

## 1.7 Quadratic Formula and Discriminant

$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$  is the quadratic formula. It is derived by completing the square on  $ax^2 + bx + c = 0$

The quadratic formula is used to determine the roots of the quadratic. Roots are values that make the equation equal to zero. This is in contrast to x-intercepts which tell you where the graph crosses the x-axis.

Fun fact - not required:

Under the square root in the quadratic formula is the discriminant.  $\Delta = b^2 - 4ac$  is the notation for just the discriminant. The discriminant is used to determine the nature of the roots:

- $\Delta = b^2 - 4ac > 0$  tells you that there are 2 real distinct roots and/or 2 x-intercepts.
- $\Delta = b^2 - 4ac = 0$  tells you that there are 2 real non-distinct roots and/or 1 x-intercept.
- $\Delta = b^2 - 4ac < 0$  tells you that there are 2 complex roots and/or 0 x-intercepts.

Complex Numbers are numbers in the form  $a + bi$  where  $a$  and  $b$  are real numbers and

$$i = \sqrt{-1}$$

Ex 1 Calculate the roots and use the discriminant to determine the nature of the x-intercepts.

(a)  $3x^2 + 4x - 5 = 0$

(b)  $3x^2 + 4x + 5 = 0$

(c)  $x^2 + 6x + 9 = 0$

p.177#1,2,4,6,7,9,10

There was a negative boy who couldn't decide whether or not to go to the radical party. He decided to be square and miss out on four awesome chicks. The party was over at 2AM.