

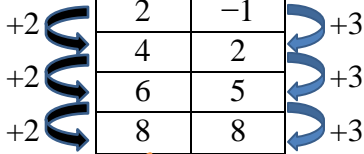


## Linear and Nonlinear Functions (page 1)

Linear functions have graphs that are straight lines. The rate of change between any two points is constant. Nonlinear functions are functions whose rates of change are NOT constant—their graphs are not straight lines. We can determine if a function is linear or nonlinear by inspecting a table of values, a graph, and/or the equation.

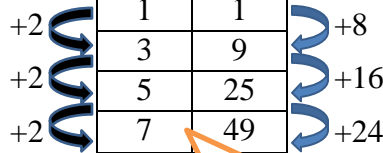
**Example: Determine whether each table represents a linear or nonlinear function.**

x	y
2	-1
4	2
6	5
8	8



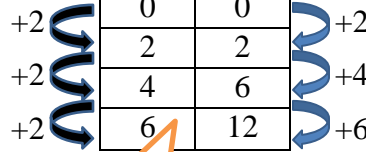
*Linear.* As  $x$  increases by 2,  $y$  increases by 3. The rate of change is constant.

x	y
1	1
3	9
5	25
7	49



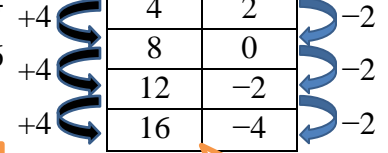
*Nonlinear.* As  $x$  increases by 2,  $y$  increases by a greater amount each time. The rate of change is NOT constant.

x	y
0	0
2	2
4	6
6	12



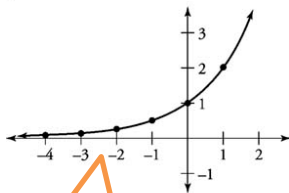
*Nonlinear.* As  $x$  increases by 2,  $y$  increases by a greater amount each time. The rate of change is NOT constant.

x	y
4	2
8	0
12	-2
16	-4

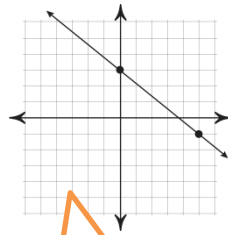


*Linear.* As  $x$  increases by 4,  $y$  decreases by 2 each time. The rate of change is constant.

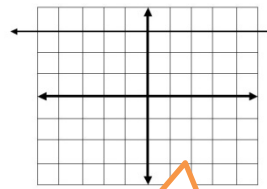
**Example: Determine whether each graph represents a linear or nonlinear function.**



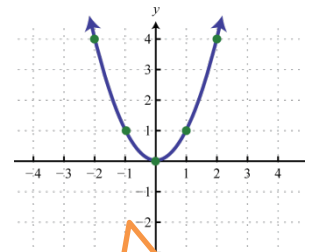
*Nonlinear.* Graph is not a straight line



*Linear.* Graph is a straight line



*Linear.* Graph is a straight line



*Nonlinear.* Graph is not a straight line

**Example: Determine whether each equation represents a linear or nonlinear function.** Remember that all linear functions can be written in the slope-intercept form.

$$y = 3x - 5$$

*Linear.* In slope-intercept form.

$$y = 2(x - 3)$$

*Linear.* Can be rewritten in slope-intercept form.  
 $y = 2x - 6$

$$y = \frac{x}{3} - 2$$

*Linear.* Can be rewritten in slope-intercept form.  
 $y = \frac{1}{3}x - 2$

$$y = \frac{3}{x} + 4$$

*Nonlinear.* Cannot be rewritten in slope-intercept form.

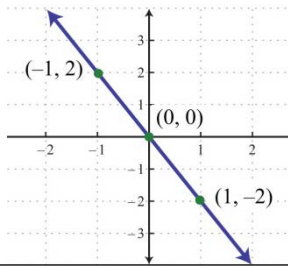
$$y = 3x$$

*Linear.* In slope-intercept form.

## Linear and Nonlinear Functions (page 2)

*Determine whether each table, graph or equation represents a linear or nonlinear function. Explain.*

1.



1. (answer & explanation)

2.  $y = 2x^2$

2.

3.

x	y
1	4
2	8
3	12
4	16

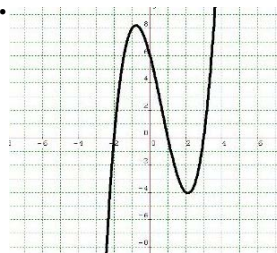
3.

4.

x	1	2	3	4
y	1	2	6	24

4.

5.



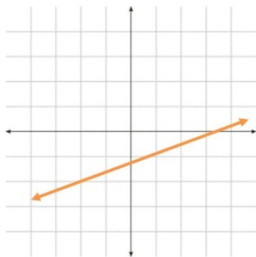
5.

6.

$$y = \frac{x}{2} + 6$$

6.

7.



7.

8.

$$2x + y = 5$$

8.

9.

x	y
1	4
2	0
3	-4
4	-8

9.