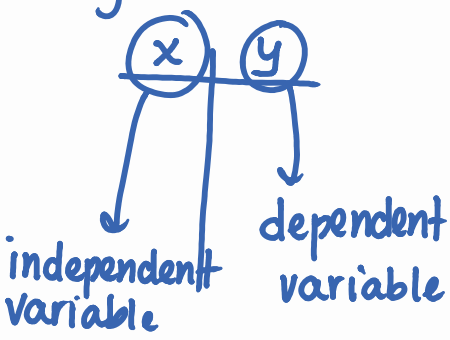
5.4 Function Notation

$y = 2x+3$



Functions can be represented in many different ways:

a) described in words
b) ordered pairs
c) arrow diagrams
d) table of values
e) equation form
- ✓ "normal" form
- ✓ **Function notation** Today!

Function notation is used to show the independent variable in a function.

- In general, we write: $y = f(x)$ → read this as "f of x"

dependent variable

independent variable

- We put the x in ( ) to show that it is the independent variable and that f depends on x.

* the ( ) do not indicate a multiplication

- The letter f is traditionally used in math but function notation but any letter can be used.

g(x) , h(x) , f(n)

Example 1: Write each function in function notation.

a) $y = 2x - 3$ b) $y = n^2 + 3$ c) $y = 2x^2 - 3x + 7$

replace y with f(x)

$f(n) = n^2 + 3$

$f(x) = 2x^2 - 3x + 7$

$f(x) = 2x - 3$

* only changed the dependent variable (y).

How Function Notation works

We often use function notation to find a specific value.

- What is the value of $f(x)$ (range) when given a specific value of x (domain)?

or

- What is the value of x (domain) when given a specific value of $f(x)$ (range)?

Example 2: Determine the value of the function $f(x)$ when given the indicated x-value.

a) Given the function $f(x)=3x-5$; find $f(3)$.

this is our given x-value.

$x = 3$

$f(x) = 3x - 5$

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

$= 9 - 5$

$f(3) = 4$

b) Given the function $g(x)=3x+1$; find $g(-2)$.

$x = -2$

$g(x) = 3x + 1$

$g(-2) = 3(-2) + 1$

$= -6 + 1$

$g(-2) = -5$

Example 3: Determine the value of x given the specific value of the function $f(x)$.

a) Given the function $f(x)=4x-2$; find the value of x when $f(x)=10$.

this is the value of f(x).

$f(x) = 4x - 2$

$10 = 4x - 2$

$+2 \quad +2$

$\frac{12}{4} = \frac{4x}{4}$

$3 = x$

b) Given the function $g(n)=2-3n$; find the value of n when $g(n)=8$.

$g(n) = 2 - 3n$

$8 = 2 - 3n$

$-2 \quad -2$

$\frac{6}{-3} = \frac{-3n}{-3}$

$-2 = n$ or $n = -2$

Example 4: The equation $V = -0.08d + 50$ represents the volume, V litres, of gas remaining in a vehicle's tank after travelling d kilometres. The gas tank is not refilled until it is empty.

a) Write the function in function notation.

$f(d) = -0.08d + 50$ or $V(d) = -0.08d + 50$

b) Determine the value of $V(600)$. What does this number represent?

↖ value of "d"

$V(600) = -0.08(600) + 50$

$= -48 + 50$

$= 2$

The gas tank's volume is 2L after driving for 600 km.

c) Determine the value of d when $V(d) = 26$. What does this number represent?

$V(d) = -0.08d + 50$

$26 = -0.08d + 50$

$-50 \quad -50$

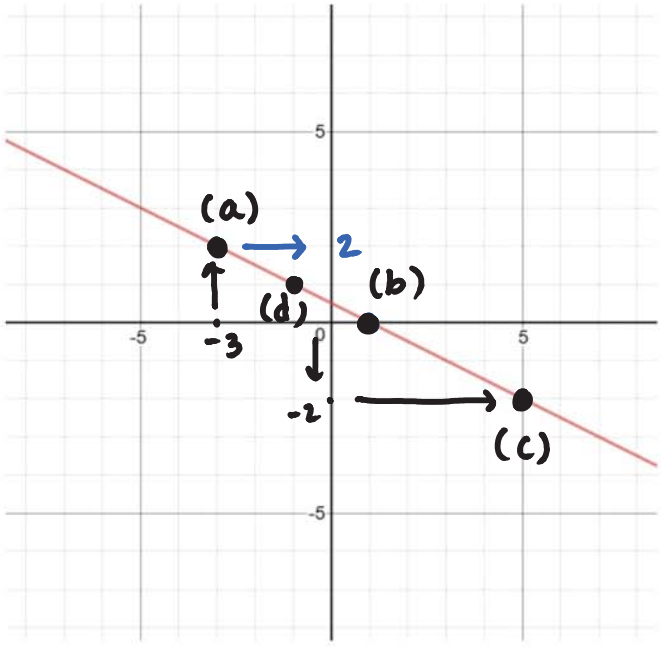
$-24 = -0.08d$

$\frac{-24}{-0.08} = \frac{-0.08d}{-0.08}$

$300 = d$

When the car has 26L left in its gas tank, it has traveled 300 km.

Example 5: The following is a graph of the function $f(x)$. Find:



x-value

a) $f(-3) =$ 2

b) $f(1) =$ 0

y-value

c) $f(x) = -2$ when $x =$ 5

d) $f(x) = 1$ when $x =$ −1