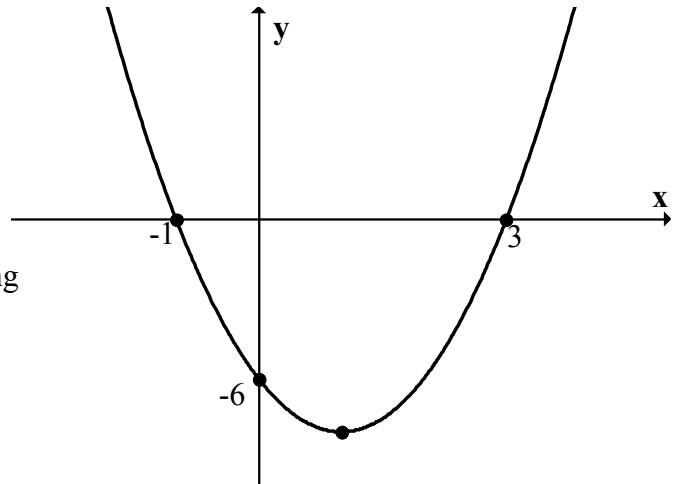16. The diagram opposite shows part of the graph of

$$y = -3x^2 + 2x + 1.$$

The graph cuts the y-axis at P and the x-axis at Q and R.

(a) Write down the coordinates of P.
(b) Find the coordinates of Q and R.
(c) Find the maximum turning point of the parabola.

17. The diagram opposite shows part of the graph of $y = k(x - a)(x - b)$.
The graph cuts the y-axis at (0,-6) and the x-axis at (-1,0) and (3,0).

(a) Write down the values of a and b.
(b) Calculate the value of k.
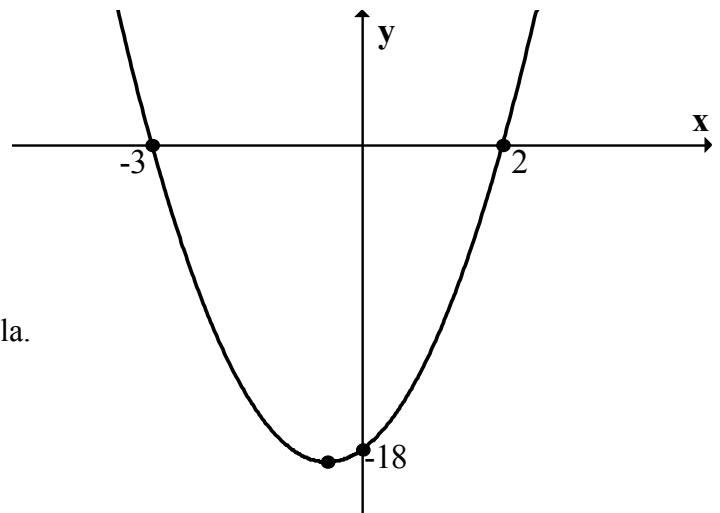(c) Find the coordinates of the minimum turning point of the parabola.

18. The diagram opposite shows part of the graph of $y = k(x - a)(x - b)$.
The graph cuts the y-axis at (0,-18) and the x-axis at (-3,0) and (2,0).

(a) Write down the values of a and b.
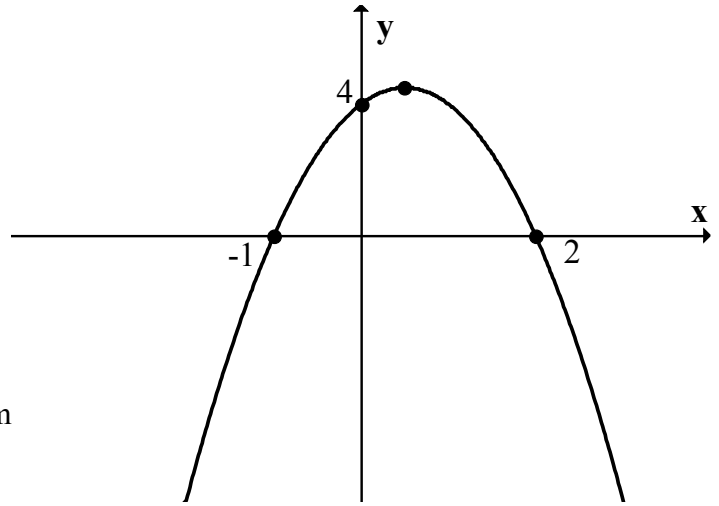(b) Calculate the value of k.
(c) Find the minimum value of the parabola.

19. The diagram opposite shows part of
the graph of $y = k(x + a)(x + b)$.
The graph cuts the y-axis at (0,4) and
the x-axis at (-1,0) and (2,0).

(a) Write down the values of a and b.
(b) Find the value of k.
(c) Find the coordinates of the maximum
turning point of the parabola.

20. The diagram opposite shows part of
the graph of $y = p(x + a)(x + b)$.
The graph cuts the y-axis at (0,-16)
and the x-axis at (-4,0) and (1,0).

(a) Write down the values of a and b.
(b) Find the value of p.
(c) Find the minimum value of y.