

C1 ALGEBRA

Worksheet H

- 1 a Factorise fully the expression

$$20x - 2x^2 - 6x^3.$$

- b Hence, find all solutions to the equation

$$20x - 2x^2 - 6x^3 = 0.$$

- 2 A is the point $(-2, 1)$ and B is the point $(6, k)$.

a Show that $AB^2 = k^2 - 2k + 65$.

Given also that $AB = 10$,

- b find the possible values of k .

- 3 Solve the equations

a $x - \frac{5}{x} = 4$

b $\frac{9}{5-x} - 1 = 2x$

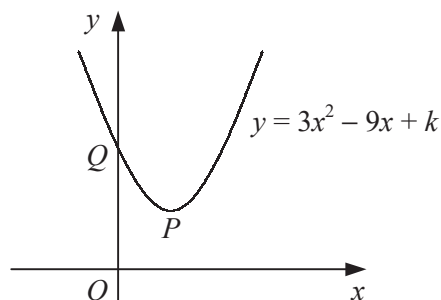
- 4 a Find the coordinates of the turning point of the curve with equation $y = 3 - 5x - 2x^2$.

- b Sketch the curve $y = 3 - 5x - 2x^2$, showing the coordinates of any points of intersection with the coordinate axes.

- 5 Find in the form $k\sqrt{2}$ the solutions of the equation

$$2x^2 + 5\sqrt{2}x - 6 = 0.$$

- 6



The diagram shows the curve with equation $y = 3x^2 - 9x + k$ where k is a constant.

- a Find the x -coordinate of the turning point of the curve, P .

Given that the y -coordinate of P is $\frac{17}{4}$,

- b find the coordinates of the point Q where the curve crosses the y -axis.

- 7 By letting $y = 2^x$, or otherwise, solve the equation

$$2^{2x} - 10(2^x) + 16 = 0.$$

- 8 Given that the equation

$$kx^2 - 2x + 3 - 2k = 0$$

has equal roots, find the possible values of the constant k .

- 9 $f(x) \equiv 3 + 4x - x^2$.
- Express $f(x)$ in the form $a(x + b)^2 + c$.
 - State the coordinates of the turning point of the curve $y = f(x)$.
 - Solve the equation $f(x) = 2$, giving your answers in the form $d + e\sqrt{5}$.
- 10 Giving your answers in terms of surds, solve the equations
- $3x^2 - 5x + 1 = 0$
 - $\frac{x}{x+2} = \frac{3}{x-1}$
- 11 **a** By completing the square, find, in terms of k , the solutions of the equation
- $$x^2 - 4kx + 6 = 0.$$
- b** Using your answers to part **a**, solve the equation
- $$x^2 - 12x + 6 = 0.$$
- 12 **a** Find in the form $a + b\sqrt{3}$, where a and b are integers, the values of x such that
- $$2x^2 - 12x = 6.$$
- b** Solve the equation
- $$2y^3 + y^2 - 15y = 0.$$
- 13 Labelling the coordinates of any points of intersection with the coordinate axes, sketch the curves
- $y = (x + 1)(x - p)$ where $p > 0$,
 - $y = (x + q)^2$ where $q < 0$.
- 14 $f(x) \equiv 2x^2 - 6x + 5$.
- Find the values of A , B and C such that
- $$f(x) \equiv A(x + B)^2 + C.$$
- b** Hence deduce the minimum value of $f(x)$.
- 15 **a** Given that $t = x^{\frac{1}{3}}$ express $x^{\frac{2}{3}}$ in terms of t .
- b** Hence, or otherwise, solve the equation
- $$2x^{\frac{2}{3}} + x^{\frac{1}{3}} - 6 = 0.$$
- 16 **a** Express $k^2 - 8k + 20$ in the form $a(k + b)^2 + c$, where a , b and c are constants.
- b** Hence prove that the equation
- $$x^2 - kx + 2k = 5$$
- has real and distinct roots for all real values of k .
- 17 **a** Show that
- $$(x^2 + 2x - 3)(x^2 - 3x - 4) \equiv x^4 - x^3 - 13x^2 + x + 12.$$
- b** Hence solve the equation
- $$x^4 - x^3 - 13x^2 + x + 12 = 0.$$