Year 8 – Algebra Techniques
Brackets, Equations & Inequalities

What do I need to be able to do?

By the end of this unit you should be able to:
- Form Expressions
- Expand and factorise single brackets
- Form and solve equations
- Solve equations with brackets
- Represent inequalities
- Form and solve inequalities

Keywords

Simplify: grouping and combining similar terms

Substitute: replace a variable with a numerical value

Equivalent: something of equal value

Coefficient: a number used to multiply a variable

Product: multiply terms

Highest Common Factor (HCF): the biggest factor (or number that multiplies to give a term)

Inequality: an inequality compares who values showing if one is greater than, less than or equal to another

Form expressions

For unknown variables, a letter is normally used in its place

More than – ADD

Less than/ difference – SUBTRACT

eg 4 more than t $\longrightarrow$ t + 4

8 less than k $\longrightarrow$ k − 8

Only similar terms can be grouped together

eg Find the perimeter of this shape
(Perimeter = length around outside of shape)

t + 2t + 1 + t + 2t + 1 $\longrightarrow$ 6t + 2

(rectangle labelled t, 2t + 1)

Directed numbers

+ + $\longrightarrow$ +
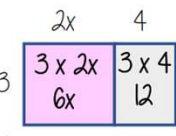
− − $\longrightarrow$ +

+ − $\longrightarrow$ −

− + $\longrightarrow$ −
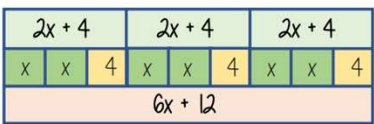
eg a = -5 and b = 2
$a^2 = a \times a = -5 \times -5 = 25$
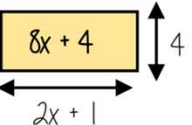$b + a = 2 + -5 = -3$

Multiply single brackets

$3(2x + 4)$

	2x	4
3	3 x 2x / 6x	3 x 4 / 12

6x + 12

6x + 12

2x + 4	2x + 4	2x + 4

6x + 12

Different representations of 3(2x+4) = 6x + 12

Factorise into a single bracket

$8x + 4$

(rectangle labelled 8x + 4, with sides 4 and 2x + 1)

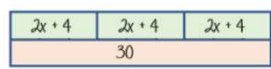Try and make this the **highest common factor**

The two values **multiply** together (also the area) of the rectangle
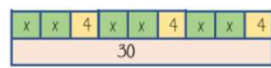
$8x + 4 \equiv 4(2x + 1)$

Note:
$8x + 4 \equiv 2(4x + 2)$
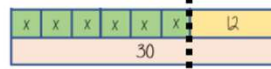This is factorised but the HCF has not been used
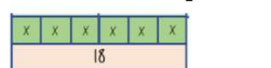
Solve equations with brackets

$3(2x + 4) = 30$

2x + 4	2x + 4	2x + 4

30

30

30

18

$3(2x + 4) = 30$

Expand the brackets

$6x + 12 = 30$

−12   −12

$6x = 18$

÷ 6   ÷ 6

$x = 3$

Substitute to check your answer. This could be negative or a fraction or decimal

Simple Inequalities

< less than

≤ Less than or equal to

> More than

≥ More than or equal to

x < 10
Say this out loud "x is a value less than 10"

10 > x
Say this out loud "10 is more than the value"

Note:
x < 10 and 10 > x represent the same values

$x + 2 \leq 20$
"my value + 2 is less than or equal to 20"
$x \leq 18$
The biggest the value can be is 18

Form and solve inequalities

Two more than treble my number is greater than 11

Find the possible range of values

Form

x $\longrightarrow$ x3 $\longrightarrow$ +2 $\longrightarrow$ 11

$3x + 2 > 11$

Solve

x $\longleftarrow$ ÷3 $\longleftarrow$ −2 $\longleftarrow$ 11

$x > 3$

Check

This would suggest any value bigger than 3 satisfies the statement

$3 \times 3 + 2 = 11 ✓$ $10 \times 3 + 2 = 32 ✓$

Algebraic constructs

Expression
A sentence with a minimum of two numbers and one maths operation

Equation
A statement that two things are equal

Term
A single number or variable

Identity
An equation where both sides have variables that cause the same answer includes ≡

Formula
A rule written with all mathematical symbols
eg area of a rectangle $A = b \times h$