



Algebra

What do I need to be able to do?

By the end of this unit you should be able to:

- Use simple formulae
- Generate and describe linear number sequences
- Express missing number problems
- Find pairs of numbers that satisfy an equation with two unknowns
- Enumerate possibilities of combinations of two variables

Keywords

Equivalent — Equal value

Formula — A mathematics rule with letters e.g. $\text{area} = \text{width} \times \text{length}$

Formulae — More than one formula

Enumerate — To count or list things one by one

Unknown Value — A mystery number we do not know yet

Linear Number Sequence — A list of number that increase or decrease by the same amount each time e.g. 1, 3, 5, 7...

Letters — They represent numbers e.g. X and B

Estimation — A clever guess

Formulae

We use formulae as a set of rules to follow. You've used this when calculating the area of a surface e.g. $\text{width} \times \text{length} = \text{area}$, or $wl = a$. We don't write the multiplication symbol as it could be read as an x. Below are some other simple formulae.

$$7D = W$$

7 days = 1 week (we don't write 1)

$$24h = D$$

24 hours = 1 day

Linear Number Sequence

Here's the formula to create the following linear number sequence: 3, 5, 7, 9, 11...

$$2n + 1$$

N is the starting number. So if you want to find the 23rd number in the sequence, multiply 23 by 2, to get 46, then add 1, which equals 47.

Two Unknowns

Sometimes a question may have two unknowns. For these questions there are numerous values that count replace each letter. For example:

$$a + b = 10$$

Below are some of the possible positive integers that could replace a and b:

$$1 + 9 = 10 \quad 5 + 5 = 10$$

$$2 + 8 = 10 \quad 6 + 4 = 10$$

$$3 + 7 = 10 \quad 7 + 3 = 10$$

$$4 + 6 = 10 \quad 8 + 2 = 10$$

Missing numbers

Algebra can be used to uncover missing numbers. For example, if $3x$ is divided by 3, it produces x. You must then do the same to the following side of the equation to make it equal

$$\begin{array}{l} 3x = 24 \\ \div 3 \downarrow \quad \quad \downarrow \div 3 \\ x = 8 \end{array}$$

Enumeration

Using enumeration (working in a list — smallest to largest), it's possible to calculate all the possibilities, similar to the 'Two Unknowns'.

Value of a	Value of b
1	24
2	12
3	8
4	6
6	4
8	3
12	2
24	1

These are all of the positive integers

$$a \times b = 24$$