# Some (structured) notes on quadratic equations

## Quadratic equations

A **quadratic equation** is an equation with the form where:

* represents an unknown and
* , and are known numbers with .

## Solutions to a quadratic equation

A solution to a quadratic equation is a value of such that the equation balances. The solutions to quadratic equations can be found by using the quadratic formula:

### The discriminant

The expression beneath the square root symbol in the quadratic formula is called the **discriminant**:

We can use this to determine the number of real roots a quadratic equation has:

| **Value of** | **Real roots** |
| --- | --- |
|  | Two, distinct |
|  | One, repeated |
|  | Zero |

**Example**

Figure : [For interactive graph go to Desmos](https://www.desmos.com/calculator/0wm3zxtsym)

[Three separate quadratic graphs

Horizontal and vertical axes without scale with three separate quadratic graphs shown.  

The left most quadratic opens upwards, crosses the horizontal axis twice, is labelled capital delta greater than 0 and is drawn in blue. 

The central quadratic opens upwards, does not cross the horizontal axis, is labelled capital delta less than 0 and is drawn in yellow. 

The right most quadratic opens downwards, touches the horizontal axis at a single point, is labelled capital delta equals 0 and is drawn in red. 
](https://www.desmos.com/calculator/0wm3zxtsym)