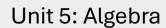


Year 10 Maths





writing algebra...

$$4 \times a$$
 is written: $4a$

$$a \times 1$$
 is written: a

$$b \times a$$
 is written: ab

$$a \times a$$
 is written: a^2

$$a \div 5$$
 is written:

Write the number first

Write divide as a fraction, from top to bottom

types of algebra...

In algebra we use letters to represent 'mystery numbers'.

We call the letters: variables.

The smallest 'building block' of algebra is called a term.

e.g.
$$5a$$
, $2gh$, x^2 , 7 , $-4p$

A term which doesn't have a letter (a variable) is called a constant term.

e.g. 9,
$$-2$$
, $\frac{1}{3}$, 0.7

Terms are the simplest type of **expression**.

They can also be used to create more complex expressions.

e.g.
$$4a + 2b$$
, $\frac{x+y}{2}$, $5x^2 + 3x - 9$, $6(x-8)$

A number at the start of a term is called a **coefficient**.

e.g. In the expression 5x + 3y, the coefficient of x is 5.

An **equation** is a statement involving an equals symbol (=).

e.g.
$$2+5=8-1$$
, $3x+4=25$

An **identity** is a statement that is always true. (It links two equivalent expressions - the same thing, just written differently.)

Sometimes for an identity we use a special triple equals symbol: \equiv

e.g.
$$a + a + a \equiv 3a$$
, $2(x + 3) \equiv 2x + 6$, $4p + 2p + p \equiv 7p$

writing expressions...

EXAMPLE:

Write an expression for (a) 5 more than n

(b) 5 less than n

(c) 6 lots of n

6n

'5 more' means add 5

'5 less' means subtract 5

Replace the a with the 5

Then work out the answer

'lots of' suggests multiplication

Replace both m and c with their values

substitution...

When we replace a variable (letter) with a number (its **value**), we call this **substituting**.

EXAMPLE:

Find the **value** of 3a + 2 when a = 5.

$$3a + 2$$

$$= 3 \times 5 + 2$$

$$= 17$$

EXAMPLE:

Evaluate 2m - 5c when m = 8 and c = 2.

$$2m - 5c$$
= $2 \times 8 - 5 \times 2$
= $16 - 10$
= 6

negative numbers...

EXAMPLE: Work out

(a)
$$-5 + 8$$

$$-5 + 8 = 3$$

(b)
$$-5 - 8$$

$$-5 - 8 = -13$$

(c)
$$-4 \times 3$$

- (d) 4×-3
- (e) -4×-3

$$-4 \times 3 = -12$$

$$4 \times -3 = -12$$

$$-4 \times -3 = 12$$

(f)
$$-20 \div 5$$

(g)
$$-20 \div -5$$

$$-20 \div 5 = -4$$

$$-20 \div -5 = 4$$

(h) 7 + -5

(i)
$$7 - -5$$

$$7 + -5$$
 $7 - -5$

$$= 7 - 5$$
 $= 7 + 5$

can be replaced with

+ -

can be replaced with +

more substitution...

Positive divided

by negative is negative

Start at – 5 and add on 8

Subtracting 8 goes further into the negatives

$$3x-6 = -18$$

and 6 + -2

is the same

as 6 – 2

Multiplying a positive and

negative gives a negative answer.

Multiplying two

Multiplying two negatives gives a

positive answer.

The same rule works for dividing

EXAMPLE:

Find the value of $\frac{1}{2}$ when m = -5

$$20 \div -5$$

$$= -4$$

EXAMPLE:

Find the value

of 3a + b when

$$a = -6$$
 and $b = -2$

$\mathbf{a} = 3\mathbf{a} + \mathbf{b}$

$$= 3 \times -6 + -2$$

$$= -18 - 2$$

$$= -20$$

EXAMPLE: If x = -3,

find the value of $4x^2$

$$4x^{2}$$

$$=4\times(-3)^2$$

$$=4 \times 9$$

$$= 36$$

-3 x -3 = 9 (If using a calculator, make sure you include the brackets) A **formula** is another special type of equation. It is used for working something out. e.g.

$$P = 2a + 2b$$

P is the **subject** of this formula

This formula is in terms of a and b

The plural is **formulas**, or **formulae**.

formulas...

EXAMPLE: Use the formula H = 20 - 2m to find the value of H when m = 7.

$$H = 20 - 2m$$

$$= 20 - 2 \times 7$$

$$= 20 - 14$$

$$= 6$$

EXAMPLE: The formula V = IR is used in Physics to find a voltage (V) using the current (I) and resistance (R). Find the voltage if I=6 and R=3.

$$V = IR$$

$$= 6 \times 3$$

$$= 18 \text{ (volts)}$$

Substitute the value 7 for m

Don't be put off by the complicatedlooking question...

...just use the formula!