Basic Algebra

Algebraic Indices
Simplify

You must use the **rules of indices** $8qr^2 \times 3qr = 24q^2r^3$ 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 x −3 = -6

And 4 x 5 = 20

Then add them together:

-6 + 20 = 14

Unit 2: Algebra

Expanding

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 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

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

Expanding double brackets

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

Multiply in grid method

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

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

When expanding brackets it is easier to use grid method.

Make sure you simplify at the end

Factorising

Factorising Single Brackets (Numbers)

Factorise $10x + 15$.

Find the **HCF** of the numbers.
HCF = 5

Divide each term by the HCF and close the bracket.

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

Factorising into a single bracket
Variables and numbers

Factorise $2ab + 4b$.

Find the **HCF** of the variables.
HCF = 2
HCF = b

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

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.

$x^2 + 9x + 18$ Factors of 18
$= (x + 6)(x + 3)$ 1, 18
                       2, 9
                       3, 6

Write a **list of factor pairs** of the **constant term.**

You can **put these in either bracket**!

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

Why must the factor pair be… ?
positive × positive
negative × negative

Sequences

Linear Sequence

Find the nth term of the following sequence:

14, 12, 10, 8, 6 …. .

-2   -2   -2   -2   = -2n

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

The nth term is = -2n + 16