

Factorisation

Factorisation is the reverse process of expanding brackets. There are 3 types of factorisation.

1 – COMMON FACTOR

Look for the highest common factor (hcf) of all terms in the expression.

The hcf goes outside the bracket.

Divide the expression by the hcf to find what goes inside the bracket.

Examples Factorise $6x + 9y$

Each term can be divided by 3, so 3 is outside the bracket.

Dividing by 3 gives $2x + 3y$, this goes inside the bracket.

$$6x + 9y = 3(2x + 3y)$$

Factorise $x^2 + 5x$

Each term can be divided by x , so x is outside the bracket.

Dividing by x gives $x + 5$, this goes inside the bracket.

$$x^2 + 5x = x(x + 5)$$

2 – DIFFERENCE OF SQUARES

This is used when you have a SQUARED term MINUS a SQUARED term. e.g. $x^2 - 25$

This factorises into 2 pairs of brackets. e.g. () ()

The square root of the first term goes into the start of each bracket. e.g. $(x \quad)(x \quad)$

The square root of the second term goes into the end of each bracket. e.g. $(x \quad 5)(x \quad 5)$

One bracket will have a plus sign the other will have a minus sign. e.g. $(x + 5)(x - 5)$

3 – TRINOMIAL (QUADRATIC)

To factorise a quadratic it is best to look at how we expand a pair of brackets.

$$(x + 2)(x + 5) = x^2 + 5x + 2x + 10 = x^2 + 7x + 10$$

The numbers in the brackets ADD to give the coefficient of the x term.

The numbers in the brackets MULTIPLY to give the end term.

So to factorise $x^2 + 7x + 10$ we want 2 numbers that ADD to give 7 AND MULTIPLY to give 10.

This gives us 2 and 5. These numbers go into the brackets with the x term.

Examples Factorise $x^2 + 3x + 2$

The numbers that add to give 3 and multiply to give 2 are 1 and 2.

$$x^2 + 3x + 2 = (x + 2)(x + 1)$$

Factorise $x^2 - x - 6$

The numbers that add to give -1 and multiply to give -6 are -3 and 2.

$$x^2 - x - 6 = (x - 3)(x + 2)$$

To factorise $3x^2 + 10x + 7$ we have to use a different method.

The brackets must have a $3x$ and a x to give $3x^2$. $(3x \quad)(x \quad)$

The numbers in the brackets still MULTIPLY to give the end term but they do NOT add to give the coefficient of the x term.

$$\text{So } 3x^2 + 10x + 7 = (3x + 7)(x + 1)$$

Factorisation Practice

http://www.cimt.plymouth.ac.uk/projects/mepres/book8/bk8i8/bk8_8i3.htm

Revise COMMON FACTOR FACTORISATION.

http://www.bbc.co.uk/bitesize/standard/maths_i/relationships/manipulation/revision/4/

Revise COMMON FACTOR FACTORISATION and try the TESTBITE.

http://www.bbc.co.uk/bitesize/standard/maths_ii/algebra/factorising_quadratics/revision/2/

Revise QUADRATIC FACTORISATION and try the TESTBITE.

http://www.cimt.plymouth.ac.uk/projects/mepres/book9/bk9i11/bk9_11i3.html

Practice COMMON FACTOR, DIFFERENCE OF SQUARES and QUADRATIC factorisation.

<http://www.supermathsworld.com/> Ask your teacher for the login details.

Select ALGEBRA from the menu. Select FACTORISING 1 and FACTORISING 2. Try on EASY, MEDIUM and HARD level.