3.1 Factorising Quadratics

In general, a quadratic equation is an equation of the form $y = ax^2 + bx + c$.

When given a specific quadratic to work on the letters *a*, *b* and *c* will be replaced with numbers. You might, for example be asked to ***factorise*** the quadratic equation,

$$y = x^2 + 11x + 24$$

In this example $a = 1$, $b = 11$ and $c = 24$.

The 1, 11 and 24 are constants in this example. They are consistent, meaning they don't change. The *x* and the *y* are variables; they are free to vary which means that changing one, changes the other.

The word ***factorise*** in this context means to ***make brackets***.

To keep things simple (to begin with) we will work on questions where $a = 1$. When asked to factorise such a quadratic the task is to find an equivalent expression of the form $y = (x + A)(x + B)$ where *A* and *B* are two real numbers (called the ***negative roots*** of the quadratic) that are to be found.

3.2 The Theory

We want to rewrite $y = x^2 + bx + c$

in the form $y = (x + A)(x + B)$

In the space below, expand the brackets, gather together like terms and write two conclusions in which you relate *A* and *B* to *b* and *c*.

3.3 Three Examples

Example #1

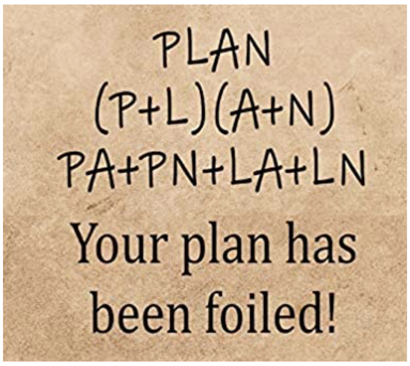
Factorise $y = x^2 + 11x + 24$

Example #2

Factorise $y = x^2 + 3x - 10$

Example #3

Factorise $y = 3x^2 - 15x + 18$



3.4 Exercise

Question 1

Factorise;

(i) $y = x^2 + 10x + 21$

(ii) $y = x^2 + 11x + 30$

(iii) $y = x^2 + 9x + 14$

(iv) $y = x^2 + 8x + 15$

(v) $y = x^2 + 14x + 33$

(vi) $y = x^2 + 6x + 9$

(vii) $y = x^2 + 10x + 9$

(viii) $y = x^2 + 14x + 13$

(ix) $y = 10x^2 + 140x + 480$

(x) $y = 2x^2 + 36x + 154$

Question 2

Factorise;

(i) $y = x^2 + 2x - 3$

(ii) $y = x^2 + 5x - 14$

(iii) $y = x^2 + 9x - 22$

(iv) $y = x^2 + 2x - 15$

(v) $y = x^2 - 2x - 15$

(vi) $y = x^2 - 4x - 21$

(vii) $y = x^2 - 8x - 20$

(viii) $y = x^2 - 8x - 33$

(ix) $y = 3x^2 - 9x - 120$

(x) $y = 5x^2 - 30x - 200$

Question 3

Factorise;

(i) $y = x^2 - 5x + 6$

(ii) $y = x^2 - 8x + 15$

(iii) $y = x^2 - 10x + 21$

(iv) $y = x^2 - 9x + 20$

(v) $y = x^2 - 10x + 25$

(vi) $y = x^2 - 7x + 6$

(vii) $y = x^2 - 10x + 16$

(viii) $y = x^2 - 8x + 12$

(ix) $y = 4x^2 - 60x + 176$

(x) $y = 10x^2 - 140x + 490$

Question 4

Factorise;

(i) $y = x^2 + 15x + 50$

(ii) $y = x^2 + 5x - 50$

(iii) $y = x^2 - 15x + 50$

(iv) $y = x^2 - 5x - 50$

Question 5

A quadratic has two real negative roots, A and B.
The sum of the negative roots is 13.
The product of the negative roots is 42.
What are the two negative roots ?

Question 6

A quadratic has two real negative roots, A and B.
The sum of the negative roots is 5.
The product of the negative roots is – 204.
What are the two negative roots ?