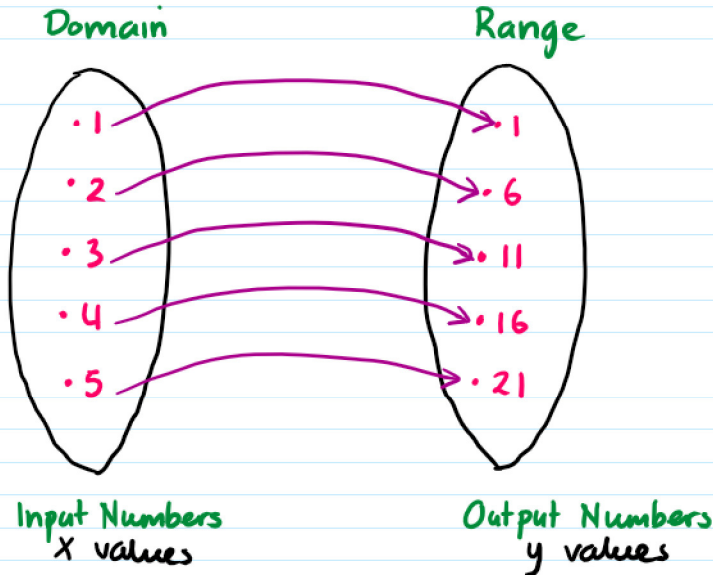


A mapping diagram is a visual way that functions can be drawn

Each input number is mapped on to **one** output number

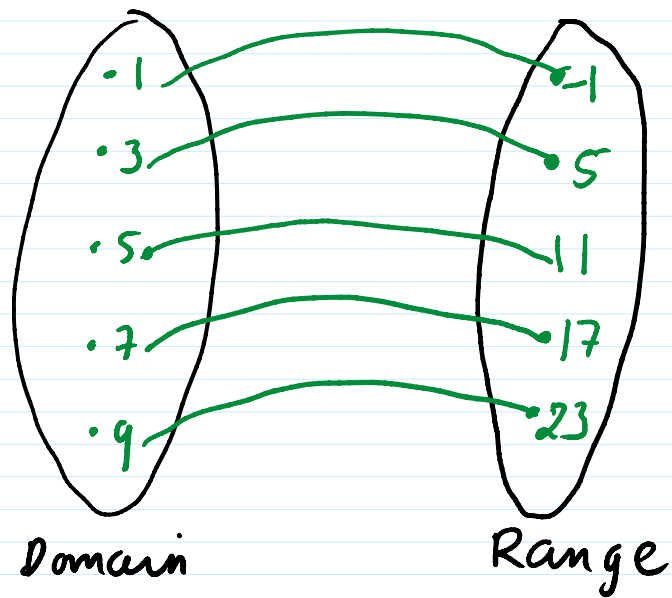


We use the word **function** to describe any equation that produces one output for each input value.

$$f(x) = 3x - 4 \quad \neq \quad y = 3x - 4$$

$$\text{Domain} \Rightarrow \{1, 3, 5, 7, 9\}$$

$$\begin{aligned} x=1 &\Rightarrow 3(1) - 4 = -1 \\ x=3 &\Rightarrow 3(3) - 4 = 5 \\ x=5 &\Rightarrow 3(5) - 4 = 11 \\ x=7 &\Rightarrow 3(7) - 4 = 17 \\ x=9 &\Rightarrow 3(9) - 4 = 23 \end{aligned} \quad \left. \vphantom{\begin{aligned} x=1 \\ x=3 \\ x=5 \\ x=7 \\ x=9 \end{aligned}} \right\} \text{RANGE}$$



Co-domain: Is the set of All possible outcomes.

CIW pg 386 Q1  $\rightarrow$  5



# Functions

chapter 19

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## Section 19.2 Mapping diagrams

### Example 1

A function  $f$  is defined as  $f: x \rightarrow 3x - 2$ .

The domain of  $f$  is  $\{0, 1, 2, 3, 4\}$ .

Represent  $f$  on a mapping diagram and write out the couples generated.

What is the range of  $f$ ?

### Exercise 19.2 - HW Q1

1. Use the given mapping diagram to write down

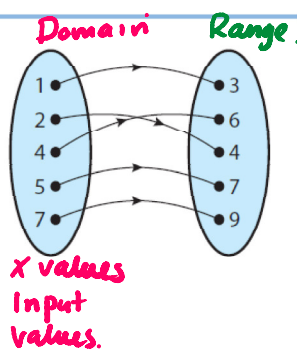
(i) the domain  $\{1, 2, 4, 5, 7\}$

(ii) the range

(iii) the set of couples formed

(iv) the rule that gives the outputs.

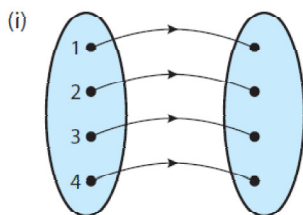
$$f(x) = ?$$



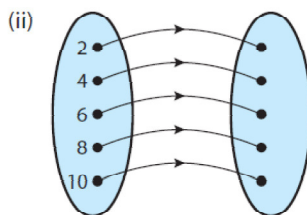
### Q2. Pg 386.

2. Copy and complete the mapping diagrams below.

Write down the domain and range of each function.

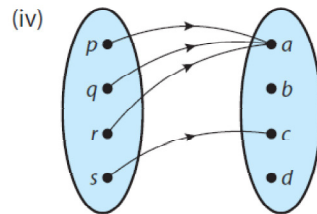
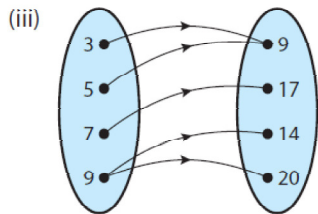
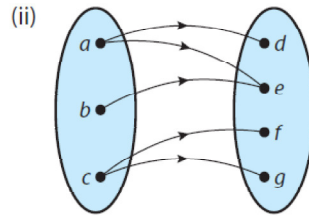
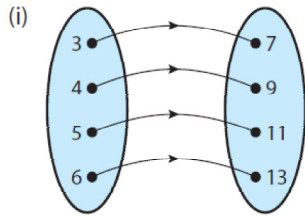


Rule: Add 5



Rule:  $x \rightarrow 2x + 1$

3. State whether each of the following mapping diagrams is a function. Give a reason for your answer in each case:



4. Say why the following set of couples is a function:  
 $\{(1, 4), (2, 5), (3, 6), (4, 7)\}$ .

**5.** Say why the following set of couples is not a function:

$\{(2, 5), (3, 6), (5, 8), (2, 10)\}$ .

**6.** Investigate if each of these sets of couples represents a function.

If it is not a function, state the reason why.

(i)  $\{(0, 0), (1, 1), (2, 4), (3, 9), (4, 16)\}$

(ii)  $\{(-2, 1), (-1, 3), (-2, 5), (1, 6), (2, 9)\}$

(iii)  $\{(-3, 4), (0, 7), (2, 9), (4, 11)\}$

7. The diagram  $x \rightarrow$  add  
3  $\rightarrow$  multiply  
by 2  $\rightarrow y$  shows how to find the output ( $y$ )

for any input ( $x$ ).

Express this in the form  $y = \dots\dots$

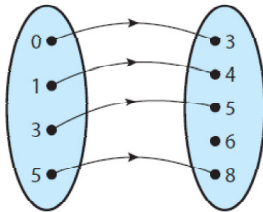
Use this function to find the values of the outputs in the given table.

Input ( $x$ )	Output ( $y$ )
1	
2	
3	
4	
5	

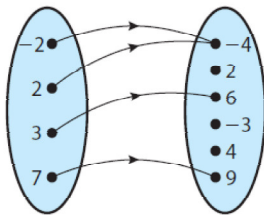
8. For each of the mapping diagrams below, write down

- (i) the domain
- (ii) the range
- (iii) the codomain.

(a)



(b)

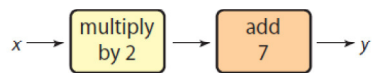


- 9.** The rule for a function is: 'Multiply by 2 and add 3'.  
If the domain of the function is  $\{0, 1, 3, 5\}$ , write down
- (i) the range
  - (ii) the couples generated.

- 10.** A function  $f$  is defined as  $f: x \rightarrow 3x - 1$ .  
The domain of the function is  $\{1, 2, 4, 6\}$ .  
Write down the range of the function.

- 11.** A function  $f$  is defined as  $f(x) = 4x - 5$ .  
The domain of the function is  $\{-2, 0, 2, 4\}$ .
- (i) What is the range of  $f$ ?
  - (ii) Write  $f$  as a set of couples.

- 12.** Make a copy of this table.  
Fill it in for the function machine shown below.

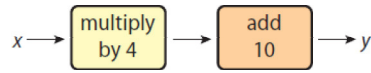


<b>x</b>	1	2	3	4	5
<b>y</b>					

Write the function in the form  $y = \dots\dots\dots$



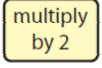
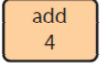
13. This is a function machine:



Write the function in the form  $y = \dots\dots$

If the input is 5, what is the output?

Use the function rule to find the input when the output is 22.

14.  $x \rightarrow$    $\rightarrow$    $\rightarrow y$  describes a function.

Copy the table on the right and fill in the missing input and output numbers.

Input	Output
3	
-2	
	14
	-8

**15.** In the three tables below, some input and output numbers are given.  
By 'trial and error' or guessing, find the rule for each function in the form  $y = \dots\dots$

(i)

Input	Output
3	2
7	10
5	6
11	18

(ii)

Input	Output
1	5
3	11
5	17
10	32

(iii)

Input	Output
1	4
3	10
6	19
8	25

**16.**  $f: x \rightarrow 6x - 2$  defines a function.  
If the couples  $(2, a)$ ,  $(-4, b)$ ,  $(c, 16)$  and  $(d, -14)$  are all couples of  $f$ , work out the values of  $a$ ,  $b$ ,  $c$  and  $d$ .

# Answers

## Exercise 19.2

- (i) {1, 2, 4, 5, 7}      (ii) {3, 4, 6, 7, 9}  
 (iii) {(1, 3), (2, 4), (4, 6), (5, 7), (7, 9)}  
 (iv) 'Add 2' [or  $f: x \rightarrow x + 2$ ]
- (i) {1, 2, 3, 4}; {6, 7, 8, 9}  
 (ii) {2, 4, 6, 8, 10}; {5, 9, 13, 17, 21}
- (i) Yes    (ii) No    (iii) No    (iv) Yes
- As no two couples have the same input.
- The input 2 has two different outputs
- (i) Yes      (ii) No      (iii) Yes
- $y = 2(x + 3)$ ;

Input (x)	Output (y)
1	8
2	10
3	12
4	14
5	16

# Answers

- (a) (i) {0, 1, 3, 5}      (ii) {3, 4, 5, 8}  
 (iii) {3, 4, 5, 6, 8}  
 (b) (i) {-2, 2, 3, 7}    (ii) {-4, 6, 9}  
 (iii) {-4, -3, 2, 4, 6, 9}
- (i) {3, 5, 9, 13}  
 (ii) {(0, 3), (1, 5), (3, 9), (5, 13)}
- {2, 5, 11, 17}
- (i) {-13, -5, 3, 11}  
 (ii) {(-2, -13), (0, -5), (2, 3), (4, 11)}
- |   |   |    |    |    |    |
|---|---|----|----|----|----|
| x | 1 | 2  | 3  | 4  | 5  |
| y | 9 | 11 | 13 | 15 | 17 |

 $; y = 2x + 7$
- $y = 4x + 10$ ; 30; 3
- | Input | Output |
|-------|--------|
| 3     | 10     |
| -2    | 0      |
| 5     | 14     |
| -6    | -8     |
- (i)  $y = 2x - 4$       (ii)  $y = 3x + 2$   
 (iii)  $y = 3x + 1$
- 10, -25, 3, -2