

Semester 1 Review – Part 1 **you should be able to solve all of these WITHOUT a calculator.**

$$f(x) = ax^2 + bx + c \Rightarrow \text{axis of symmetry } x = -\frac{b}{2a} \quad \text{Discriminant: } \Delta = b^2 - 4ac$$

The Quadratic Formula: *if* $ax^2 + bx + c = 0$ *then* $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

Solve problems (1) and (2) by factorization:

1) $x^2 - 5x + 6 = 0$

2) $2x^2 - 9x = -10$

2) Solve the equation $3x^2 - 10x + 2 = 0$ by using the quadratic formula

3) Determine how many Real roots (Zeros) the following quadratics have (without GRAPHING!)

a) $f(x) = 3x^2 - 5x + 10$

b) $g(x) = 2x^2 + 3x - 10$

4) Consider $f(x) = -kx^2 + 6x - 1$, for $k \neq 0$. The equation $f(x) = 0$ has two equal roots.

(a) Find the value of k .

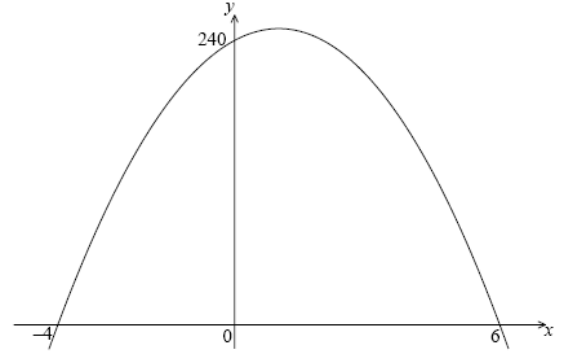
(b) The line $y = p$ intersects the graph of f . Find all possible values of p .

5) Express $f(x) = x^2 + 6x - 14$ in the form $f(x) = (x - h)^2 + k$, where h and k are to be determined.

In other words, figure out what h and k must be. Does this function have a maximum or minimum?

6) The following diagram shows part of the graph of a quadratic function f .

The x -intercepts are at $(-4, 0)$ and $(6, 0)$ and the y -intercept is at $(0, 240)$.



(a) Write down $f(x)$ in the form $f(x) = -10(x - p)(x - q)$.

(b) Find another expression for $f(x)$ in the form $f(x) = -10(x - h)^2 + k$.

(b) Show that $f(x)$ can also be written in the form $f(x) = 240 + 20x - 10x^2$.

(c) A particle moves along a straight line so that its velocity, v in meters per second, at time t seconds is given by $v = 240 + 20t - 10t^2$, for $0 \leq t \leq 6$.

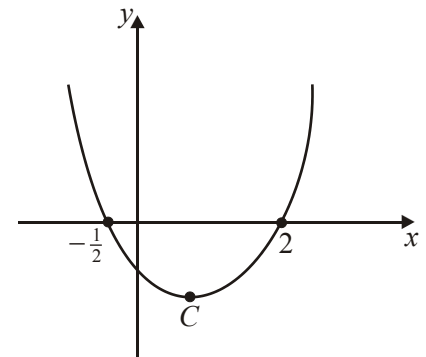
(i) Find the value of t when the speed of the particle is greatest.

(ii) What is the particle's initial velocity?

7) The diagram represents the graph of the function

$$f: x \mapsto (x - p)(x - q).$$

(a) Write down the values of p and q .



(b) The function has a minimum value at the point C . Find the coordinates of C .

(c) Describe the transformation that changes the function $g(x) = x^2$ into $f(x)$ above.