

# 7.4 Lesson

## Key Vocabulary

nonlinear function,  
p. 296

The graph of a linear function shows a constant rate of change.

A **nonlinear function** does not have a constant rate of change.

So, its graph is *not* a line.

## EXAMPLE 1 Identifying Functions from Tables

Does each table represent a *linear* or *nonlinear* function? Explain.

a.

		+3	+3	+3	
		↗	↗	↗	
x	3	6	9	12	
y	40	32	24	16	
		↘	↘	↘	
		-8	-8	-8	

As  $x$  increases by 3,  $y$  decreases by 8. The rate of change is constant. So, the function is linear.

b.

		+2	+2	+2	
		↗	↗	↗	
x	1	3	5	7	
y	2	11	33	88	
		↗	↗	↗	
		+9	+22	+55	

As  $x$  increases by 2,  $y$  increases by different amounts. The rate of change is *not* constant. So, the function is nonlinear.

**Try It** Does the table represent a *linear* or *nonlinear* function? Explain.

1.

x	2	4	6	8
y	-8	-4	0	4

2.

x	0	3	7	12
y	25	20	15	10

## EXAMPLE 2 Identifying Functions from Equations

Does each equation represent a *linear* or *nonlinear* function? Explain.

a.  $y = 4(x - 1)$

You can rewrite  $y = 4(x - 1)$  in slope-intercept form as  $y = 4x - 4$ . The function has a constant rate of change. So, the function is linear.

b.  $y = \frac{4}{x}$

You cannot rewrite  $y = \frac{4}{x}$  in slope-intercept form. The function does not have a constant rate of change. So, the function is nonlinear.

**Try It** Does the equation represent a *linear* or *nonlinear* function? Explain.

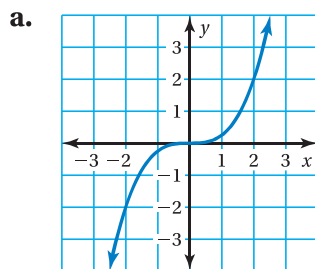
3.  $y = x + 5$

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

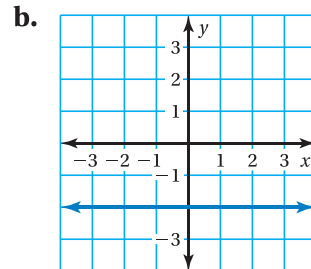
5.  $y = 1 - x^2$

**EXAMPLE 3****Identifying Functions from Graphs**

Does each graph represent a *linear* or *nonlinear* function? Explain.

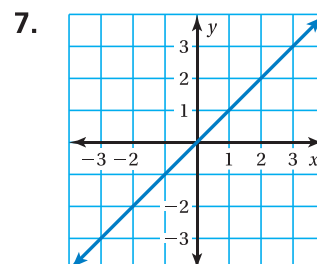
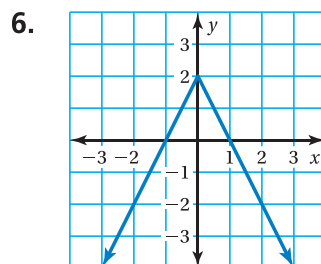


▶ The graph is *not* a line. So, the function is nonlinear.



▶ The graph is a line. So, the function is linear.

**Try It** Does the graph represent a *linear* or *nonlinear* function? Explain.



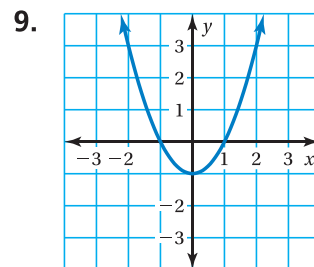
## Self-Assessment for Concepts & Skills

Solve each exercise. Then rate your understanding of the success criteria in your journal.

**IDENTIFYING FUNCTIONS** Does the table or graph represent a *linear* or *nonlinear* function? Explain.

8.

<b>x</b>	3	-1	-5	-9
<b>y</b>	0	2	4	6



10. **WHICH ONE DOESN'T BELONG?** Which equation does *not* belong with the other three? Explain your reasoning.

$$15y = 6x$$

$$y = \frac{2}{5}x$$

$$10y = 4x$$

$$5xy = 2$$