

Lesson 6.3 Understanding Linear and Nonlinear Functions Day 2

Week 1 Friday Course 3 Warm-up



Adam bought 5 packets of roasted peanuts and 3 packets of beef jerky for \$37.80. Joe bought 3 packets of roasted peanuts and 2 packets of beef jerky for \$23.87. Find the cost of a packet of roasted peanuts and a packet of beef jerky.

Finding Functions

Which graph shows y as a function of p ?

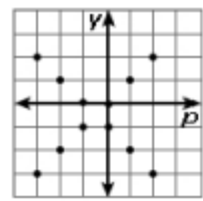


Figure 1

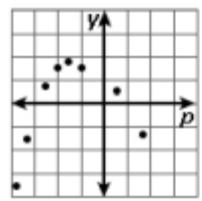


Figure 2

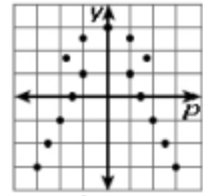


Figure 3

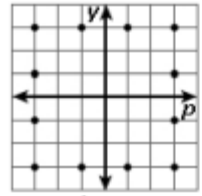
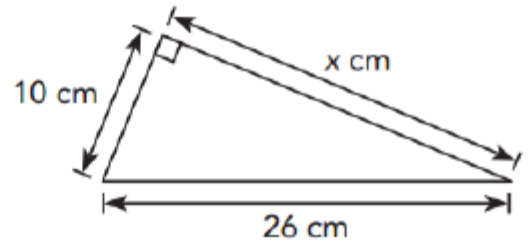


Figure 4

Calculate the missing length X . Round to nearest tenth



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Adam bought 5 packets of roasted peanuts and 3 packets of beef jerky for \$37.80. Joe bought 3 packets of roasted peanuts and 2 packets of beef jerky for \$23.87. Find the cost of a packet of roasted peanuts and a packet of beef jerky.

The cost of a packet of roasted peanuts is \$3.99 and that of a packet of beef jerky is \$5.95.

Finding Functions

Which graph shows y as a function of p ?

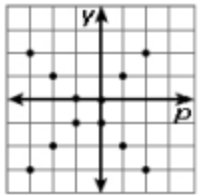


Figure 1

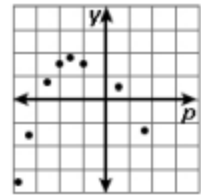


Figure 2

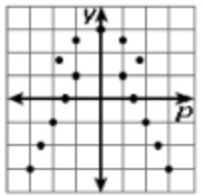


Figure 3

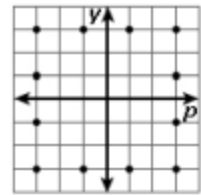
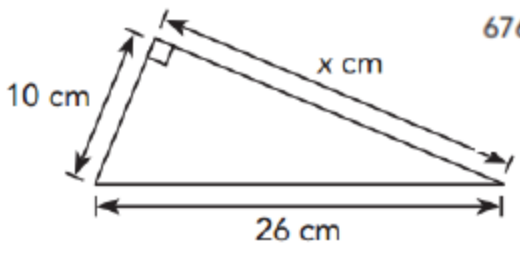


Figure 4

Calculate the missing length X . Round to nearest tenth



$$\begin{aligned}
 26^2 &= 10^2 + x^2 \\
 676 &= 100 + x^2 \\
 676 - 100 &= 100 + x^2 - 100 \\
 576 &= x^2 \\
 x &= \sqrt{576} \\
 x &= 24
 \end{aligned}$$

Lesson 6.3 Understanding Linear and Nonlinear Functions

Day 2

Objective

TSW identify linear and nonlinear functions by analyzing graphs.



▶ A function is a relation between a set of inputs and a set of outputs, in which every input has exactly one output. You can use tables, graphs, and equations to represent many functions.

Common Core State Standards

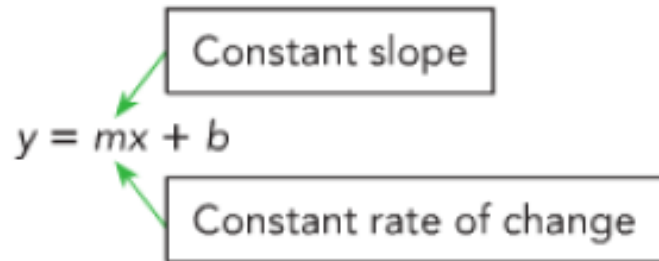
8 F2 Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal description) 8 F3 Interpret the equation $y=mx+b$ as defining a linear function, whose graph is a straight line; give examples of functions that are not linear.

Mathematical Practices *MP1 Solve problems/persevere MP2 Reason MP 4 Model Mathematics*

Lesson 6.3 Understanding Linear and Nonlinear Functions Day 2

TSW identify linear and nonlinear functions by analyzing tables and graphs

Slope = Rate of Change



The slope is the same as the function's constant rate of change.

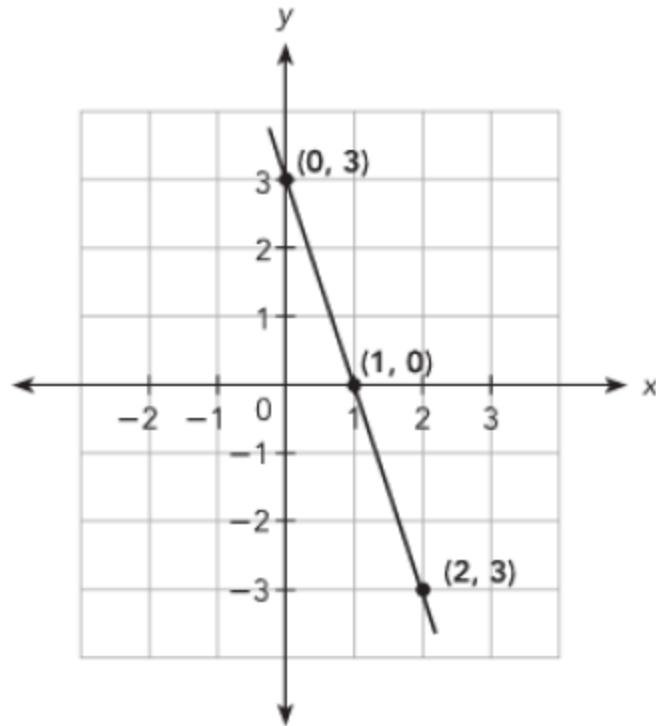
If the slope is constant then the straight line represents a **linear function**

You can check to see if a function is linear by finding and comparing rates of change for different pairs of points on its graph.

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Find the slope (or constant rate of change) in the graph below. Decide if this line represents a linear or nonlinear function.

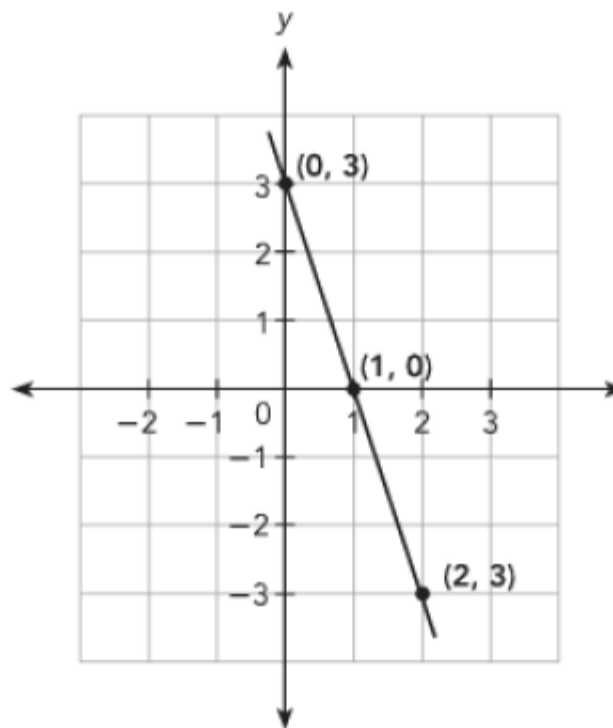
The graph shows a straight line.



The line passes through (0, 3) and (1, 0).

Find the slope (or constant rate of change) in the graph below. Decide if this line represents a linear or nonlinear function.

The graph shows a straight line.



The line passes through (0, 3) and (1, 0).

$$\begin{aligned}\text{Slope } m &= \frac{0 - 3}{1 - 0} \\ &= \frac{-3}{1} \\ &= -3\end{aligned}$$

The line also passes through (1, 0) and (2, -3).

$$\begin{aligned}\text{Slope } m &= \frac{-3 - 0}{2 - 1} \\ &= \frac{-3}{1} \\ &= -3\end{aligned}$$

You can see that the **slope** of the line is a constant.
So, the straight line graph represents a **linear** function.

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Tell whether a graph is linear or nonlinear function

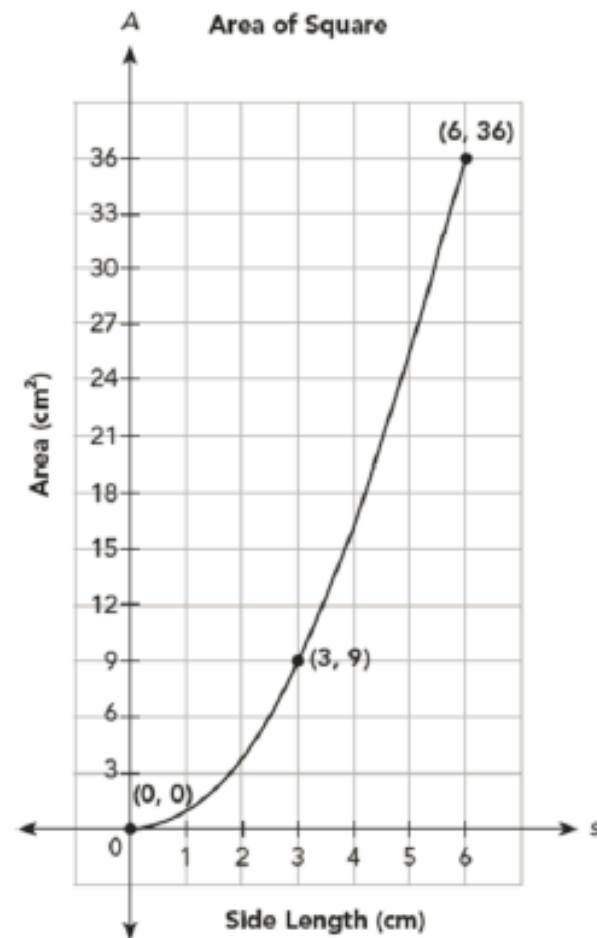
Example 8 Tell whether a graph is a linear function.

The graph shows the relation between the area of a square, A square centimeters, and its side length, s centimeters.

- a) Explain why the relation between the two variables, A and s , is a function.

Solution

The relation between the two variables, A and s , is a function because from the graph, each input is assigned exactly one output.



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b) Explain whether the rate of change of the graph is constant.

Solution

The curve passes through (0, 0) and (3, 9).

$$\begin{aligned}\text{Rate of change} &= \frac{9 - 0}{3 - 0} \\ &= \frac{9}{3} \\ &= 3\end{aligned}$$

The curve also passes through (3, 9) and (6, 36).

$$\begin{aligned}\text{Rate of change} &= \frac{36 - 9}{6 - 3} \\ &= \frac{27}{3} \\ &= 9\end{aligned}$$

You can see that the rate of change of the graph is not constant.

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c) From the graph, tell whether it is a linear function.

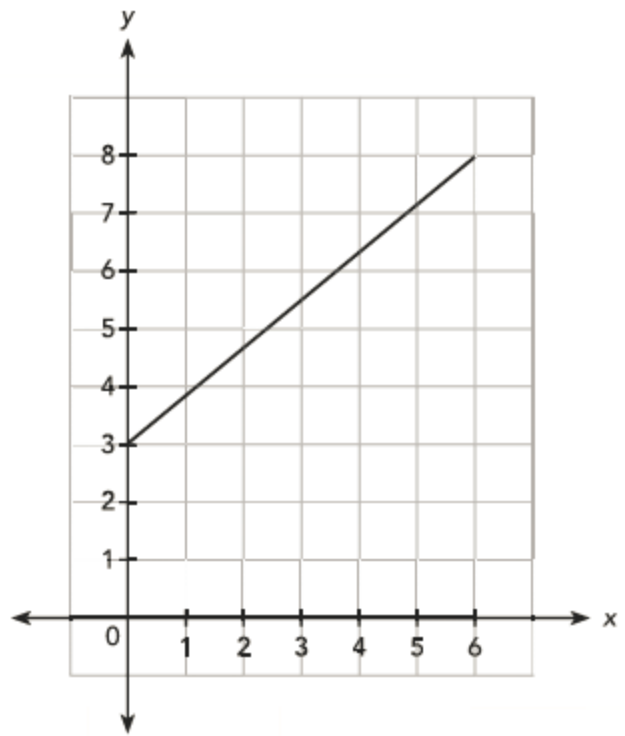
Solution

Because the graph is not a straight line, it represents a nonlinear function.

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Tell whether each graph represents a linear function. If so, find the rate of change.

3



Because the graph is a straight line, it represents a linear function.

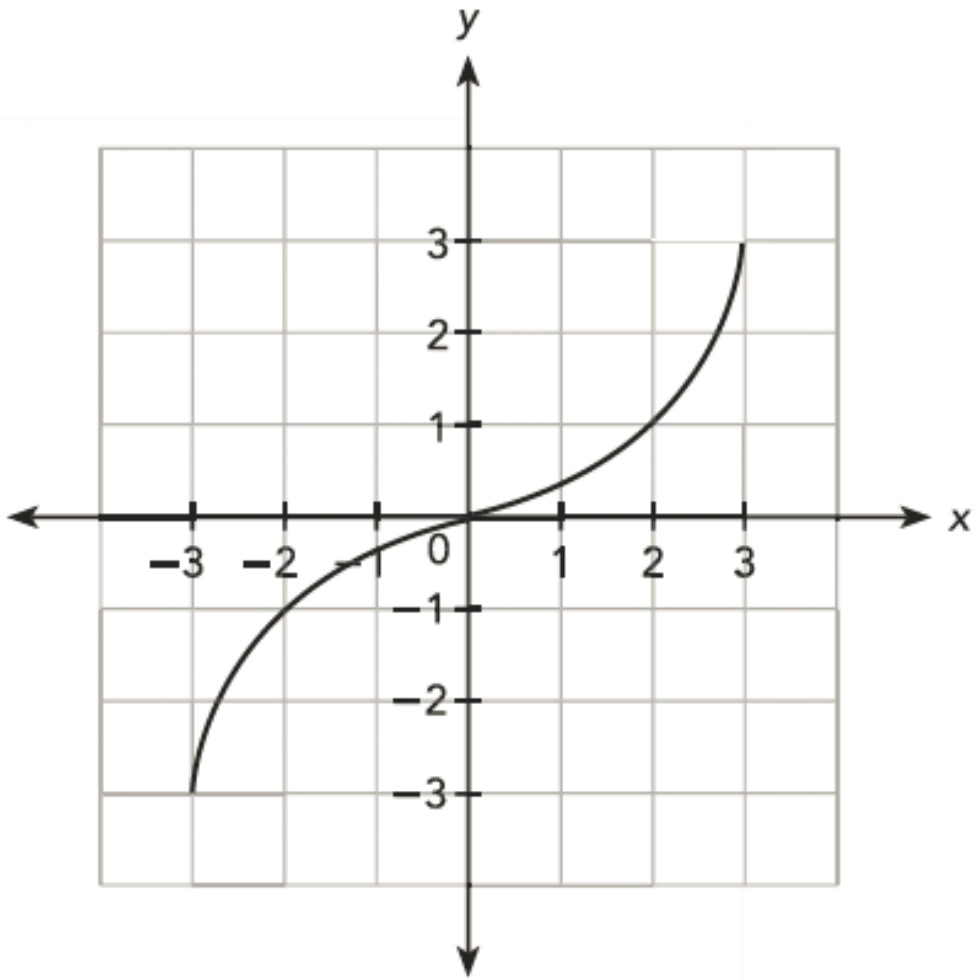
The line passes through $(0, 3)$ and $(6, 8)$.

$$\begin{aligned} \text{Rate of change} &= \frac{8 - 3}{6 - 0} \\ &= \frac{5}{6} \end{aligned}$$

So, the rate of change of the graph is constant.

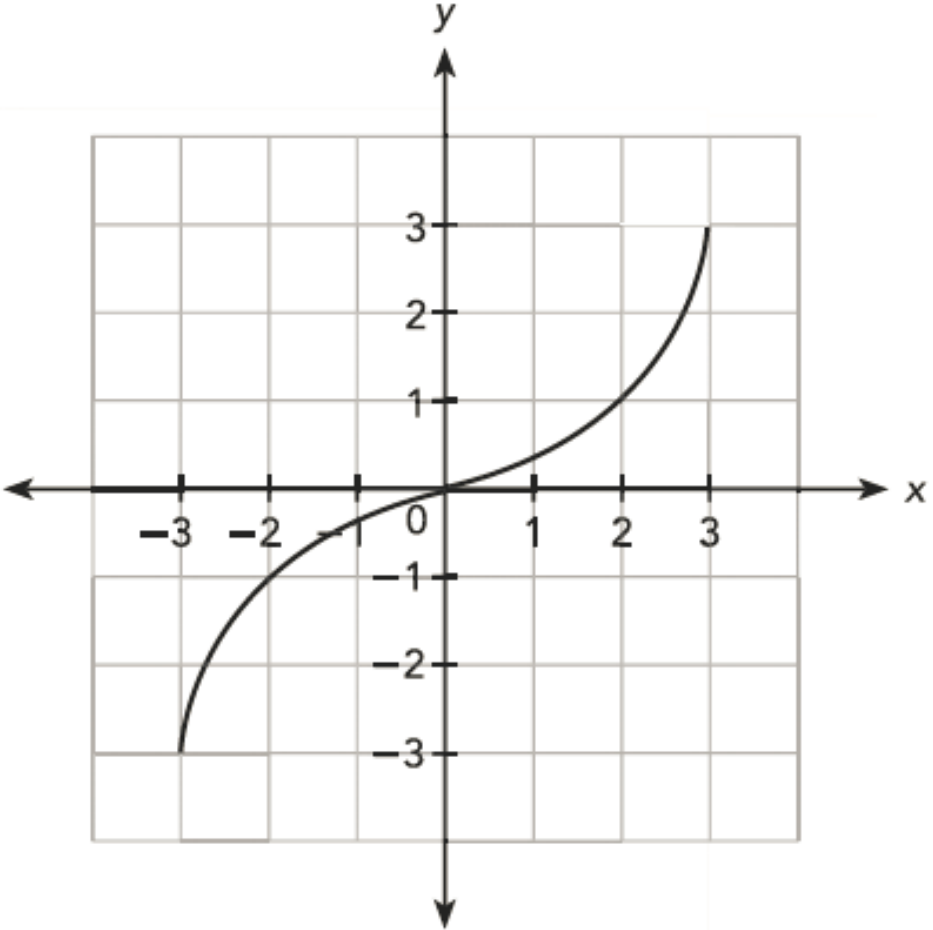
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4



Lesson 6.3 Understanding Linear and Nonlinear Functions Day 2

4



Because the graph is a curve, it represents a nonlinear function.

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Practice 6.3 #5-6

Challenge-

*Solve created equations

“Pick a Snowflake”

*BuzzMath

Name: _____ Date: _____

Practice 6.3

Tell whether each table of values represents a linear or nonlinear function.

1

x	3	5	7	9
y	6	12	18	24

2

x	-15	-10	-5	20
y	12	8	4	-16

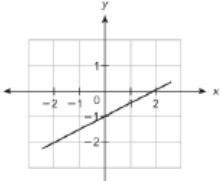
3

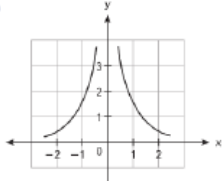
x	-8	-3	8	27
y	-2	-1	2	3

4

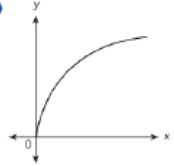
x	-8	-6	-2	2
y	-1	-4	2	8

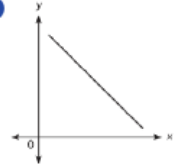
Tell whether each graph represents a linear function. If so, find the rate of change.

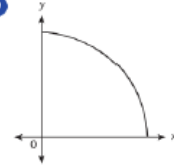
5 

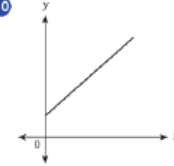
6 

Tell whether each function is linear or nonlinear. Then tell whether the function is increasing or decreasing.

7 

8 

9 

10 

Course 3



Lesson Check #5-can represent a graph represents a linear function

Ticket Out the Door- Connect, Extend, Challenge

1. How are the ideas and information presented **CONNECTED** to what you already knew?
2. What new ideas did you get that **EXTENDED** or pushed your thinking in new directions?
3. What is still **CHALLENGING** or confusing for you to get your mind around? What questions, wonderings or puzzles do you now have?