www.m4ths.com – C1 – Quadratic Functions

(1) Factorise the following quadratic expressions:

(a) $x^2 - x - 12$

(b) $8 - 6x + x^2$

(c) $x^2 + 3x$

(2) Solve the following quadratic equations:

(a) $(x-2)(x+1) = 0$

(b) $(2x+3)(x+4) = 0$

(c) $x^2 - 2x - 8 = 0$

(d) $x(x-1) = 6$

(3) Factorise the following quadratic expressions:

(a) $2x^2 + x - 1$

(b) $3x^2 - 5x - 2$

(c) $12x^2 + 16x - 3$

(4) Factorise and solve the following quadratic equations:

(a) $2x^2 - 5x - 3 = 0$

(b) $5x^2 + 4x - 1 = 0$

(c) $6x^2 + 7x = 3$

(d) $x(2x-1) = 15$

(e) $0.4x^2 + x = 0.6$

(5) (a) Given that the quadratic equation $f(x) = (2x-3)(3x-5)$ can be written in the form $f(x) = ax^2 + bx + c$, find the values of a, b and c.

(b) Write down the solutions to the equation $f(x) = 0$.

(c) Find the solutions to the equation $f(x) = 15$.

(6) Write the following quadratic expressions in the form $(x+a)^2 + b$

(a) $x^2 - 4x - 3$

(b) $2 - 6x + x^2$

(c) $x^2 + 5x + 2$

(d) $x^2 + 3x$

(7) Solve the following quadratic equations by completing the square leaving your answers in exact form where appropriate:

(a) $x^2 - 2x - 8 = 0$

(b) $x^2 + 3x + 1 = 0$

(c) $x^2 + 8x = 12$

(d) $2x^2 + 7x - 1 = 0$

(8) Write the following quadratic expressions in the form $a(x+b)^2 + c$:

(a) $2x^2 + 4x + 7$

(b) $-x^2 + 5x - 2$

(c) $7x^2 + 3x + 1$

(d) $8x + 5x^2$

(9) Solve the following quadratic equations by completing the square leaving your answers in exact form where appropriate:

(a) $3x^2 + 6x - 1 = 0$

(b) $7x^2 + 5x - 2 = 0$

(c) $4x(x-6) = 7$

(10) (a) Sketch the graph of $y = x^2 + 4x + 1$ showing any points of intersection with the coordinate axes and the coordinates of the minimum point.

(b) Sketch the graph of $y = 2x^2 + 5x - 4$ showing any points of intersection with the coordinate axes and the coordinates of the minimum point.

(c) Sketch the graph of $y = 3 - 5x - x^2$ showing any points of intersection with the coordinate axes and the coordinates of the maximum point.

(11) (a) Given that the quadratic expression $2(x+0.75)^2 - 1$ can be written in the form $ax^2 + bx + c$. Find the values of a, b and c.

(b) Solve the equation $2(x+0.75)^2 - 1 = 0$ giving your answers in exact form.

(12) Use the quadratic formula to find the solutions to the following equations. Give your answers in exact form:

(a) $x^2 - 3x - 8 = 0$

(b) $0 = 2 - 10x + x^2$

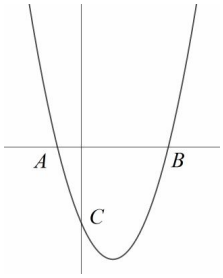
(c) $3x^2 - 2x - 4 = 0$

(d) $-x^2 + 7x - 1 = 0$

(e) $7x^2 = 1 + 5x$

(f) $0.3x + 1.2x^2 - 2.5 = 0$

(13) Part of the graph of $y = 4x^2 - 12x - 19$ is shown below. The curve crosses the x axis at the points A and B and the y axis at the point C.



(a) Write down the coordinates of the point C.

(b) Find the length of the line segment AB giving your answer in exact form.

(14) In completed square form the equation $y = x^2 + px + q$ can be written as $y = (x-2)^2 - 5$

(a) Find the values of p and q.

(b) Sketch the graph of $y = (x-2)^2 - 5$ showing any point of intersection with the coordinate axes.

(c) Label the minimum point M on the graph and write down its coordinates.

(d) The graph crosses the x axis at the points A and B. Find the area of the triangle AMB giving your answer in exact form.

(15) (a) Find the solutions to the equation $px^2 + qx + r = 0$ in terms of p, q and r.

(b) Given that $p < 0 < r < q$ draw a rough sketch of the curve $y = px^2 + qx + r$