

YR6 Knowledge Organiser - Algebra

Key Concepts

- Use simple formulae.
- Generate and describe linear number sequences.
- Express missing numbers that satisfy an equation with 2 unknowns.
- Enumerate possibilities of combinations of 2 variables.

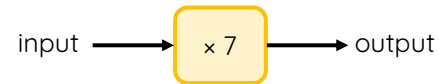
Key Vocabulary

- algebra
- formulae
- express
- equation
- rule
- function
- input / output
- substitute
- integer
- value
- variable

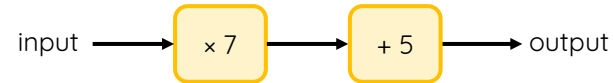


Find a Rule

Function machines perform operations on an input to produce an output. We can use function machines with one step:



We can use function machines with more than one step:



If we know the input to this two-step function machine, we can calculate the output.



“If the input is 6, then the output is 47 because $6 \times 7 = 42$ and $42 + 5 = 47$ ”

If we know the output, we can calculate the input by using inverse operations.

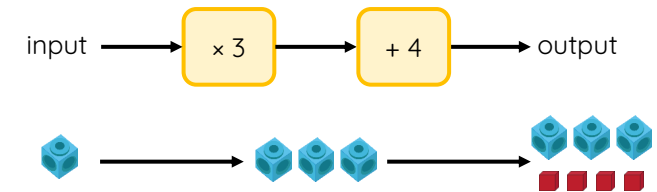
“If the output is 26, then the input is 3 because $26 - 5 = 21$ and $21 \div 7 = 3$ ”



Form Expressions

In addition to numerical inputs in function machines, we can use simple algebraic inputs.

Instead of a given number, we can use a letter to represent the input, e.g. ‘y’. If we need to multiply the input, we put the number we are multiplying by in front of the letter.



The expression to match the two-step function machine would be: **$3y + 4$**

Substitution

If we are given the value of the letters in an expression, we can substitute them to work out the value of the expression.

$$a = 6 \quad b = 10 \quad c = \frac{1}{2}$$

$$2a + b = 12 + 10 = 22$$

$$4a - 8c = 24 - 4 = 20$$

If we change the value of the letters, we need to substitute them again to work out the new value.

Formulae

A formula is a way to represent calculations. It is a factor or rule that uses mathematical symbols.



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It usually has an equals sign and two or more algebraic values.

Some formulae is used for different areas of mathematics. For example...

perimeter of rectangle = $(2 \times \text{length}) + (2 \times \text{width})$

$$P = 2l + 2w$$

We can also use formulae to work out values in everyday contexts.



"My older sister has a part time job. She gets paid £5 per hour and works 4 hours over the weekend."

P = pay

h = number of hours

$$P = £5 \times h$$

$$£20 = £5 \times 4$$

One-Step Equations

We can build on our knowledge of forming expressions to form one-step equations.

It is important to recognise and understand the difference between **expressions** such as $y + 4$ (which can take different values depending on the value of y) and **equations** such as $y + 4 = 11$ (where y has a specific value).



"I think of a number. I add 6. My answer is 13."



$$y + 6 = 13$$

Now that we understand how equations are formed, we can solve one-step equations. We can use a balancing method with inverse operations.

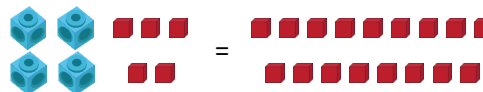
"y equals 7 because $13 - 6 = 7$ "



Two-Step Equations

We can apply the same balancing method with inverse operations to solve two-step equations.

$$4y + 5 = 17$$



$$17 - 5 = 12 \text{ and } 12 \div 4 = 3, \text{ so } y = 3$$

Find Pairs of Values

Our knowledge of substitution can be used to find the possible values of pairs of values. It is best to find one of the possible values first then work out what the other value would be.

A trial and improvement approach can be used but working systematically is much more efficient.

$$a - b = 3$$

Here are three possible solutions:

a	b
10	7
9	6
8	5

Now, we can explore equations with multiples of one or more unknown values. There may also be rules for the values which restrict the possibilities.

$$2c + 8 = d$$

c is an odd number; d is a multiple of 10

Here are three possible solutions:

c	d
1	10
11	30
21	50

