

8 - CHAPTER 4: FUNCTIONS - NOTE PACKET

NAME: _____

HOUR: _____

Lesson 4.1: Representing Relationships

Vocabulary	
Term	Definition
Linear Equations	an equation that's graph is a straight line.
Slope Intercept Form	$y = mx + b$ <p style="text-align: center;"> Slope y-int. </p>
	Slope Formula $m = \frac{y_2 - y_1}{x_2 - x_1}$

How to make an equation with a...

Table

1. Find the Slope / constant rate of change.
2. Find the initial value

Luke's family goes to the movies and purchases a large popcorn. They are debating whether or not to purchase any drinks. The table shows how much they'll spend based on the number of drinks they decide to purchase.

Number of Drinks, d	Total Cost, c
0	2.50
1	\$6.25
2	\$10.00
3	\$13.75
4	\$21.25

- a. Write an equation to find the total cost of any number of drinks. Describe the relationship in words.

$$c = 3.75d + 2.50$$

- b. Use the equation to find the cost of 9 drinks.

$$\$33.75 = 9 \cdot 3.75 + 2.50$$

$$\boxed{\$36.25}$$

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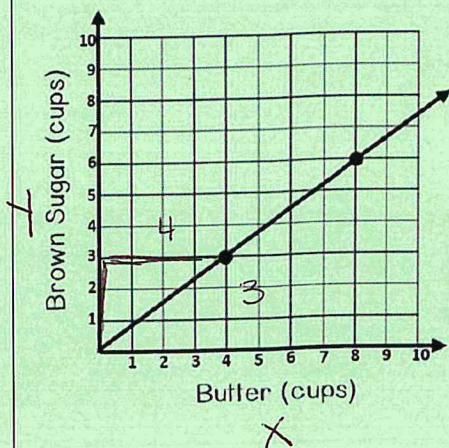
How to make an equation with a...

Graph

1. Find the slope ($\frac{\text{rise}}{\text{run}}$)

2. Find the value of y when the line crosses the y -axis. (initial value)

Betty's Bakery uses a chocolate chip cookie recipe that calls for a certain ratio of brown sugar to butter as shown in the graph.



a. Write an equation to find the ~~total cost~~ ^{brown sugar} of any number of ~~drinks~~ ^{butter (cups)}. Describe the relationship in words.

$$y = \frac{3}{4}x + 0 \text{ or } y = \frac{3}{4}x$$

b. Use the equation to find the total cups of brown sugar used if 20 cups of butter are used.

$$15 \text{ cups} \quad y = \frac{3}{4}(20) = 15$$

Lesson 4.2: Relations

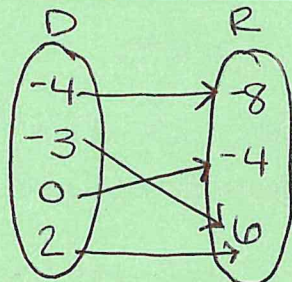
Vocabulary

Term	Definition
Relation	Any set of ordered pairs. $\{(1,2), (-3,4), (-5,-6), (2,2)\}$
Domain x -values $\{-5, -3, 1, 2\}$	Range y -values $\{-6, 2, 4\}$
Mapping Diagram	Illustrates how each element in the domain pairs with an element in the range.

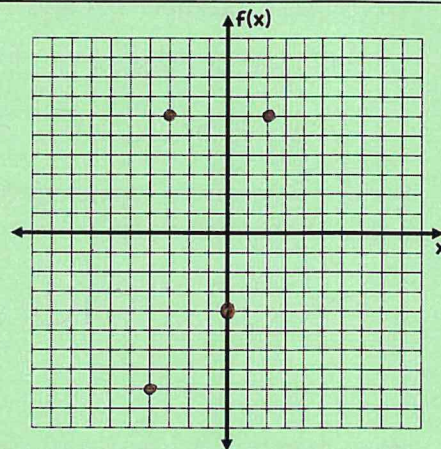
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Express the relation $\{(2, 6), (-4, -8), (-3, 6), (0, -4)\}$ as a table, a mapping diagram, and a graph. State the domain and range.

x	y
-4	-8
-3	6
0	-4
2	6



Domain: $\{-4, -3, 0, 2\}$
 Range: $\{-8, -4, 6\}$



Lesson 4.3: Functions

Steps		
Term	Definition	
Function	A relation in which every domain value has exactly one range value.	$f(x) = y$
Term	Definition	Example
Independent Variable	The variable that isn't affected by anything x-values / Domain	time
Dependent Variable	The variable that is affected by the independent variable y-values / Range	Final Score cost miles traveled

Make a function table for $f(x) = x + 5$. State the domain and range of the function.

Domain	Rule	Range
x	$f(x) = x + 5$	$f(x)$
-2	$f(-2) = -2 + 5$	3
-1	$f(-1) = -1 + 5$	4
0	$f(0) = 0 + 5$	5
1	$f(1) = 1 + 5$	6
2	$f(2) = 2 + 5$	7

Domain:
 $\{-2, -1, 0, 1, 2\}$
 Range:
 $\{3, 4, 5, 6, 7\}$

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There are approximately 770 peanuts in a jar of peanut butter. The total number of peanuts $p(j)$ is a function of the number of jars of peanut butter purchased j .

a. Identify the independent and dependent variables

Independent: number of jars

Dependent: total number of peanuts

b. Write a function to represent the total number of peanuts. Then determine the number of peanuts in 7 jars of peanut butter.

$$p(j) = 770j$$

$$p(7) = 770(7)$$

$$p(7) = 5,390 \text{ peanuts}$$

c. What values of the domain and range make sense for this situation? Explain.

Domain: whole numbers

Range: whole numbers

Lesson 4.4: Linear Functions

How to graph a function...

1. Make a function table
2. Graph the coordinates from the table

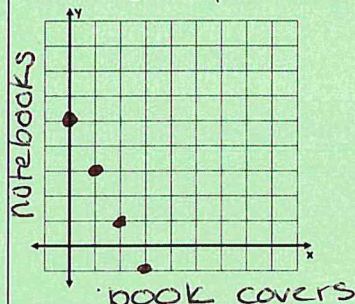
The school store sells book covers for \$2 each and notebooks for \$1. Toni has \$5 to spend. The function $f(x) = 5 - 2x$ represents the number of book covers x and notebooks y she can buy.

1. Make a function table

Domain	Rule	Range
x	$f(x) = 5 - 2x$	$f(x)$
0	$5 - 2(0)$	5
1	$5 - 2(1)$	3
2	$5 - 2(2)$	1
3	$5 - 2(3)$	-1

(0, 5)
(1, 3)
(2, 1)
(3, -1)

2. Graph the ordered pairs. (x, y)



3. Interpret the points graphed.

If she buys 0 covers she can buy 5 notebooks
 " " 1 cover she can buy 3 notebooks
 " " 2 covers she can buy 1 notebook

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Steps	
Term	Definition
Linear Function	Functions that's graphs are straight lines
Continuous Data	There can be parts of things represented with a line connecting the points
Discrete Data	There can't be parts of things represented with just plotted points.

Lesson 4.5: Compare Properties of Functions

How to compare functions...
<ul style="list-style-type: none"> ◦ Slope differences ◦ y-intercept differences

Lesson 4.6: Construct Functions

How to construct functions...
<ol style="list-style-type: none"> 1. Find the initial value (y-intercept) 2. Find the rate of change (slope)

Lesson 4.7: Linear and Nonlinear Functions

Vocabulary	
Linear the cons rate of change is constant.	Nonlinear the rate of change is not constant

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Increasing

as x increases
 y increases

Decreasing

as x increases
 y decreases

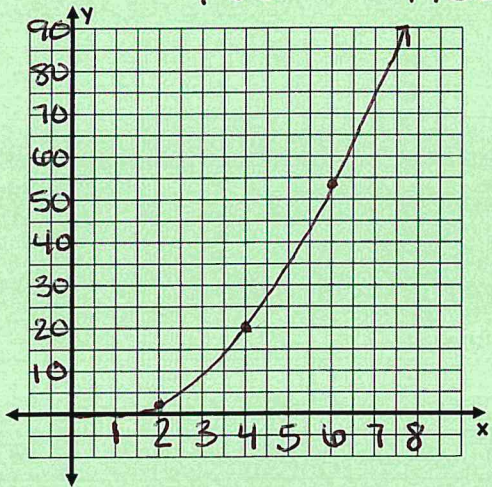
Determine whether each table represents a linear or nonlinear function. Explain. Use a graph

x	y
2	2
4	20
6	54
8	104

+2
+2

18
34
+50

Non linear

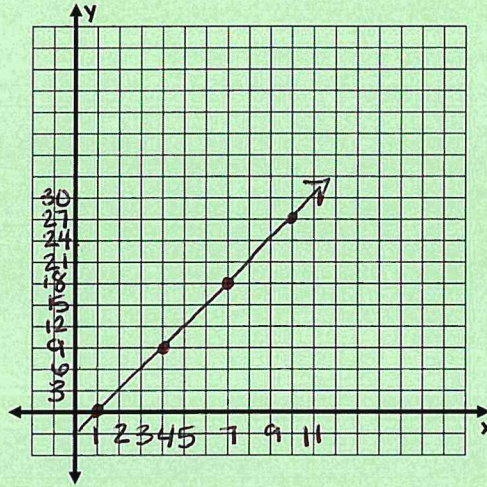


x	y
1	0
4	9
7	18
10	27

3
3
3

9
9
9

Linear



Lesson 4.8: Quadratic Functions

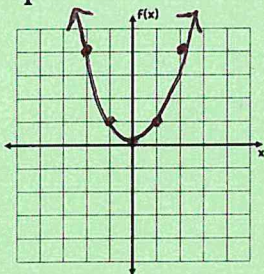
Vocabulary

Quadratic Function

functions in which the greatest power of the variable is 2.

$$y = ax^2 + bx + c$$

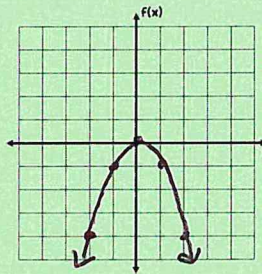
Upward



$$y = x^2$$

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

Downward



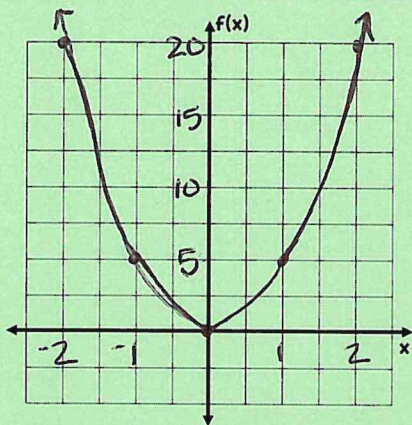
$$y = -x^2$$

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

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1. $f(x) = 5x^2$

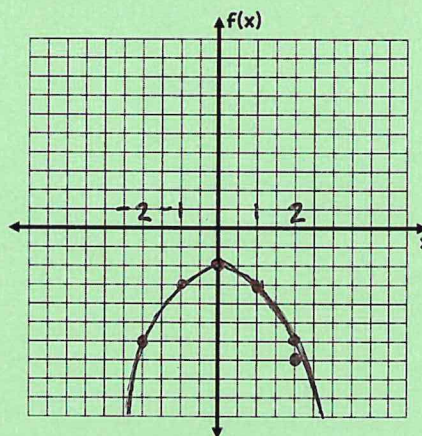
Domain	Rule	Range
x	$5x^2$	$f(x)$
-2	$5(-2)^2$	20
-1	$5(-1)^2$	5
0	$5(0)^2$	0
1	$5(1)^2$	5
2	$5(2)^2$	20



* go up by 2.5

2. $f(x) = -x^2 - 2$

Domain	Rule	Range
x	$-x^2 - 2$	$f(x)$
-2	$-(-2)^2 - 2$	-6
-1	$-(-1)^2 - 2$	-3
0	$-(0)^2 - 2$	-2
1	$-(1)^2 - 2$	-3
2	$-(2)^2 - 2$	-6

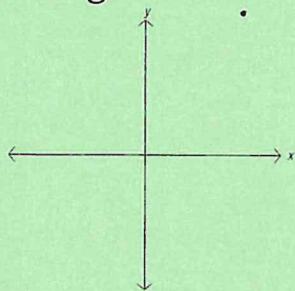


Lesson 4.9: Qualitative Graphs

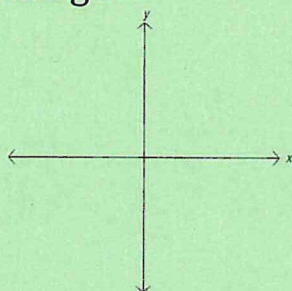
Vocabulary

Qualitative Graph

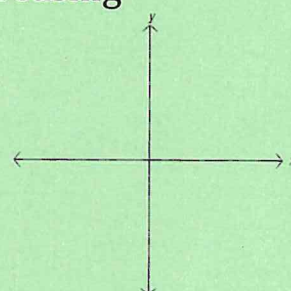
Increasing



No Change



Decreasing



Describe the change in the runners speed to the time they are running.

