FUNCTIONS

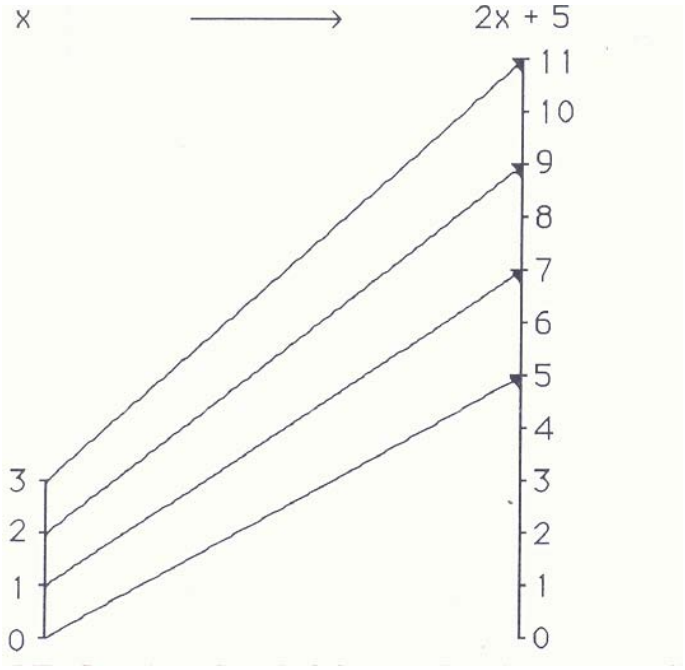
In the unit on simple graphs you were dealing with equations like y = 2*x* + 5. To find the value of y, a particular value of *x* was chosen and then substituted into the equation

e.g. when *x* = 1 y = 2(1) + 5
y = 2 + 5
y = 7

The value of y depends on the value of *x* we chose. Therefore *x* is called the **INDEPENDENT VARIABLE** and y is called the **DEPENDENT VARIABLE** i.e. y is a function of *x*
So instead of saying y = 2*x* + 5, we now say f:*x* Æ 2*x* + 5 or f(*x*) = 2*x* + 5
This means the function of *x* is 2*x* + 5.
This relationship can be shown on a **MAPPING** diagram.

Example 1

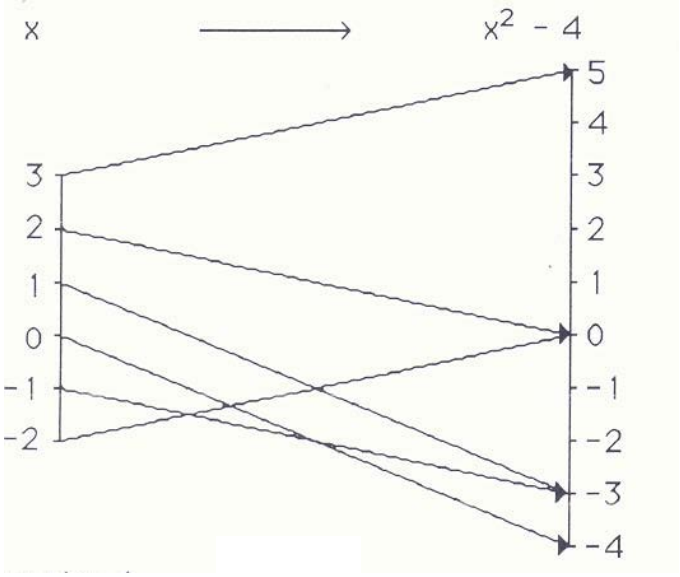
Draw the mapping diagram for *x* = 0, 1, 2, 3, f:*x* Æ 2*x* + 5



(**NB** Substitute 0, 1, 2, 3 for *x* to find the corresponding value).

Example 2

Draw the mapping diagram for x = -2, -1, 0, 1, 2, 3 f(x) = $x^2 - 4$



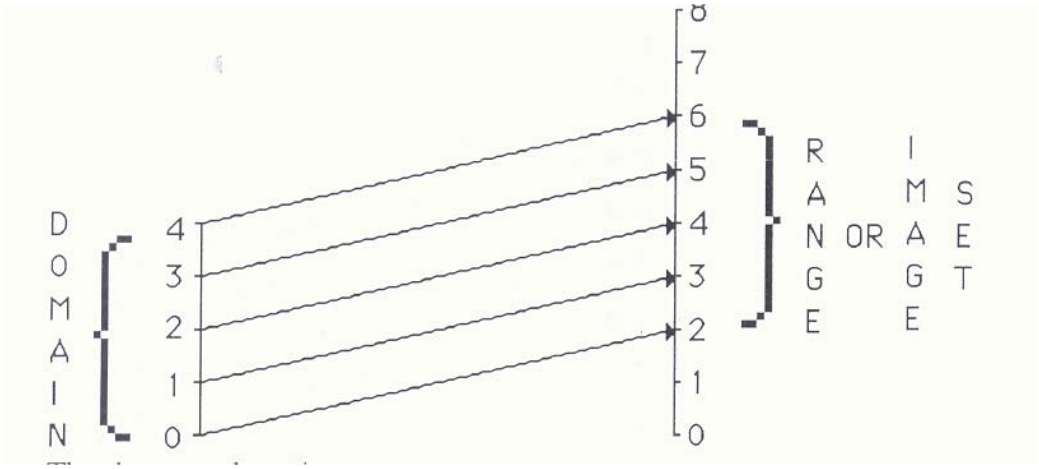
Exercise 1

1. Draw the mapping diagram for f(x) = x + 2 for the values of x = 0, 1, 2, 3, 4

2. Draw the mapping diagram for f(x) = $x^2 - x$ for the values of x = -1, 0, 1, 2, 3

The set of values of x which is used in the mapping is called the **DOMAIN**. In Exercise 1 question 1 the domain is 0 – 4. The corresponding values which are worked out when x is substituted in the function are called the **IMAGES**. In Exercise 1 question 1 the **IMAGES** are 2, 3, 4, 5, 6. The set of the images is called the **RANGE** i.e. the range is 2 – 6.

(x) _____ x + 2



The above can be written
f(0) = 0 + 2 = 2
f(1) = 1 + 2 = 3
f(2) = 2 + 2 = 4
f(3) = 3 + 2 = 5
f(4) = 4 + 2 = 6

Example 3

Find f(2) if f(x) = x^2 – 1
f(2) means the value of the function when x = 2

f(2) = 2^2 – 1
= 4 - 1
= 3

Example 4

Find f(-1) if f(x) = 3x – 2
f(-1) means the value of the function when x = -1

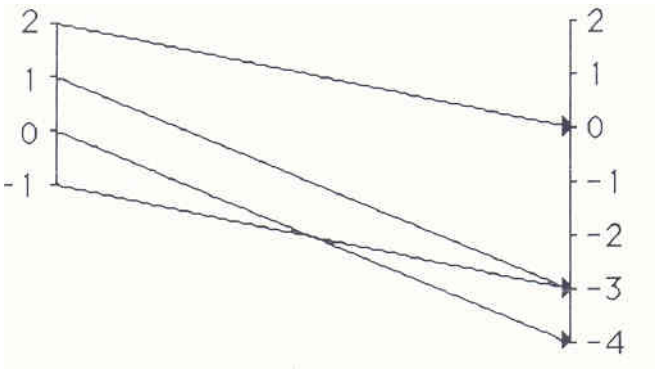
f(-1)= 3(-1)-2
= -3 – 2
= -5

Example 5

Calculate the range of the function f if f is defined by f:x Æ x^2 – 4 for
-1 ≤ x ≤ 2

NB "f:x" is the same as "f(x)". The end values of the domain **i.e** – 1 and 2 **DO NOT ALWAYS** give the end points of the range therefore work out all the values as shown below.

x _____ x^2 – 4



The range is from -4 to 0.

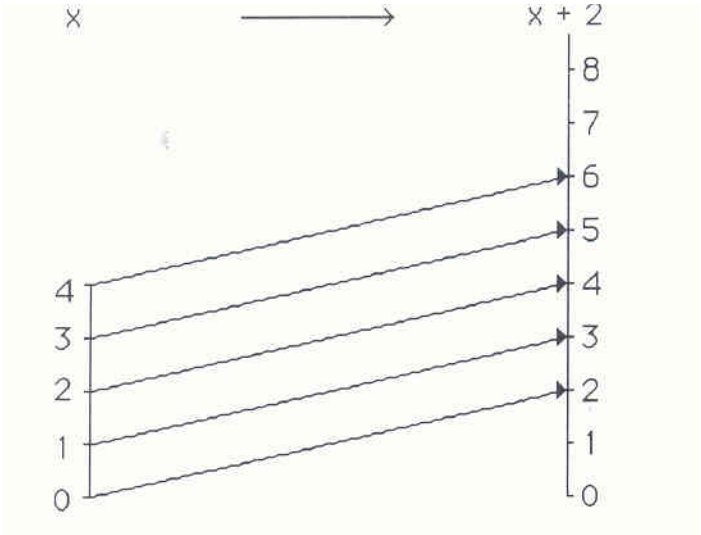
Exercise 2

1. Find f(2) when f(x) = 3x – 3
2. Find f(0) and f(-2) when f(x) = x^2 – 4
3. Find f(3) and f(-3) when f(x) = x^2
4. If f(x) = x^2 – 2x find the values of f(2) and f(0)
5. Find the range of the function f(x) = 2x^2 if -1 ≤ x ≤ 3

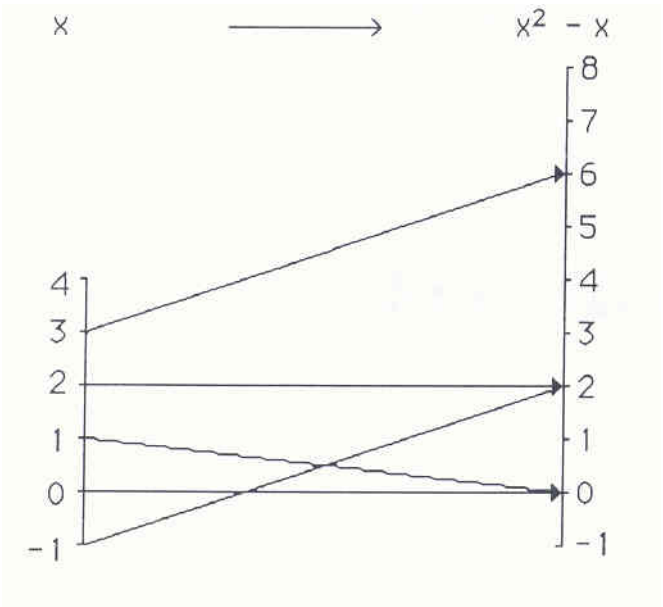
ANSWERS

Exercise 1

1. f(x) = x + 2



2. f(x) = $x^2 - x$



Exercise 2

1. 3
2. -4 0
3. 9 9
4. 0 0
5. Range is from 0 to 18.