What is a function?

A function in algebra is an equation where any x-value can be put into the equation to produce exactly one y value.

We have been dealing with functions all year!

What functions have we worked with?

Linear

Exponential

Quadratic

Let's check when x = 2

$y = 3x - 5$

$= 3(2) - 5$

$= 6 - 5$

$= 1$

$y = 5(2)^x$

$= 5(2)^2$

$= 5 \cdot 4 = 20$

$y = 3x^2 + x - 1$

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

$= 12 + 2 - 1$

$= 13$

How can we tell if a relationship is a function?

table

Review the columns. The relation will not be a function if any x-value corresponds to more than one different y-value.

Yes

x	y
-2	-2
-1	2
0	6
1	10
2	14

No

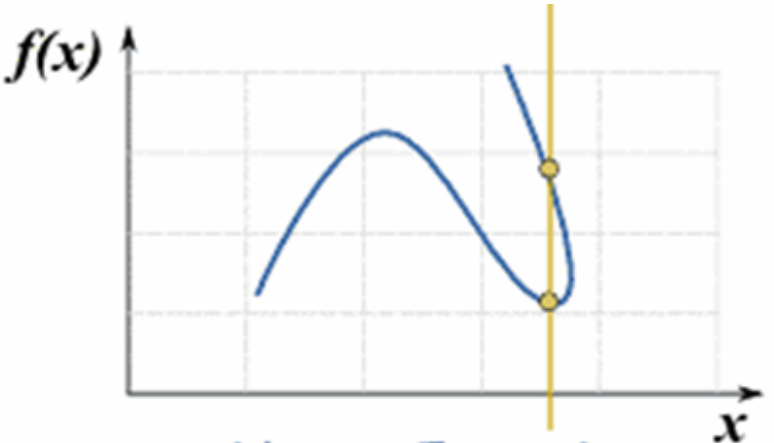
x	y
-4	-4
-2	-2
1	0
1	1

Yes

x	y
−3	6
−2	0
−1	−4
0	−6
1	−6
2	−4
3	0
4	6

graph

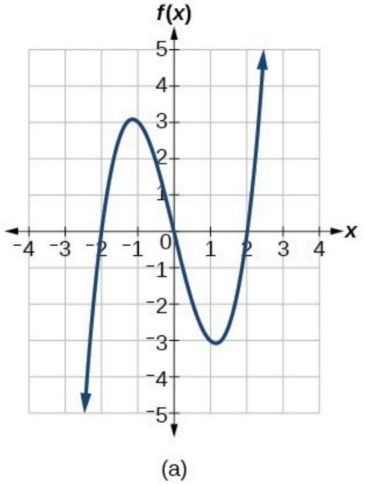
Use the Vertical line test.
The relation will not be a function if a vertical line ever crosses more than one place on the graph.



Not a Function
(a vertical line crosses 2 values)

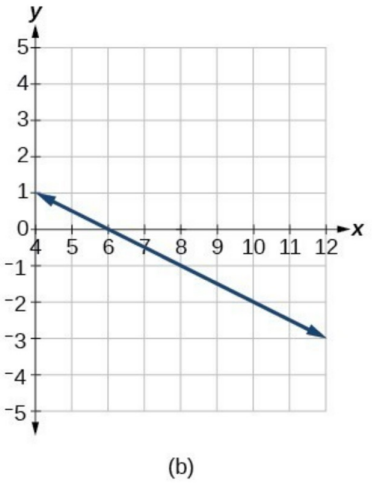
How about these?

Yes



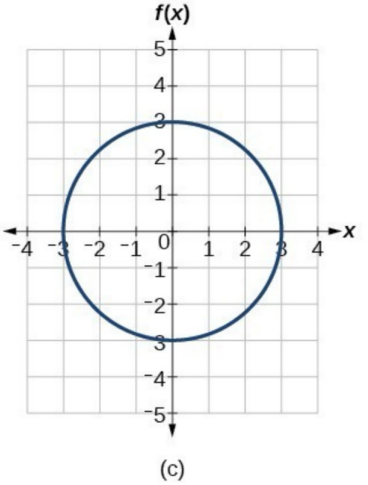
(a)

Yes



(b)

No



(c)

Set notation

Review each ordered pair. The relation will not be a function if any x-value corresponds to more than one different y-value.

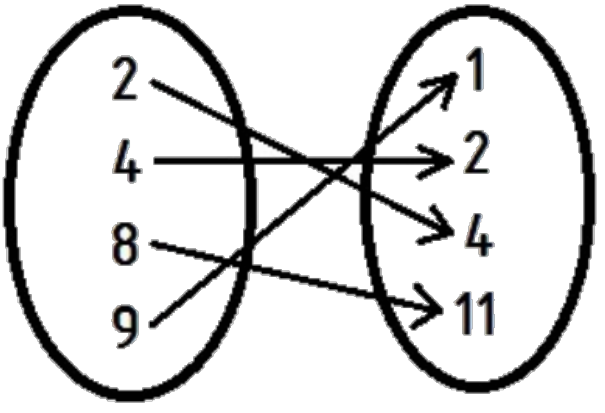
Instead of ordered pairs being listed in a table they are listed with commas between them.

Yes $\{(3, 3), (4, -1), (2, 3)\}$

No $\{(1, 8), (0, -2), (1, -3)\}$

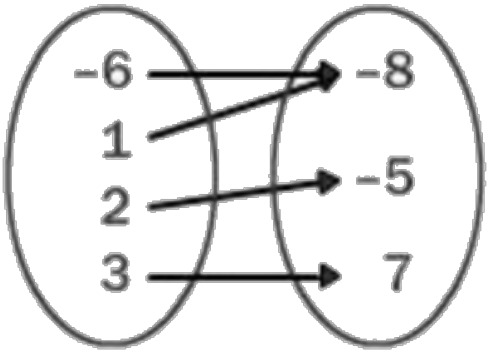
mapping diagram

Review the arrows. The relation will not be a function if any x-value maps to more than one different y-value.

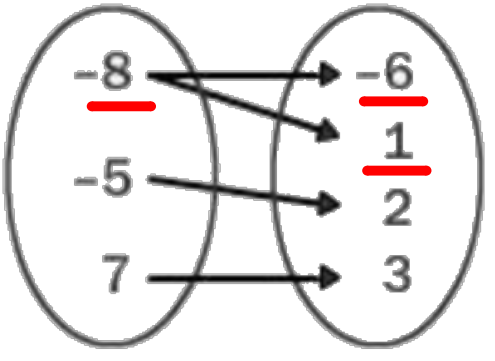


How about these?

Yes



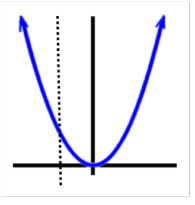
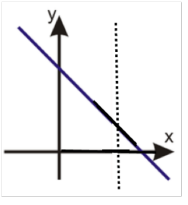
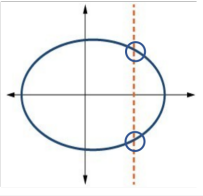
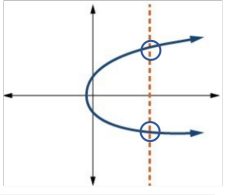
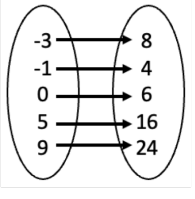
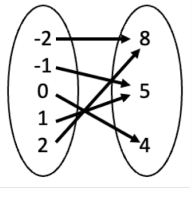
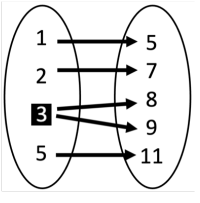
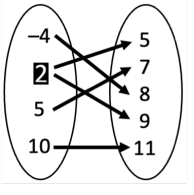
No



Is it a Function?

only if ...

Every x-value is assigned to ONLY ONE y-value.

	YES	NO
Tables	<table><tr><th>x</th><th>y</th></tr><tr><td>-3</td><td>8</td></tr><tr><td>-1</td><td>4</td></tr><tr><td>0</td><td>6</td></tr><tr><td>5</td><td>16</td></tr><tr><td>9</td><td>24</td></tr></table> <table><tr><th>x</th><th>y</th></tr><tr><td>-2</td><td>8</td></tr><tr><td>-1</td><td>5</td></tr><tr><td>0</td><td>4</td></tr><tr><td>1</td><td>5</td></tr><tr><td>2</td><td>8</td></tr></table> A y-value **CAN** be the result of 2 different x-values.	<table><tr><th>x</th><th>y</th></tr><tr><td>1</td><td>5</td></tr><tr><td>2</td><td>7</td></tr><tr><td>3</td><td>8</td></tr><tr><td>3</td><td>9</td></tr><tr><td>5</td><td>11</td></tr></table> <table><tr><th>x</th><th>y</th></tr><tr><td>2</td><td>5</td></tr><tr><td>5</td><td>7</td></tr><tr><td>-4</td><td>8</td></tr><tr><td>2</td><td>9</td></tr><tr><td>10</td><td>11</td></tr></table> x-values **CANNOT** be assigned to multiple y-values.
Graphs	 	 
	Move a **VERTICAL LINE** across a graph to check that it only crosses the graph **once**. **REMEMBER**: Every point on a vertical line has the same x-value	
Data Points	$\{(-3,8),(-1,4),(0,6),(5,16),(9,24)\}$ $\{(-2,8),(-1,5),(0,4),(1,5),(2,8)\}$	$\{(1,5),(2,7),(3,8),(3,9),(5,11)\}$ $\{(2,5),(5,7),(-4,8),(2,9),(10,11)\}$
Diagram	 	 

Function Notation Recap

Function notation is just a different way to write things we already have been writing!

What we are used to:		Function Notation
$y = 7x + 10$	instead →	$f(x) = 7x + 10$
What is the value of y when $x = 5$	instead →	$f(5)$
$y = 7(5) + 10$ $y = 35 + 10$ $y = 45$	instead →	$f(5) = 7(5) + 10$ $= 35 + 10$ $= 45$

What Did Farmer John Show His Chicken When She Wouldn't Lay Any Eggs?

Determine whether each relation is a function. Indicate whether it "is a function" or is "not a function" by circling the appropriate letter in the chart. The answer to the title question is found by reading the circled letters in the top row, then the circled letters in the bottom row.

1. $\{(-1, 8), (0, 15), (1, -4), (2, 0)\}$
2. $\{(-2, 7), (6, 2), (-2, -3), (0, 9)\}$
3. $\{(-5, 2), (5, 2), (0, -3), (3, -8), (-7, 4), (-1, -1)\}$
4. $\{(-7, 2), (4, -6), (2, -2), (-3, 9), (0, -11), (4, 0)\}$

5.

x	y
−6	4
−4	0
−2	−5
0	−5
2	0
4	4

6.

x	y
8	7
−3	16
−9	0
15	33
−1	−1
−9	−6

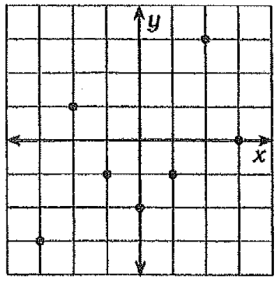
7.

x	y
5	18
−2	−2
0	12
12	0
−40	17
−5	18

8.

x	y
−1	75
0	80
1	85
0	90
−1	95

9.



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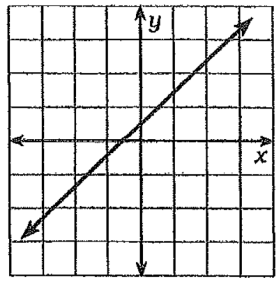

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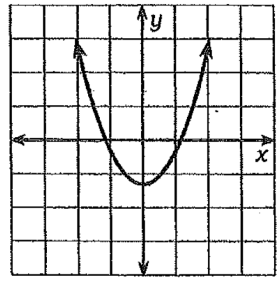

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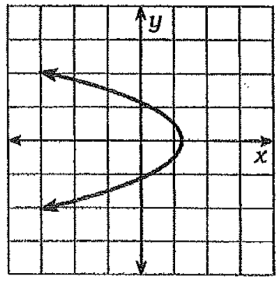

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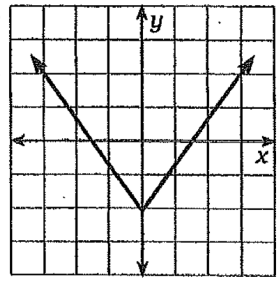

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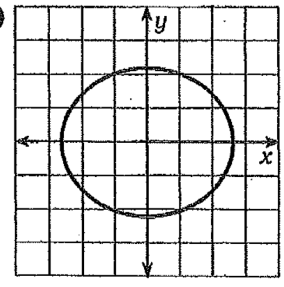

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
IS A FUNCTION >	A	R	G	E	O	L	O	F	D	E	G	O	G	G
NOT A FUNCTION >	I	S	T	A	T	M	E	P	O	L	A	L	L	E