

Basic Algebra

Algebraic Indices

Simplify

$$8qr^2 \times 3qr = 24q^2r^3$$

You must use the rules of indices when simplifying with algebra

Solving Equations

Solve $3(x + 5) = 21$

Expand first

$$3x + 15 = 21$$

Solve for x

$$3x = 6$$

$$x = 2$$

Substitution

When we substitute values into a formula we take out the variables and put in the numbers.

Example: $2a + 4b$

Where $a = -3$ and $b = 5$

You do $2 \times -3 = -6$

And $4 \times 5 = 20$

Then add them together:

$$-6 + 20 = 14$$

Expanding Single Brackets

Expand $3(x + 4 + y)$

Multiply in grid method

x	x	4	y
3	$3x$	12	$3y$

$$3(x + 4 + y) = 3x + 12 + 3y$$

Expanding double brackets

Expand $(x + y)(x + y)$

Multiply in grid method

x	x	y
x	x^2	xy
y	xy	y^2

$$= x^2 + xy + xy + y^2 = x^2 + 2xy + y^2$$

Expanding

Expanding double brackets that look like single brackets

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

Multiply in grid method

x	x	1
x	x^2	x
1	x	1

$$= x^2 + x + x + 1 = x^2 + 2x + 1$$

When expanding brackets it is

easier to use grid method.

Make sure you simplify at the end

Unit 2: Algebra

Factorising Single Brackets (Numbers)

Factorise $10x + 15$.

Find the HCF of the numbers.

$$10x + 15 = 5(2x + 3)$$

HCF = 5

Divide each term by the HCF and close the bracket.

Factorising into a single bracket

Variables and numbers

Factorise $2ab + 4b$.

Find the HCF of the variables.

$$2ab + 4b = 2b(a + 2)$$

HCF = 2

HCF = b

Divide each term by the HCFs and close the bracket.

Only 'open the brackets' once all HCFs are found.

Factorising Double Brackets

Factorise the following quadratic expression into double brackets.

$$x^2 + 9x + 18 = (x + 6)(x + 3)$$

Factors of 18

1, 18

2, 9

3, 6

Write a list of factor pairs of the constant term.

Choose the pair that add to make "+9".

Why must the factor pair be... ?
positive \times positive
negative \times negative

You can put these in either bracket!

Linear Sequence

Find the n th term of the following sequence:

14, 12, 10, 8, 6 ...

$$\begin{matrix} \text{ } & \text{ } & \text{ } & \text{ } & \text{ } \\ \text{ } & \text{ } & \text{ } & \text{ } & \text{ } \\ \text{ } & \text{ } & \text{ } & \text{ } & \text{ } \\ \text{ } & \text{ } & \text{ } & \text{ } & \text{ } \\ \text{ } & \text{ } & \text{ } & \text{ } & \text{ } \end{matrix} \begin{matrix} \text{ } \\ \text{ } \\ \text{ } \\ \text{ } \\ \text{ } \end{matrix} = -2n$$

To find the constant we find the term before
The 1st term which is 16

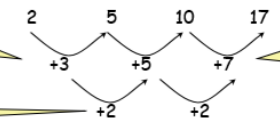
$$\text{The } n\text{th term is } = -2n + 16$$

Quadratic Sequence

Example: Find the formula for the n th term of the sequence:

2, 5, 10, 17

Find the differences



Not constant so find second differences

This is constant

The second difference is **CONSTANT** so the formula for the n th term must contain n^2 . The number in front of n^2 is **half** the constant difference.

n^2

This is constant so now we can work out the n th term

Term number	1	2	3	4
Sequence	2	5	10	17
	+1	+1	+1	+1
n^2	1	4	9	16

$$n^2 + 1$$

Factorising

Sequences