FACTORISATION OF QUADRATIC EXPRESSIONS

Quadratic expression is of the form $ax^2 + bx + c$

To factorise a quadratic expression:

1. Identify the coefficient of the highest power, multiply it by the constant term.

2. Look for two factors of the value in (a) above that must also add up to give the middle term.

3. This will make the equation become four terms, then group in twos and factorise.

EXAMPLES

1. Factorise $a^2 + 12a - 45$

   Solution:

   Multiply the coefficient of a^2 (which is 1) by the constant term (-45): 1 * -45 = -45

   Look for two factors of -45 that add up to the middle term's coefficient (12).

   +15 x -3 = -45

   +15 + (-3) = +12

Rewrite the middle term using these factors:

$a^2 + 15a - 3a - 45$

Group the terms in twos:

$(a^2 + 15a) - (3a + 45)$

Factor out the common factor from each group:

$a(a + 15) - 3(a + 15)$

Notice that (a + 15) is a common factor. Factor it out:

$(a - 3)(a + 15)$

2. Factorise $3c^2 + 14c + 16$

Solution:

Multiply the coefficient of c^2 (which is 3) by the constant term (16): 3 * 16 = 48

Look for two factors of 48 that add up to the middle term's coefficient (14).

+8 x +6 = +48

+8 + +6 = +14

Rewrite the middle term using these factors:

$3c^2 + 8c + 6c + 16$

Group the terms in twos:

Here is the continuation:

$(3c^2 + 6c) + (8c + 16)$

Factor out the common factor from each group:

$3c(c + 2) + 8(c + 2)$

Notice that (c + 2) is a common factor. Factor it out:

$(3c + 8)(c + 2)$

SOLVING QUADRATIC EQUATION

EXAMPLES

1. Solve $x^2 + 17x - 18 = 0$

   Solution:

   $x^2 + 18x - 1x - 18 = 0$

   $(x^2 + 18x) - (1x + 18) = 0$

   $x(x + 18) - 1(x + 18) = 0$

   $(x - 1)(x + 18) = 0$

   So, either:

   $x - 1 = 0$ OR $x + 18 = 0$

   $x = 1$ OR $x = -18$

2. Solve $m^2 = 11m + 42$

Solution:

First, rearrange the equation to the standard quadratic form ($m^2 + bm + c = 0$):

$m^2 - 11m - 42 = 0$

Now, factorise the quadratic expression:

$m^2 - 14m + 3m - 42 = 0$

$(m^2 - 14m) + (3m - 42) = 0$

$m(m - 14) + 3(m - 14) = 0$

$(m + 3)(m - 14) = 0$

So, either:

$m + 3 = 0$ OR $m - 14 = 0$

$m = -3$ OR $m = 14$