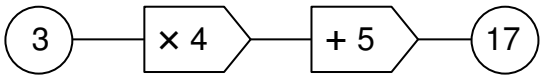
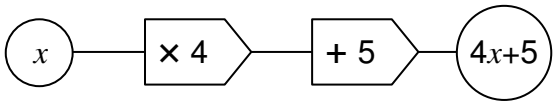
Functions

What is a function ?

You have seen number machines, also known as function machines.



We apply this to any input x:



And we can write this in a condensed form – known as 'function notation'.

$$f(x) = 4x + 5$$

This has 3 parts.

$f(x) = 4x + 5$ $\quad$ $f(x) = 4x + 5$ $\quad$ $f(x) = 4x + 5$

the input $\quad$ the rule $\quad$ the output

A function is simply a rule, to calculate a value from a given input.

x is the input to the function and indicates which letter the rule works on.

$f(x)$ is the value of the function

$4x + 5$ is the rule, that tells you how to calculate the value of the function.

Evaluating a function

Example 1:

Evaluate $f(x) = 5x - 3$ when $x = 2$

This means calculate $f(2)$

Replace x with 2 in the rule and complete the calculation.

So, $f(2) = 5(2) - 3 \rightarrow 10 - 3 \rightarrow 7$

The value of the function is: 7

Example 2:

Given $f(t) = t^2 + 3t + 7$, evaluate $f(-1)$

Replace t with –1 in the rule and complete the calculation.

So, $f(-1) = (-1)^2 + 3(-1) + 7$

thus: $f(-1) = 1 - 3 + 7 \rightarrow 5$

Any letter can be used to indicate a function, it does not have to be f.

Although usually, we tend to use the letters: f, g, h, k

The variable in the function does not have to be x.

Other common variable letters include: y, z, t, u, v

Try these examples:

1. Given that $f(m) = m^2 - 3m$, evaluate f(-5) [Ans. = 40]

2. $h(t) = 15t - 3t^2$ Find h(-2) [Ans. = –42]

3. $f(x) = 7 - 4x$ Evaluate f(-1) [Ans. = 11]

Reverse Functions

Sometimes we are given the output and have to work back to the input.

Example:

A function is given by: $g(x) = 7x - 2$

Find the value of a such that $g(a) = 19$

Solution:

$g(x) = 7x - 2$ so, $g(a) = 7a - 2$, but $g(a) = 19$

Hence: $19 = 7a - 2$, solve this equation to find that $a = 3$

Try this one:

$f(x) = 7 - 4x$

(a) Evaluate f(-2) [Ans. = 15]

(b) Given that f(t) = 9, find t [Ans. = –½]