

8 - CHAPTER 3: EQUATIONS IN TWO VARIABLES - NOTE PACKET

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HOUR: 1st

Lesson 3.1: Constant Rate of Change

Vocabulary	
Term	Definition
Linear Relationship	A relationship that has a straight line graph & constant rate of change
Constant Rate of Change	When the rate of change is the same between any two points in a linear relationship.

How to find a constant rate of change on a...

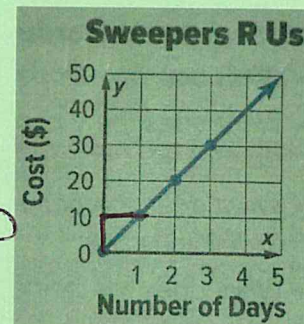
Tables

Carpets Plus	
Time (Days)	Cost (\$)
2	30
3	45
4	60

+1 (between 2 and 3 days) +15 (between 30 and 45 dollars)
 +1 (between 3 and 4 days) +15 (between 45 and 60 dollars)

$$\frac{\text{cost}}{\text{time}} = \frac{15}{1} = 15$$

Graphs



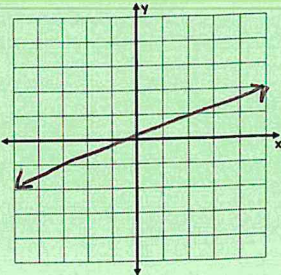
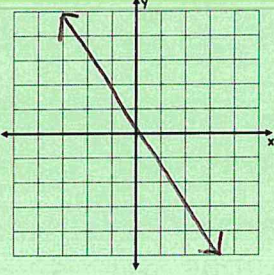
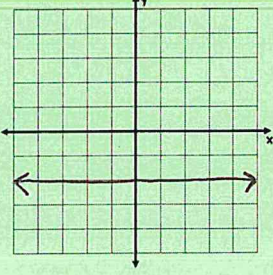
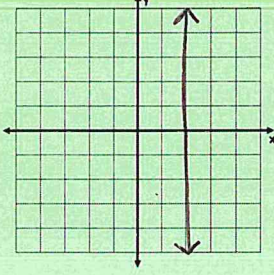
$$\frac{10}{1} = 10$$

The line is straight therefore this has a constant rate of change

Lesson 3.2: Slope

Vocabulary	
Term	Definition
Slope	The ratio of the rise (vertical change) to the run $\text{Slope} = \frac{\text{rise}}{\text{run}}$
Rise vertical change (y-values)	Run horizontal change (x-values)

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Slope Formula	$m = \frac{y_2 - y_1}{x_2 - x_1}$ (x_1, y_1) (x_2, y_2)		
Different types of slopes			
Positive  $m = a$	Negative  $m = -a$	Zero $y = -2$  $y = a$	Undefined $x = 2$  $x = a$

Lesson 3.3: Equations in $y = mx$ Form

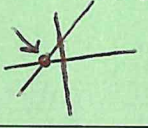
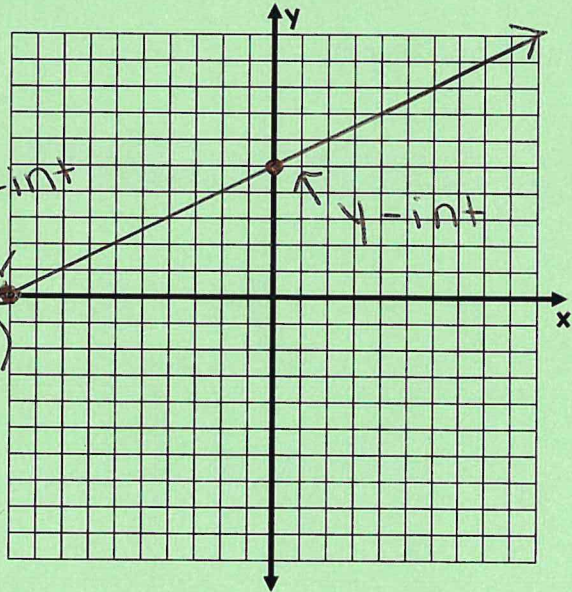
Steps	
Term	Definition
Proportional Relationship	Two quantities are proportional if they have a constant ratio. $\frac{25}{5} = 5 \quad \frac{50}{10} = 5$
How to determine if a relationship is proportional when looking at a graph... the line will go through the origin.	
Direct Variation	proportional relationships When the ratio of y to x is a constant m . <div style="float: right;"> Formula $y = m x$ \uparrow $\frac{y}{x}$ </div>
How to compare direct variations... to compare their slopes	

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Lesson 3.4: Slope-Intercept Form

Vocabulary	
y- intercept	The point at which our line cross the y-axis 
Slope Intercept Form	
$y = mx + b$	
$m = \text{slope}$	$b = y\text{-intercept}$

Lesson 3.5: Graph a Line Using Intercepts

Vocabulary	
x- intercept	The point at which our line crosses the x-axis 
How to graph an equation using intercepts...	
$y = \frac{1}{2}x + 5$	
1) Find the y- intercept:	
$b = 5 \ (0, 5)$	
2) Find the x- intercept:	
* replace the y with zero & solve for x	
$0 = \frac{1}{2}x + 5 \quad \left(\frac{2}{2}\right) - 5 = \frac{1}{2}x \left(\frac{2}{1}\right)$ $-5 \quad -5 \quad -10 = x$	
3) Plot the two intercepts on the coordinate plane.	
4) Connect the points.	

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Vocabulary	
Standard Form	$Ax + By = C$
How to convert Standard Form into Slope Intercept Form...	
1) Subtract the x variable from both sides.	$60x + 15y = 4,740$ $\begin{array}{r} -60x \qquad -60x \\ \hline 15y = -60x + 4740 \\ \hline \frac{15y}{15} = \frac{-60x + 4740}{15} \end{array}$
2) Divide both sides by the co-efficient of y .	$y = \frac{-60x}{15} + \frac{4740}{15}$
* Note:	$\frac{-Ax + C}{B}$
	$\frac{-A}{B}x + \frac{C}{B}$
	$y = -4x + 316$
	$0 = -4x + 316 \quad \frac{-316}{-4} = \frac{-4}{-4}$ $-316 \qquad -316 \qquad 79 = x$
	$316 = y\text{-int.} \qquad 79 = x\text{-int}$

Lesson 3.6: Write Linear Equations

Vocabulary		
Point Slope Form		
Point-Slope Intercept Form		
$y - y_1 = m(x - x_1)$		
$y_1 = y\text{-value}$	$m = \text{slope}$	$x_1 = x\text{-value}$

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How to convert Point Slope Form into Slope Intercept Form...

Write an equation in point-slope form for the line that passes through $(-2, 3)$ with a slope of 4.

1) Input coordinates and slope where they belong in the point slope formula.

$$y - y_1 = m(x - x_1)$$

$$y - 3 = 4(x - -2)$$

2) Use the distributive property.

$$y - 3 = 4(x + 2)$$

$$y - 3 = 4x + 8$$

$$+3 \qquad \qquad +3$$

3) Add/Subtract the constant from both sides

$$y = 4x + 11$$

Write a Linear Equation

From Slope and a Point

point-slope form

From Slope and y -intercept

Slope-intercept form

From a graph

Slope-intercept form

From two points

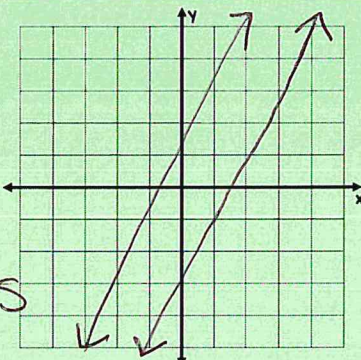
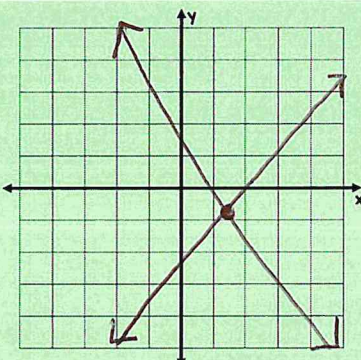
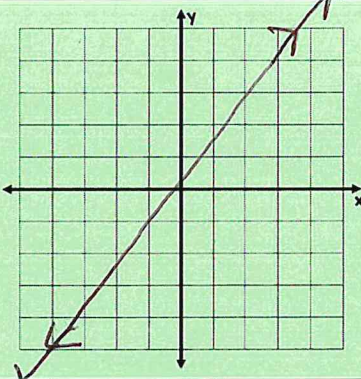
point-slope form

From a table

point-slope form

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Lesson 3.7: Solve Systems of Equations by Graphing

Vocabulary		
System of Equations	Two or more equations with the same set of variables.	
Number of Solutions		
Null Set	<p>If the lines are parallel</p> <p>The same slope and different y-intercepts</p>	
One Solution	<p>If the lines cross</p> <p>The different slope and different y-intercept.</p>	
Identify	<p>If the lines are the same.</p> <p>The same slope and same y-intercept.</p>	

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Lesson 3.8: Solve Systems of Equations Algebraically

Vocabulary

Substitution

replace a variable with an expression

$$y = x - 3$$

$$y = 2x$$

$$x - 3 = 2x$$

$$\begin{array}{r} -x \\ -x \end{array}$$

$$\boxed{-3 = x}$$

$$y = 2x$$

$$y = 2(-3)$$

$$\boxed{y = -6}$$

$$\boxed{(-3, -6)}$$

$$y = 3x + 8$$

$$8x + 4y = 12$$

$$8x + 4(3x + 8) = 12$$

$$8x + 12x + 32 = 12$$

$$20x + 32 = 12$$

$$\begin{array}{r} -32 \\ -32 \end{array}$$

$$\frac{20x}{20} = \frac{-20}{20}$$

$$\boxed{x = -1}$$

$$y = 3x + 8$$

$$y = 3(-1) + 8$$

$$\boxed{y = 5}$$

$$\boxed{(-1, 5)}$$

