Some important graphs (answers at the end)

1 The function f is defined by $f(x) = 7x - 4$.

(a) Find the values of $f(7)$, $f(\frac{1}{2})$ and $f(-5)$.

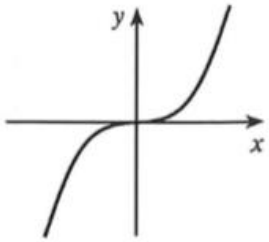
(b) Find the value of x such that $f(x) = 10$.

(c) Find the value of x such that $f(x) = x$.

(d) Find the value of x such that $f(x) = f(37)$.

2 The function f is defined by $f(x) = x^2 - 3x + 5$. Find the two values of x for which $f(x) = f(4)$.

3 The diagram shows the graph of $y = x^n$, where n is an integer. Given that the curve passes between the points (2, 200) and (2, 2000), determine the value of n.



4 Find the points of intersection of the curves $y = x^2 - 7x + 5$ and $y = 1 + 2x - x^2$.

5 Find the points of intersection of the line $y = 2x + 3$ and the curve $y = 2x^2 + 3x - 7$.

6 Show that the line $3x + y - 2 = 0$ is a tangent to the curve $y = (4x - 3)(x - 2)$ and find the point of contact.

7 Find the coordinates of any points of intersection of the curves $y = (x - 2)(x - 4)$ and $y = x(2 - x)$. Sketch the two curves to show the relationship between them.

8 Given that k is a positive constant, sketch the following graphs.

(a) $y = (x + k)(x - 2k)$ (b) $y = (x + 4k)(x + 2k)$

(c) $y = x(x - k)(x - 5k)$ (d) $y = (x + k)(x - 2k)^2$

9 The function f is defined by $f(x) = ax^2 + bx + c$. Given that $f(0) = 6$, $f(-1) = 15$ and $f(1) = 1$, find the values of a, b and c.

10 Find the point where the line $y = 3 - 4x$ meets the curve $y = 4(4x^2 + 5x + 3)$.

11 Sketch the following graphs.

(a) $y = (x + 4)(x + 2) + (x + 4)(x - 5)$ (b) $y = (x + 4)(x + 2) + (x + 4)(5 - x)$

12 A function f is defined by $f(x) = ax + b$. Given that $f(-2) = 27$ and $f(1) = 15$, find the value of x such that $f(x) = -5$.

13 A curve with equation $y = ax^2 + bx + c$ crosses the x-axis at $(-4, 0)$ and $(9, 0)$ and also passes through the point $(1, 120)$. Where does the curve cross the y-axis?

14 Show that the curves $y = 2x^2 + 5x$, $y = x^2 + 4x + 12$ and $y = 3x^2 + 4x - 6$ have one point in common and find its coordinates.

15 Given that the curves $y = x^2 - 3x + c$ and $y = k - x - x^2$ meet at the point $(-2, 12)$, find the values of c and k. Hence find the other point where the two curves meet.

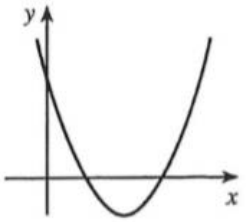
16 Find the value of the constant p if the three curves $y = x^2 + 3x + 14$, $y = x^2 + 2x + 11$ and $y = px^2 + px + p$ have one point in common.

17 The straight line $y = x - 1$ meets the curve $y = x^2 - 5x - 8$ at the points A and B. The curve $y = p + qx - 2x^2$ also passes through the points A and B. Find the values of p and q.

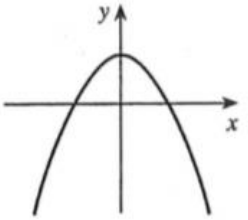
18 Find, in surd form, the points of intersection of the curves $y = x^2 - 5x - 3$ and $y = 3 - 5x - x^2$.

19 Suggest a possible equation for each of the graphs shown below.

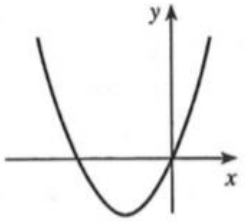
(a)



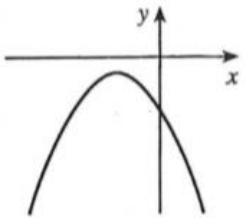
(b)



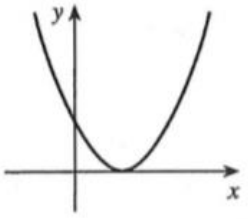
(c)



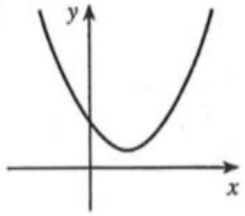
(d)



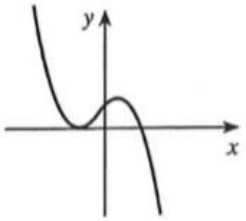
(e)



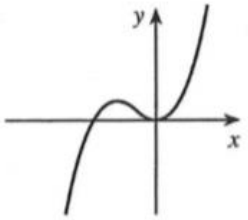
(f)



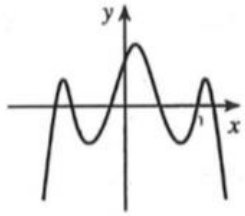
(g)



(h)



(i)



20 Show that the curves $y = 2x^2 - 7x + 14$ and $y = 2 + 5x - x^2$ meet at only one point and use a graphic calculator to confirm the relationship between the curves. Without further calculation or sketching, deduce the number of points of intersection of the following curves.

(a) $y = 2x^2 - 7x + 12$ and $y = 2 + 5x - x^2$

(b) $y = 2x^2 - 7x + 14$ and $y = 1 + 5x - x^2$

(c) $y = 2x^2 - 7x + 34$ and $y = 22 + 5x - x^2$

1 (a) $45,\ -\frac{1}{2},\ -39$ (b) 2 (c) $\frac{2}{3}$ (d) 37

2 $-1,\ 4$

3 9

4 $(\frac{1}{2}, 1\frac{3}{4}),\ (4, -7)$

5 $(-2\frac{1}{2}, -2),\ (2, 7)$

6 $(1, -1)$

7 $(2, 0)$

9 $a = 2,\ b = -7,\ c = 6$

10 $(-\frac{3}{4}, 6)$

12 6

13 $(0, 108)$

14 $(3, 33)$

15 $c = 2,\ k = 14,\ (3, 2)$

16 2

17 $p = q = 13$

18 $(\sqrt{3},\ -5\sqrt{3}),\ (-\sqrt{3},\ 5\sqrt{3})$

20 (a) 2 (b) 0 (c) 1