My mathematical journey

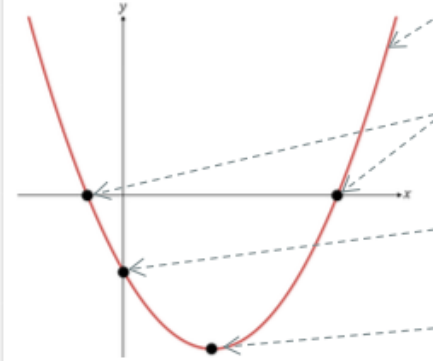| What do I need to remember from before?	What will I learn about in this unit?	Where does this lead?
Substitution (A5) Linear and quadratic graphs (A6) Factorising quadratics (A11)	Solving quadratic equations using graphs, factorising, the quadratic formula and completing the square Sketching graphs of quadratics using their key features	Quadratic sequences (A13) Advanced quadratic equations (A14) Quadratic inequalities (A14) A-Level Mathematics

Key words and symbols: what I need to say and write accurately

Word	Explanation
parabola	The shape of a quadratic graph.
roots	The points on the graph of $y = ax^2 + bx + c$ where $y = 0$. These are the solutions to the equation $ax^2 + bx + c = 0$ and are the points where the graph crosses the x-axis.
y-intercept	Where a graph crosses the y-axis. This is the point where $x = 0$, so on a quadratic graph with equation $y = ax^2 + bx + c$, its value is c.
vertex/ turning point	The minimum or maximum point on a quadratic graph. Its x-coordinate is the midpoint of the roots. The vertical line through the vertex is the graph's line of symmetry.

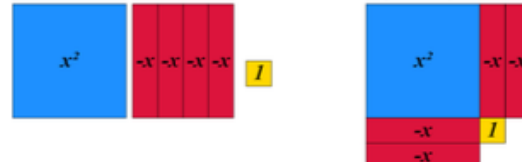## Fingertip facts: what I need to learn by heart

The quadratic formula

Every quadratic equation of the form $ax^2 + bx + c = 0$ can be solved using the quadratic formula:

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Completing the square

Every quadratic expression of the form $x^2 + bx + c$ can be written as an adjustment to a perfect square, $(x + p)^2 + q$.

e.g. $x^2 - 4x + 1$ is 3 less than the perfect square $(x - 2)^2$.

$x^2 - 4x + 1$　　　$\equiv$　　　$(x - 2)^2 - 3$

Deciding how to solve a quadratic

If the quadratic *can* be factorised, do so to solve.

If the quadratic *cannot* be factorised, you should either complete the square (which is easier when $a = 1$) or use the quadratic formula.