Maths Expressions & Formulae

Algebra Definition

Algebra uses letters in place of an unknown number. Each different letter used in an equation means it is representing a different value.

e.g.

$x + 3 = 7$

x is used in place of a number not known and is called a the unknown variable

$5 \times 8 = 40$

*Product
The answer to a multiplication problem

Subject

Single letter on left side of = sign
s = 10t+4

Using a Formula

A fact or rule that uses mathematical symbols / letters
It will usually have:
An equals sign =

volume = length x width x height
v = l x w x h
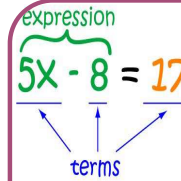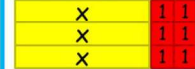
Rules of Algebra

Never write a x sign for multiplying → 5a not 5 x a
Write combined letters alphabetically → ab not ba
Never write a ÷ sign, use a fraction → $\frac{2}{}$ not $x \div 2$
In products*, write numbers before letters. → 2xy not yx2

Expanding single brackets

To expand a single bracket, multiply whatever is inside the bracket by the number outside.

Here is x + 2:

| x | 1 1 |

3(x + 2) means 3 lots of x + 2 and would look like this:

x	1 1
x	1 1
x	1 1

Altogether this is 3x + 6.
Algebraically, we would write:
3(x + 2) = 3x + 6.

We have multiplied each term inside the bracket by 3.

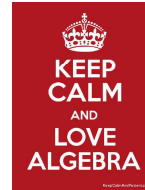$4(x + 3) = 4x + 12$ $4 \times x = 4x$ $4 \times 3 = 12$

$5(2x + 4) = 10x + 20$ $5 \times 2x = 10x$ $5 \times 4 = 20$

Watch out!
Be really careful with negatives!

$3(x - 3) = 3x - 9$ Remember: $- \times - = +$

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

Remember:
-x - = +

expression
$5X - 8 = 17$
terms

Expression is part of a sum without the = sign
Terms are each part of the sum

Simplify

VARIABLE
A letter to represent a number

Collect all the terms with the same letter into one group and all the numbers into a group and simplify

$1x = x$
No need to write the 1!

Collect like terms

$4a + 5 + 2a - 3$

$= 6a + 2$

Like Terms ?

1) **4g** and **4h**   NO – letter variables are different.

2) **3h** and **-h**   YES – letters the same ($^-h = ^-1h$)

3) **5x** and **4xy**   NO – letter variables are different.

4) $2x^2y^3$ and $2x^2y^5$ NO – y powers are different.

5) $5p^2q^3$ and $-4p^2q^3$ YES – letters & powers same

IN OUT
12 x

Writing a Formula

Joe works at a car wash on Sundays.
He is paid a basic wage of £10 and a bonus of £3 for each car washed.

w = wage
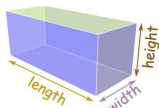**n = number of cars washed**
10 = basic wage

Formula:
w = 3n +10

Substitution

You can substitute a value into an expression (or formula) to find its value

If a = 3
$4a + a^2 = x$
$4 \times 3 + 3^2 = 12 + 9$
$x = 21$

KEEP CALM AND LOVE ALGEBRA

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