

3.1 Introduction to Functions

A relation is a set of ordered pairs

The first item in an ordered pair is identified as the x-value
(Domain)

- This is considered the independent variable
- Also referred to as inputs

(x, y)

The second item in an ordered pair is identified as the y-value
(Range)

- This is considered the dependent variable
- Also referred to as outputs

* List domain + range in
"set notation" → { }

Exercise 1: Given the following relation

{(2,4) (3,6) (4,8) (5,10)}

The domain is { 2, 3, 4, 5 } and the range is { 4, 6, 8, 10 }

Exercise 2: Given the following relation

{(March, 20) (April, 28)}

The domain is { March, April } and the range is { 20, 28 }

A special kind of relation is a function.

A function is a *relation* in which no two ordered pairs have the same first element. (The domain CANNOT repeat!). It is a rule that converts an input (x - values) into only one output (y - values). A function can be represented in many ways such as:

* Every input must have exactly one output.

ordered pairs, tables, mapping diagram, graph.

Like stated above, there are different ways to determine whether an equation is a function:

I. When given a set of coordinate points

Exercise 1: State if the set of coordinate points represent a function and justify your answer.

*check the x-values.

a) {(1,2) (3,4) (5,6) (7,8) (9,10)}

Yes, every input (x) has exactly one output (y).

b) {(5,7) (6,3) (-8,1) (-4,2) (-8,-4)}

Not a function!
The input -8 has more than one output (1 and -4).

* Every x must have exactly one y .

II. When given a table:

a) Does the table below represent a function?

Hours, h	x	0	1	2	3
Temperature, $T(t)$	y	212	141	104	85

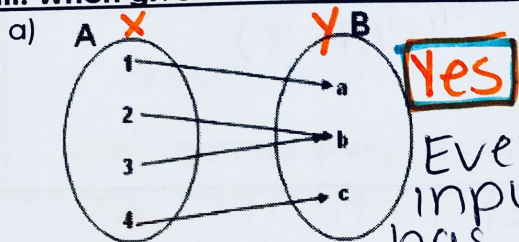
YES

b) Does the table below represent a function?

x	x	-1	1	3	5	3
$F(x)$	y	0	2	3	-5	-3

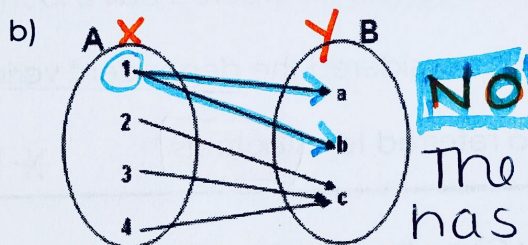
NO The input 3 has two outputs (3 and -3).

III. When given a "mapping" diagram:



Yes

Every input has only one output.

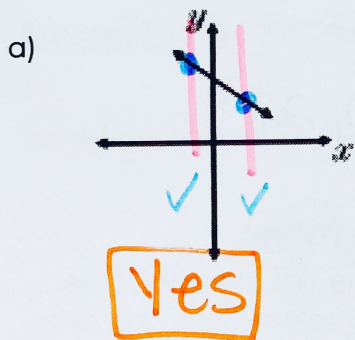


NO

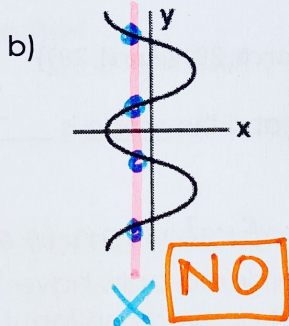
The input 1 has more than one output (a, and b)

IV. When given a graph:

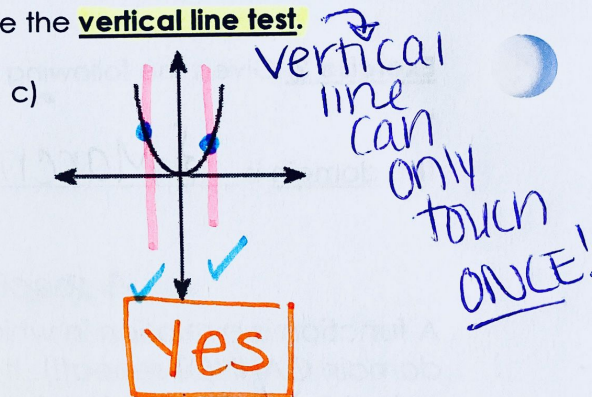
To determine whether it's a function when given a graph we can use the **vertical line test**.



Yes



NO



Yes

Vertical line can only touch ONCE!

PRACTICE Determine whether each is or is not a function. Explain your reasoning.

<p>a) $\{(1,2) (3,4) (5,6) (7,8) (9,10)\}$</p> <p>Yes, every input has one output.</p>	<p>b)</p> <p>Yes, every input has 1 output.</p>	<p>c) $\{(5,7) (6,3) (-8,1) (-4,2) (-8,-4)\}$</p> <p>No, input -8 has more than one output.</p>												
<p>d)</p> <p>Yes, passes VLT.</p>	<p>e)</p> <p>No, fails VLT.</p>	<p>f)</p> <table border="1"> <tr><th>x</th><th>y</th></tr> <tr><td>2</td><td>6</td></tr> <tr><td>3</td><td>-12</td></tr> <tr><td>4</td><td>7</td></tr> <tr><td>5</td><td>5</td></tr> <tr><td>2</td><td>-6</td></tr> </table> <p>No, input 2 has more than one output.</p>	x	y	2	6	3	-12	4	7	5	5	2	-6
x	y													
2	6													
3	-12													
4	7													
5	5													
2	-6													