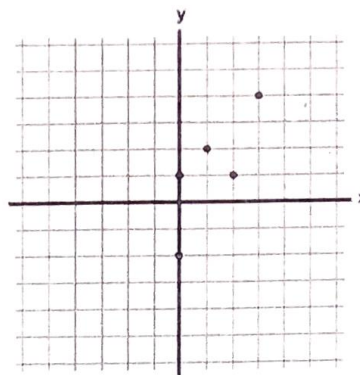
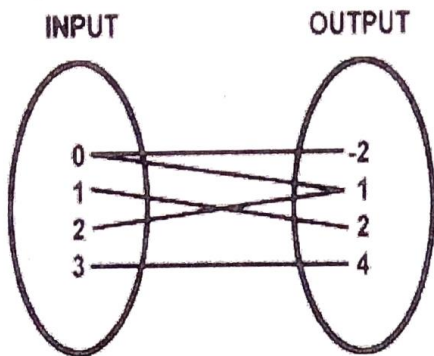


Relations

A relation is a set of inputs and outputs, often written as ordered pairs (input, output). We can also represent a relation as a mapping diagram or a graph. For example, the relation can be represented as:



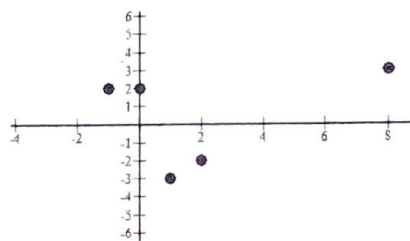
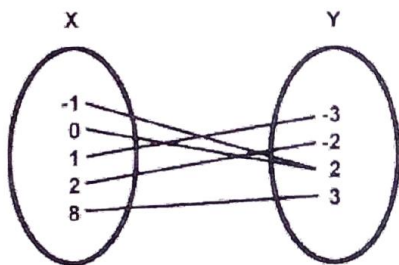
Mapping Diagram of Relation

Graph of Relation

y is not a function of x (x = 0 has multiple outputs)

Functions

A function is a relation in which each input x (**domain**) has **only one** output y (**range**).



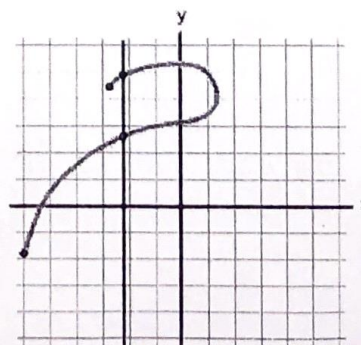
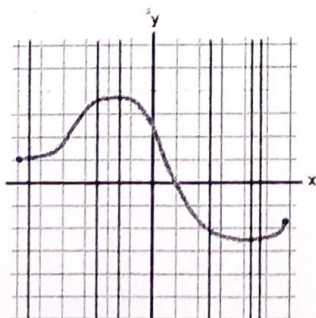
To check if a relation is a function, given a mapping diagram of the relation, use the following criterion:

1. *If each input has only one line connected to it, then the outputs are a function of the inputs.*
2. *The Vertical Line Tests for Graphs*

*To determine whether y is a function of x , given a graph of a relation, use the following criterion: if every vertical line you can draw goes through only 1 point, y is a function of x . If you can draw a vertical line that goes through 2 points, y is not a function of x . This is called the **vertical line test**.*

In the following graphs:

y is a function of x (passes vertical line test) | y is not a function of x (fails vertical line test)



Function notation

There is a special notation, that is used to represent this situation:

if the function name is f , and the input name is x , then the unique corresponding output is called $f(x)$ (which is read as "f of x".)

We can also use letters: $g(x)$, $h(x)$ or simply y

Question: What does the function notation $g(7)$ represent?

Answer: the output from the function g when the input is 7

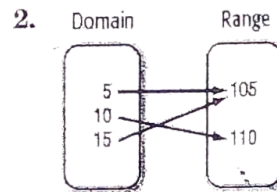
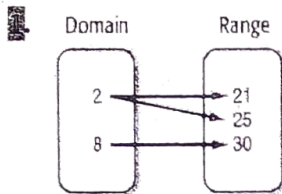
Question: Suppose $f(x) = x + 2$. What is $f(3)$?

Answer:

Question: Suppose $f(x) = x + 2$. What is $f(x+5)$?

Answer:

State the domain and range of each relation. Then determine whether each relation is a *function*



3.

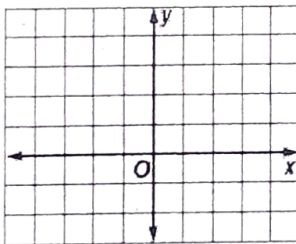
-3	0
-1	-1
0	0
2	-2
3	4

4.

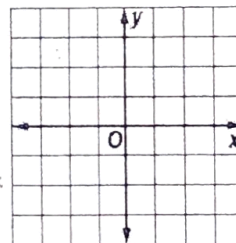
-2	-1
-2	1
-1	0
1	0
2	1

Graph each relation or equation and determine the domain and range.

5. $x = -1$



6. $y = 2x - 1$



Find each value if $f(x) = -5x + 2$ and $g(x) = -2x + 3$.

7. $f(3)$

8. $f(-4)$

9. $g(-12)$

10. $f(-2)$

11. $g(-6)$