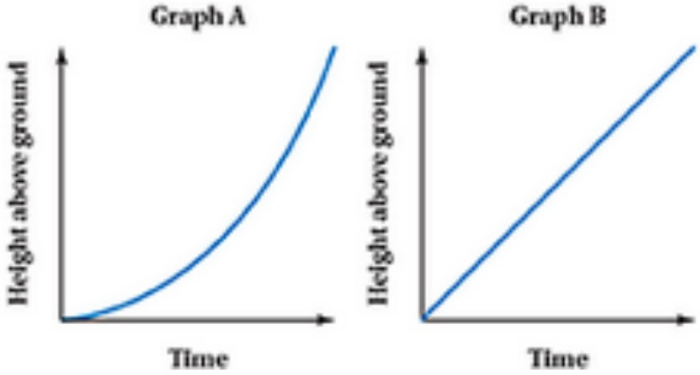
6.4 Linear vs. Non-Linear Functions

Learning Targets

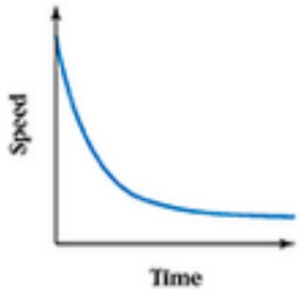
- Identify Functions from Graphs
- Identify Functions from Tables
- Identify Funtions from Equations
- Apply to Real-Life

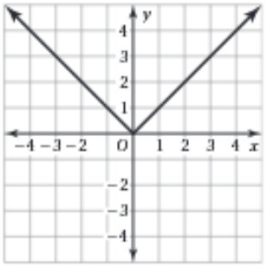


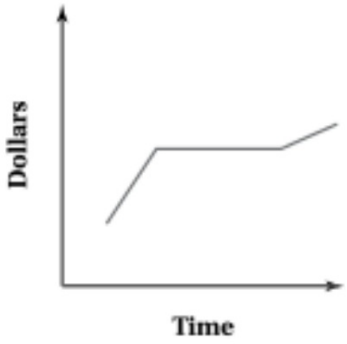
Linear Function vs Nonlinear Function

A Linear Function has a constant rate of change (LINE).

A Nonlinear Function does not have a constant rate of change.
NOT a straight line.





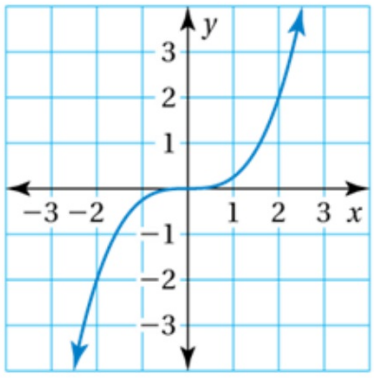


Learning Target 1

Identify Functions from Graphs

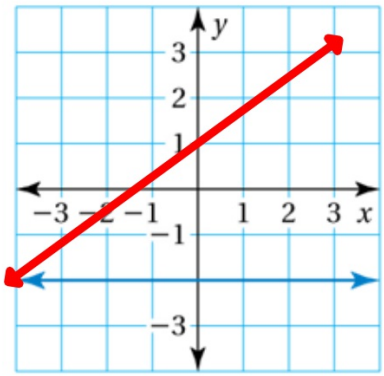
Does the graph represent a *linear* or *nonlinear* function? Explain.

a.



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

b.



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

Learning Target 2

Identify Functions from Tables

Does the 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

$m = \frac{-8}{3}$

Constant

Yes

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.

Learning Target 3

Identify Functions from Equations

Linear Function: y = mx + b

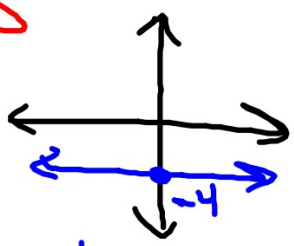
$y = mx$

$ax + by = c$

$y = 3x - 6$ Yes

$y = \frac{1}{5}x$ Yes

$y = -4$ Yes



$x = -4$ No b/c vertical line

Learning Target 3

Linear Function? $y = mx + b$

$y = \frac{2}{5}x + 0.5$

Yes

$y = 4(x - 2)$ Yes

$y = 4x - 8$

$y = -7$

Yes

$x = 8$

NO

$y = \frac{1}{3}x - 1$ Yes

$y = \frac{1}{3}x - 1$

$y = \frac{-2}{x} + 9$

÷ by x

Learning Target 3

Identify Functions from Equations

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

4. $y = x + 5$

Yes

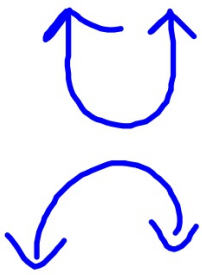
5. $y = \frac{4x}{3}$

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

Yes

6. $y = 1 - x^2$

No

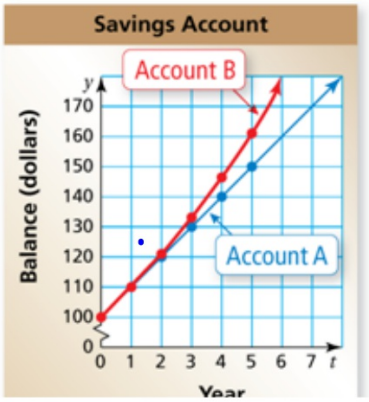


Learning Target 4

Real-Life Application

Account A earns simple interest. Account B earns compound interest. The table shows the balances for 5 years. Graph the data and compare the graphs.

Year, t	Account A Balance	Account B Balance
0	\$100	\$100
1	\$110	\$110
2	\$120	\$121
3	\$130	\$133.10
4	\$140	\$146.41
5	\$150	\$161.05



Both graphs show that the balances are positive and increasing.

The balance of Account A has a constant rate of change of \$10. So, the function representing the balance of Account A is linear.

The balance of Account B increases by different amounts each year. Because the rate of change is not constant, the function representing the balance of Account B is nonlinear.

Homework

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X	Y
-3	
-2	
-1	
0	
1	
2	
3	

Make a t-table