**Factorizing quadratic expressions**

When you start learning about algebra you are introduced to quadratic expressions. To simplify algebraic expressions and understand the various characteristics of quadratic functions factorization is a useful technique. Let’s dive into how to factorize quadratic expressions.

**Identifying a quadratic expression**

A quadratic expression is a polynomial where the highest power of the variable/unknown is 2.

Challenge:

Which of the following are quadratic expressions?

From the above expression 1, 2, 4, and 5 are all quadratic expressions. Expression 3 is cubic as the highest power of the variable (a) is 3.

**Factorizing quadratic expressions**

Factorizing an expression is about rewriting an expression as a product of one or more expressions. In quadratic expressions we are looking to convert expressions of the form into the following form:

To do this we can utilize the **ac** method.

**The ac method**

Consider the example

Step 1: Identify the coefficients a,b, and c

a is the coefficient of , therefore a = 2

b is the coefficient of x, therefore b = -7

c is the constant term, therefore c = 6

Step 2: Determine ac

ac = 12

Step 3: Select the suitable factor pair of **ac**

Here we need to consider the factor pairs of -12, which can be used to rewrite the middle term.

The factor pairs of -12 are:

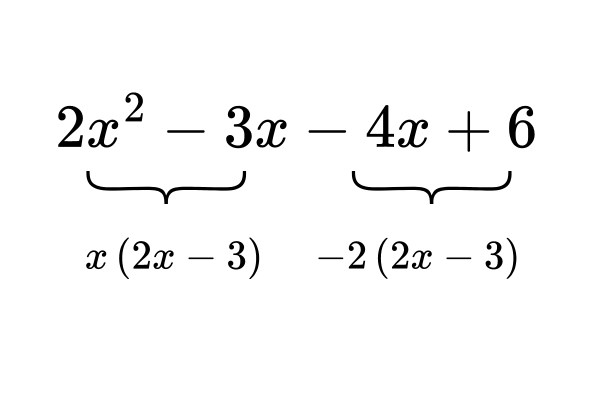


Out of these, we need to pick the factor pairs of which the sum is equivalent to -7 (b). The factor -3 and -4 should be selected as -3 + -4 = -7.

Step 4: Rewrite the middle term as a sum of the selected factor pair

Step 5: Factorize in pairs

Now that we have broken down the quadratic expression into 4 terms, we can factorize in pairs, as shown below.



To factorize we select the common factor out of each expression:

Step 6: Factorize fully

We can see that (2x-3) is a common factor hence we can rearrange the expression as:

(2x-3)(x-2)

**Special Quadratic Expressions**

1. Difference of squares

The difference of squares is a special form of quadratic expressions. It takes the form:

This can be factored into:

Example: Factorize

This can be recognized as the difference of squares :

Therefore it can be factored as :

1. c = 0

When a quadratic expression has the form , where there is no term independent of x, it can be factored as follows:

Example: Factorize

This can be factored in by identifying the common factors :