2A/B Solving Quadratic Equations

1. Solve the Equation

a) $x^2 = 9x$

b) $x^2 - 2x - 15 = 0$

c) $2x^2 - 9x - 5 = 0$

d) $6x^2 + 13x - 5 = 0$

e) $x^2 - 5x + 18 = 2 + 3x$

f) $(2x - 3)^2 = 25$

g) $(x - 3)^2 = 7$

2. Solve $4x^2 - 3x - 2 = 0$ by using the Quadratic formula.

2C/D Completing the Square

1. Complete the square for the following expressions

a) $x^2 + 8x$

b) $x^2 - 4x$

c) $x^2 - 2x$

d) $x^2 + 16x$

2. Solve the following equations. You can use completing the square, but I prefer to stick to the Quadratic formula – give both a go and see if you have a preference (and get the same answer)

a) $x^2 + 4x - 3 = 0$

b) $x^2 - 6x + 4 = 0$

c) $2x^2 + 12x - 10 = 0$

d) $ax^2 + bx + c = 0$ (complete the square only – what do you find?)

2E Part 1 Quadratics as a Function

1. The function f and g are given by $f(x) = 2x - 10$ and $g(x) = x^2 - 9, \quad x \in \mathbb{R}$.

a) Find the values of $f(5)$ and $g(10)$

b) Find the value of x for which $f(x) = g(x)$

2. The function f is defined as $f(x) = x^2 + 6x - 5, \ x \in \mathbb{R}$.

a) Write $f(x)$ in the form $(x + p)^2 + q$

b) Hence, or otherwise, find the roots of $f(x)$, leaving all your answers in surd form

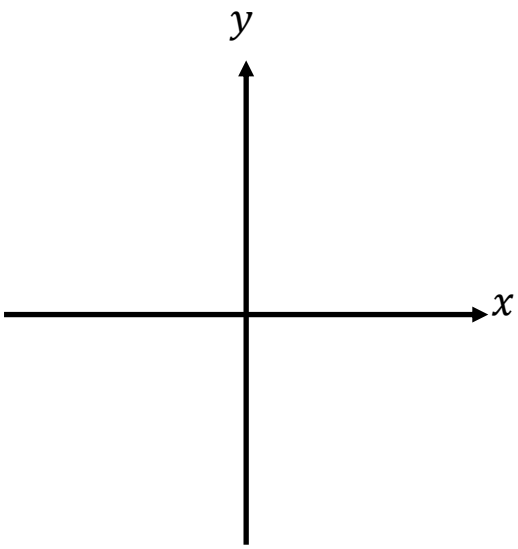
c) Write down the minimum value of $f(x)$ and state the value of x for which it occurs

2E Part 2 Hidden Quadratics

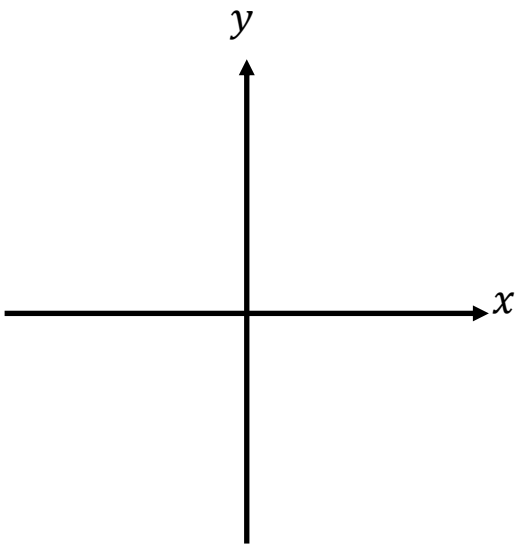
1. Find the roots of the function $f(x) = x^6 + 7x^3 - 8,\ x \in \mathbb{R}$

2F Sketching Quadratics

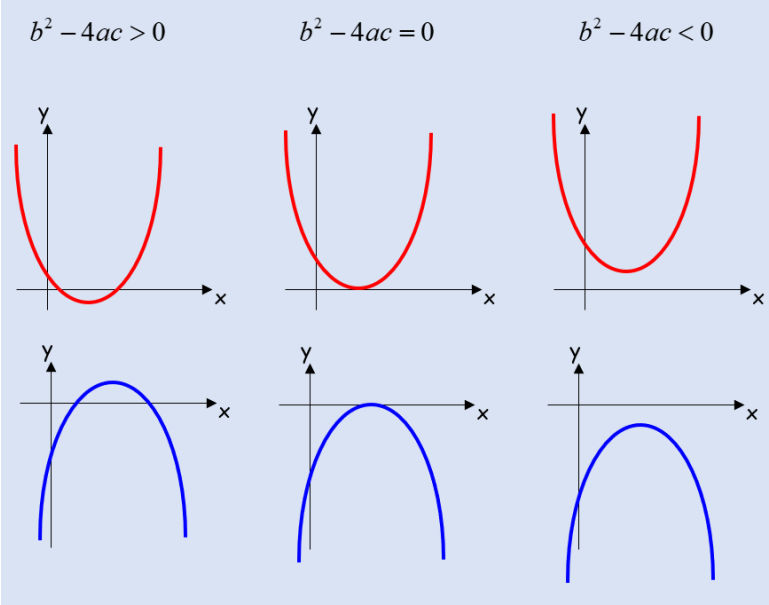
1. Sketch the graph of the function $y = x^2 - 5x + 4$, and find the coordinates of its turning point.



2. Sketch the graph of the function $y = 4x - 2x^2 - 3$, and find the coordinates of its turning point.



2G The Discriminant



1. Find the values of k for which;

$$x^2 + kx + 9 = 0$$

has equal roots.

2. Find the values of k for which;

$$x^2 + 4x + k = 0$$

has two distinct real solutions.

2H Modelling with Quadratics

1. A spear is thrown over level ground from the top of a tower. The height, h, in metres, of the spear above the ground after t seconds is modelled by the function:

$$h(t) = 12.25 + 14.7t - 4.9t^2, \ t \geq 0$$

a) Interpret the meaning of the constant 12.25 in the question

b) After how many seconds does the spear hit the ground?

c) Write $h(t)$ in the form $A - B(t - C)^2$, where A, B and C are constants to be found.

d) Using your answer to part c), or otherwise, find out the maximum height of the spear, and when it reaches this height