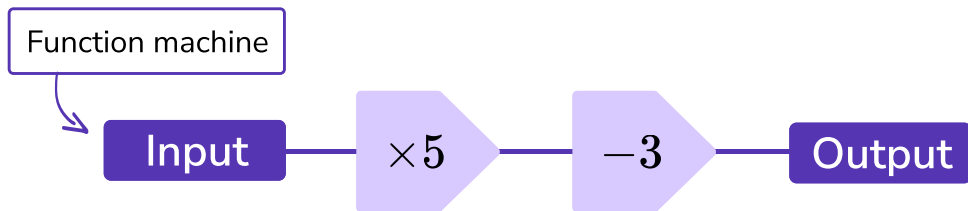


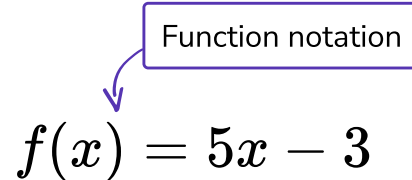
Functions

Functions are used to describe the operation being applied to an input in order to get an output.

 **Example** The rule “multiply by 5, then subtract 3”



Function notation

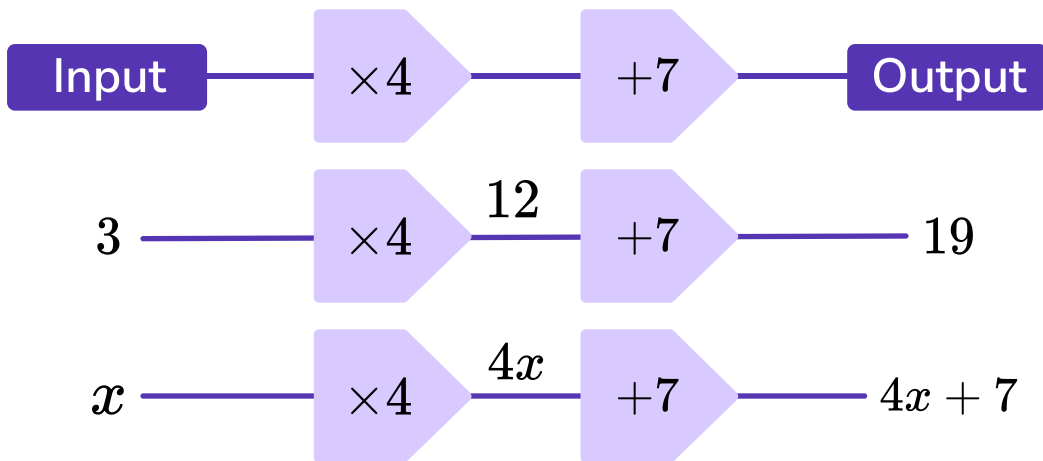

$$f(x) = 5x - 3$$

Function Machines

Function machines are used to apply operations in a given order to a value known as the **input**. The final value produced is known as the **output**.

Function machines can be used to solve number problems, solve equations and rearrange formulae.

 Example




Composite Functions

A **composite function** uses the output of one function as the input of another.

$fh(x)$ means that we substitute the **inner function** $h(x)$ into the **outer function** $f(x)$.

↑
We read this as “ f of h of x ”, or “ fh of x ”.

 **Example** If $h(x) = x^2$ and $f(x) = x - 5$ we can find an expression for $fh(x)$:

$$fh(x) = f[h(x)]$$

$$= f[x^2] \quad \leftarrow \text{apply the function } h \text{ first (squaring)}$$

$$= x^2 - 5 \quad \leftarrow \text{then apply the function } f \text{ (subtracting 5)}$$

Inverse Functions

Inverse functions are functions which reverse or “undo” another function.

To write the inverse of the function f , we use the notation f^{-1} .

 **Example** Find the inverse of $f(x) = 5x + 3$

write the function
using a “ y ”



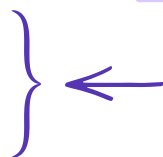
$$5y + 3 = x$$



set equal
to “ x ”

$$5y = x - 3$$

$$y = \frac{x - 3}{5}$$



rearrange
to make y
the subject

use f^{-1}
notation



$$f^{-1} = \frac{x - 3}{5}$$

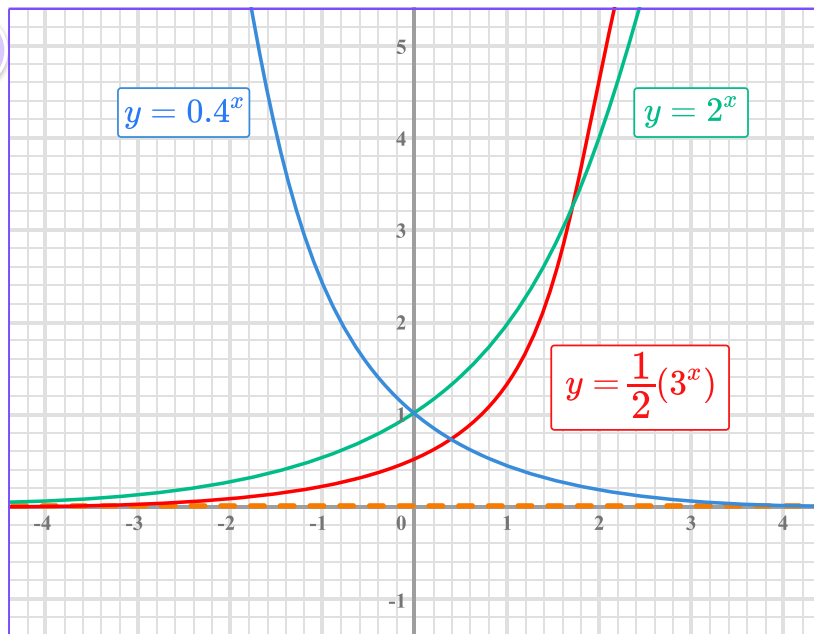
Exponential Functions

An **exponential function** is a mathematical function in the form $y = ab^x$

The graph of an exponential function has a **horizontal asymptote**.

a and b are constants with $b > 0$

 Example



The curve gets increasingly close to the x -axis but does not touch it.

These graphs all have a horizontal asymptote at $y = 0$ (the x -axis) because ab^x can never equal zero.