

Math 10-C Linear Equations & Graphs Assignment List Name: _____

KEYS

C1: Linear Relations

- CP Handout pg. 153
- Slope as a Rate of Change Assignment
- Slope Graphic Organizer
- Linear or Non-linear Investigation

C2: Graphing Lines

- CP Handout pg. 150,151
- Investigating Lines Handout
- CP Handout pg. 155,157
- Instruction Manual (Explain a Process)
- A Straight-Line Landmark
- C1-C2 Quick Check

C3: Determine Equation of Lines

- pg. 143: 3ace,5,12
- CP Handout pg. 159,160
- Determine Equations Assignment
- Text pg. 152: 5
- Text pg. 148: 6,7

C4: Parallel & Perpendicular Lines

- Parallel & Perpendicular Lines Investigation
- Text pg. 156: 2,6-10,12
- C3-C4 Quick Check

Linear Equations & Graphs Chapter Review

- Holt's Hundred Linear Functions Review
- Text pg. 135: 10
- Text pg. 158: 1-14

Slope as a Rate of Change Assignment

KEY

1. $(5, -16)$ $(11, -55)$ $m = \frac{y_2 - y_1}{x_2 - x_1}$
 $x_1 \ y_1$ $x_2 \ y_2$

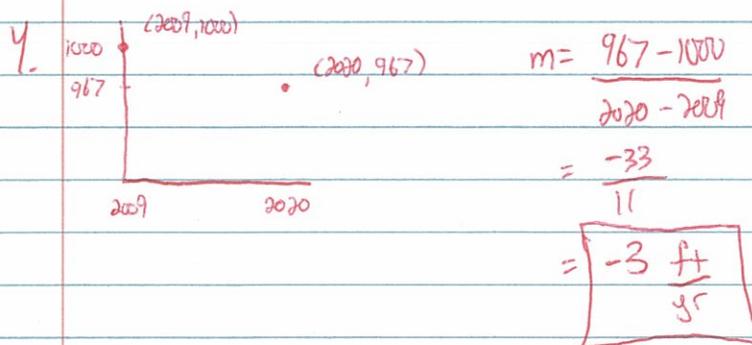
$$= \frac{-55 - (-16)}{11 - 5}$$
$$= \frac{-39}{6}$$
$$= \boxed{-6.5 \frac{^{\circ}\text{C}}{\text{km}}}$$

2. $(85, 500)$ $(180, 1000)$ $m = \frac{y_2 - y_1}{x_2 - x_1}$
 $x_1 \ y_1$ $x_2 \ y_2$

$$= \frac{1000 - 500}{180 - 85}$$
$$= \frac{500}{95}$$
$$= \boxed{5.3 \frac{\text{m}}{\text{s}}}$$

3. $m = \frac{\text{rise}}{\text{run}} = \frac{10}{24}$

$$= \boxed{\frac{5}{12} \text{ or } 0.42}$$

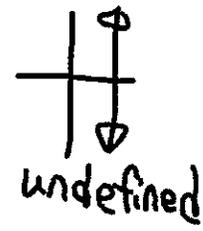
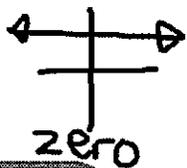


5. $m = \frac{48.5 - 36}{10} = \frac{12.5}{10} = \boxed{1.25 \frac{\text{cm}}{\text{month}}}$

Definition:
Steepness of a Line.

Ratio of $\frac{\text{rise}}{\text{run}}$

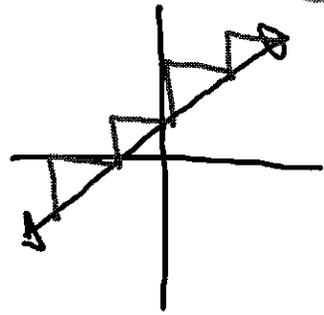
Classify Slopes:



Slope
is

$$m = \frac{\text{rise}}{\text{run}}$$

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$



Slope from a Graph:

Slope from a Formula:

M10C Lin Eqs & Graphs C1 – Linear Relations
 Linear or Non-Linear Assignment

Name: KEY

In each of the problems you will be given a relation as an equation or a table of values. First, you must try to decide if the given relation is linear or non-linear and then complete the missing parts of the table.

Problem #1

Equation: $y = 2x$	Table of Values <table border="1"> <thead> <tr> <th>x</th> <th>y</th> </tr> </thead> <tbody> <tr> <td>-2</td> <td>-4</td> </tr> <tr> <td>-1</td> <td>-2</td> </tr> <tr> <td>0</td> <td>0</td> </tr> <tr> <td>1</td> <td>2</td> </tr> <tr> <td>2</td> <td>4</td> </tr> </tbody> </table>	x	y	-2	-4	-1	-2	0	0	1	2	2	4	Graph
x		y												
-2		-4												
-1		-2												
0		0												
1	2													
2	4													
Domain: $\{x -2 \leq x \leq 2, x \in R\}$														
Range: $\{y -4 \leq y \leq 4, y \in R\}$														
Linear or Non-Linear (Circle One)														
Slope: (If linear) $m = \frac{2}{1} = 2$														

Problem #2

Equation: $y = x^2$	Table of Values <table border="1"> <thead> <tr> <th>x</th> <th>y</th> </tr> </thead> <tbody> <tr> <td>-2</td> <td>4</td> </tr> <tr> <td>-1</td> <td>1</td> </tr> <tr> <td>0</td> <td>0</td> </tr> <tr> <td>1</td> <td>1</td> </tr> <tr> <td>2</td> <td>4</td> </tr> </tbody> </table>	x	y	-2	4	-1	1	0	0	1	1	2	4	Graph
x		y												
-2		4												
-1		1												
0		0												
1	1													
2	4													
Domain: $\{x -2 \leq x \leq 2, x \in R\}$														
Range: $\{y 0 \leq y \leq 4, y \in R\}$														
Linear or Non-Linear (Circle One)														
Slope: (If linear) N/A														

Problem #3

Equation: $y = \sqrt{x}$	Table of Values <table border="1"> <thead> <tr> <th>x</th> <th>y</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>0</td> </tr> <tr> <td>1</td> <td>1</td> </tr> <tr> <td>2</td> <td>$\sqrt{2}$</td> </tr> <tr> <td>3</td> <td>$\sqrt{3}$</td> </tr> <tr> <td>4</td> <td>2</td> </tr> </tbody> </table>	x	y	0	0	1	1	2	$\sqrt{2}$	3	$\sqrt{3}$	4	2	Graph
x		y												
0		0												
1		1												
2		$\sqrt{2}$												
3	$\sqrt{3}$													
4	2													
Domain: $\{x x \geq 0, x \in R\}$														
Range: $\{y y \geq 0, y \in R\}$														
Linear or Non-Linear (Circle One)														
Slope: (If linear) N/A														

Problem #4

Equation: $y = \frac{1}{2}x - 2$	Table of Values	Graph																
Domain: $\{-3, -2, -1, 0, 1, 2, 3\}$																		
Range: $\{-2.5, -3, -2.5, -2, -1.5, -1, -0.5\}$	<table border="1"> <thead> <tr> <th>x</th> <th>y</th> </tr> </thead> <tbody> <tr><td>-3</td><td>-3.5</td></tr> <tr><td>-2</td><td>-3</td></tr> <tr><td>-1</td><td>-2.5</td></tr> <tr><td>0</td><td>-2</td></tr> <tr><td>1</td><td>-1.5</td></tr> <tr><td>2</td><td>-1</td></tr> <tr><td>3</td><td>-0.5</td></tr> </tbody> </table>	x	y	-3	-3.5	-2	-3	-1	-2.5	0	-2	1	-1.5	2	-1	3	-0.5	
x	y																	
-3	-3.5																	
-2	-3																	
-1	-2.5																	
0	-2																	
1	-1.5																	
2	-1																	
3	-0.5																	
Linear or Non-Linear (Circle One)																		
Slope: (If linear) $m = \frac{1}{2}$																		

Problem #5

Equation: $y = 2^x$	Table of Values	Graph														
Domain: $\{x x \in R\}$																
Range: $\{y y > 0, y \in R\}$	<table border="1"> <thead> <tr> <th>x</th> <th>y</th> </tr> </thead> <tbody> <tr><td>-2</td><td>$2^{-2} = \frac{1}{4}$</td></tr> <tr><td>-1</td><td>$2^{-1} = \frac{1}{2}$</td></tr> <tr><td>0</td><td>$2^0 = 1$</td></tr> <tr><td>1</td><td>$2^1 = 2$</td></tr> <tr><td>2</td><td>$2^2 = 4$</td></tr> <tr><td>3</td><td>$2^3 = 8$</td></tr> </tbody> </table>	x	y	-2	$2^{-2} = \frac{1}{4}$	-1	$2^{-1} = \frac{1}{2}$	0	$2^0 = 1$	1	$2^1 = 2$	2	$2^2 = 4$	3	$2^3 = 8$	
x	y															
-2	$2^{-2} = \frac{1}{4}$															
-1	$2^{-1} = \frac{1}{2}$															
0	$2^0 = 1$															
1	$2^1 = 2$															
2	$2^2 = 4$															
3	$2^3 = 8$															
Linear or Non-Linear (Circle One)																
Slope: (If linear) N/A																

Problem #6

Equation: $y = 3$	Table of Values	Graph														
Domain: $\{x x \in R\}$																
Range: $\{y y = 3\}$	<table border="1"> <thead> <tr> <th>x</th> <th>y</th> </tr> </thead> <tbody> <tr><td>-2</td><td>3</td></tr> <tr><td>-1</td><td>3</td></tr> <tr><td>0</td><td>3</td></tr> <tr><td>1</td><td>3</td></tr> <tr><td>2</td><td>3</td></tr> <tr><td>3</td><td>3</td></tr> </tbody> </table>	x	y	-2	3	-1	3	0	3	1	3	2	3	3	3	
x	y															
-2	3															
-1	3															
0	3															
1	3															
2	3															
3	3															
Linear or Non-Linear (Circle One)																
Slope: (If linear) $m = 0$																

Math 10 C: Investigating Lines

Complete the following with a partner.

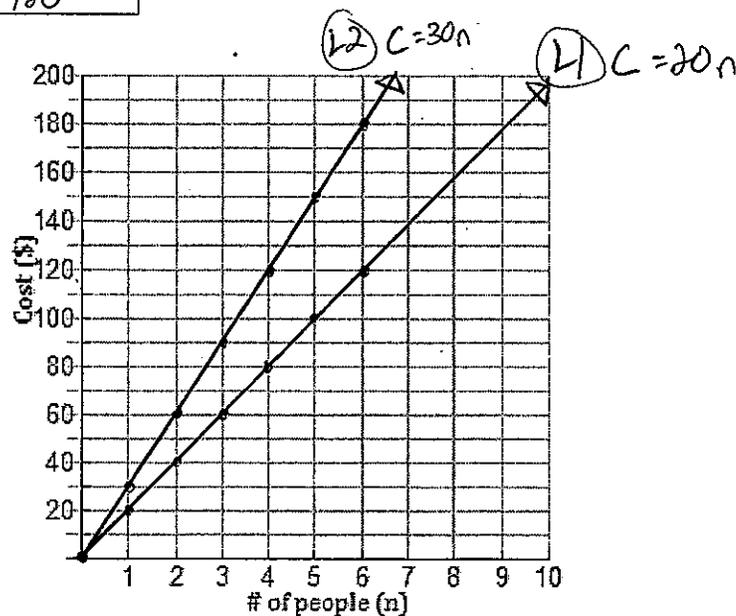
Part A

1. The cost of a private dinner with a set menu at a restaurant is represented by the equation $C = 20n$ where n is the number of people in attendance and C is the total cost. Complete the partial table of values below. Then, graph the data on the grid provided. Label the graph L1.

n	C
0	0
1	20
2	40
3	60
4	80
5	100
6	120

2. The cost of a different menu is represented by the equation $C = 30n$ where n is the number of people in attendance and C is the total cost. Complete the partial table of values below. Then, graph the data on the same grid as number 1. Label the graph L2.

n	C
0	0
1	30
2	60
3	90
4	120
5	150
6	180



3. Is the function represented by the equations (and graphs) above linear or non-linear? How do you know?

Linear — graph forms a straight line / constant rate

4. How are L1 and L2 different? How are they similar?

Different — slopes

Similar — same y-int (start @ 0), linear

5. What would happen to the **graph** if the equation was $C = 15n$?

Slope would decrease / not as steep

6. (a) What does the number in front of the independent variable represent in this problem?

Cost per person

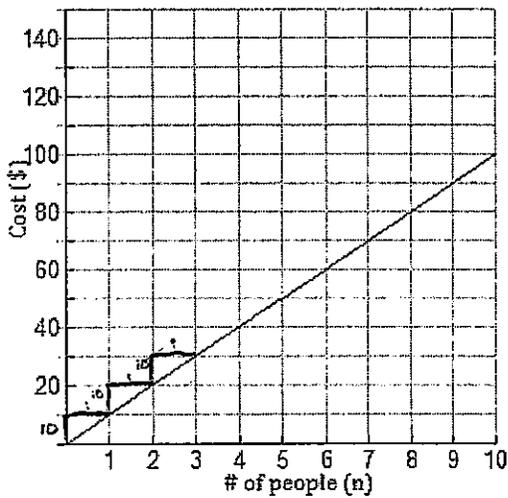
(b) What does the number in front of the independent variable represent in general?

slope / rate of change

7. Given the graphs below, determine:

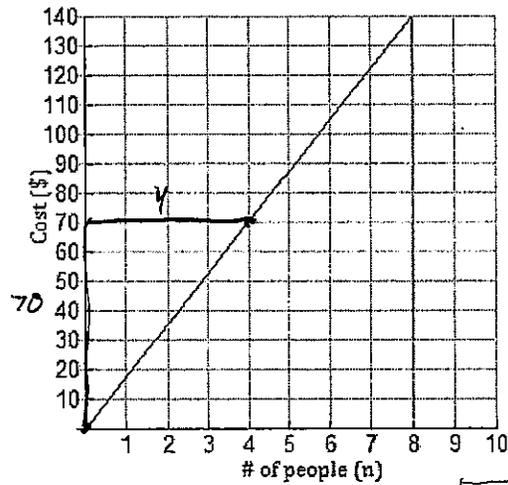
(a) The cost/person

(b) The equation of the line.



(a) $\frac{\text{cost}}{\text{person}} = \10

(b) $C = 10n$



(a) $\frac{\text{cost}}{\text{person}} = \frac{\$70}{4 \text{ ppl}} = \$17.50$

(b) $C = 17.5n$

8. How did you find the value in front of the variable in question #7?

Calculated slope.

9. What if you were told that the cost for 8 people was \$96? What would be the equation of the line?

$\frac{\text{cost}}{\text{person}} = \frac{\$96}{8} = \$12$

$C = 12n$

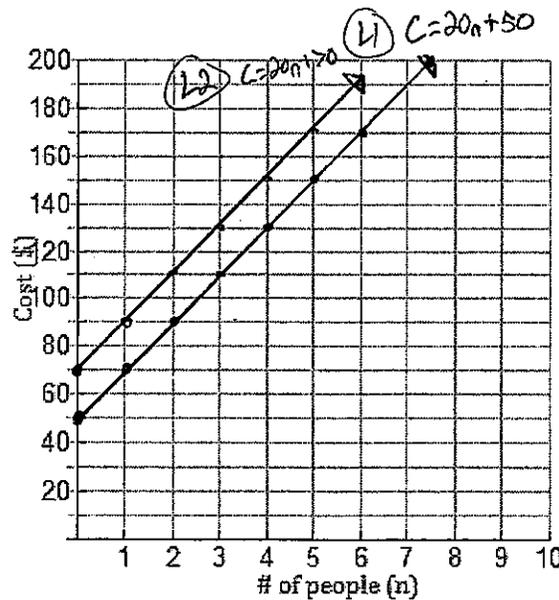
Part B

1. The cost of a dinner at another restaurant is represented by the equation $C = 20n + 50$ where n is the number of people in attendance and C is the total cost. Complete the table of values below. Then, graph the data on the grid provided. Label the line L1.

n	C
0	50
1	70
2	90
3	110
4	130
5	150
6	170

2. The cost of a different menu at the same restaurant is represented by the equation $C = 20n + 70$ where n is the number of people in attendance and C is the total cost. Create a table of values below. Then, graph the data on the same grid as number 1. Label the line L2.

n	C
0	70
1	90
2	110
3	130
4	150
5	170
6	190



3. How are L1 and L2 different? How are they similar?

Different - y-int (initial cost)

Similar - slope (cost per person)

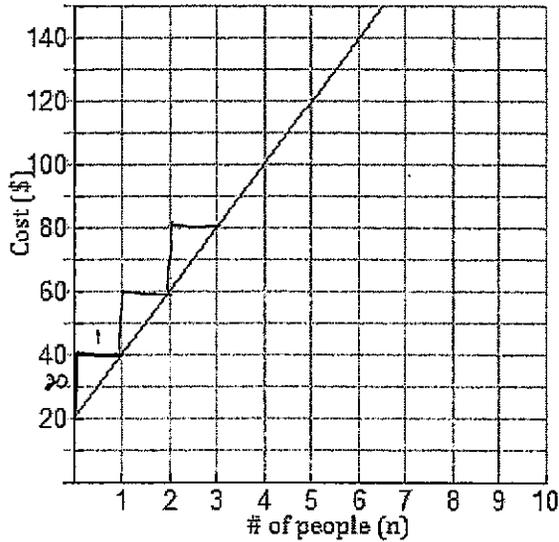
4. What would happen to the **graph** if the equation was $C = 20n + 30$?

Begin at 30

5. What does the constant number (the number NOT multiplied by a variable) in the equation represent?

Initial Cost

6. What is the equation of the line shown below? Explain.



$$\text{Initial Cost (y-int)} = 20$$

$$\text{Cost/person (slope)} = 20$$

$$C = 20n + 20$$

7. What if you were told that the fixed cost of renting a room is \$40 and the cost per person is \$15. Write the equation of the line.

$$C = 15n + 40$$

Instruction Manual (Explain a Process) Activity
Linear Equations & Graphs C2

We've discussed in class that there are two main strategies for sketching a graph of a line.

- Strategies to graph a line:
- 1) Calculate x and y intercepts
 - 2) Slope Intercept Form
- } Instruction Manuals on next 2 pages.

Your task is to create instruction manuals for the strategies listed above.

Your instruction manuals should have step by step instructions and should include an example. The goal is that someone who has never used these strategies before should be able to follow your instructions to solve a problem of their own.

You may work on your own or with a partner. Please hand in your instruction manuals on a separate sheet of paper once you are done. You will have approximately 35 minutes for this.

Practice:

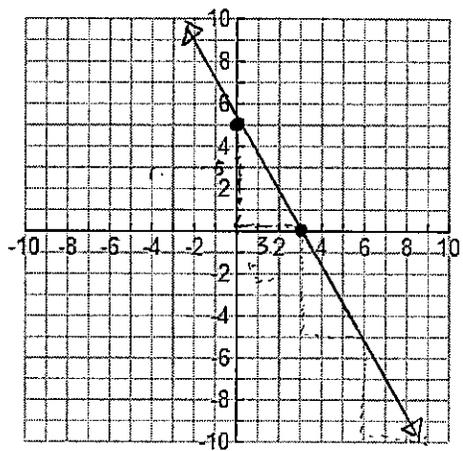
Test your instruction manuals by using both strategies to graph $5x + 3y - 15 = 0$.

① x and y intercepts

$\begin{aligned} & \text{y-int (x=0)} \\ & 3y - 15 = 0 \\ & 3y = 15 \quad (0, 5) \\ & y = 5 \end{aligned}$	$\begin{aligned} & \text{x-int (y=0)} \\ & 5x - 15 = 0 \\ & 5x = 15 \quad (3, 0) \\ & x = 3 \end{aligned}$
--	--

② Slope Intercept Form

$\begin{aligned} 5x + 3y - 15 &= 0 \\ 3y &= -5x + 15 \\ y &= -\frac{5}{3}x + 5 \end{aligned}$	$\begin{aligned} m &= -\frac{5}{3} \checkmark \\ b &= 5 \checkmark \end{aligned}$
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① Graphing a line Strategy #1 - Calculate x and y intercepts

To explain this strategy I will show the steps required to graph $2x - 3y - 6 = 0$.

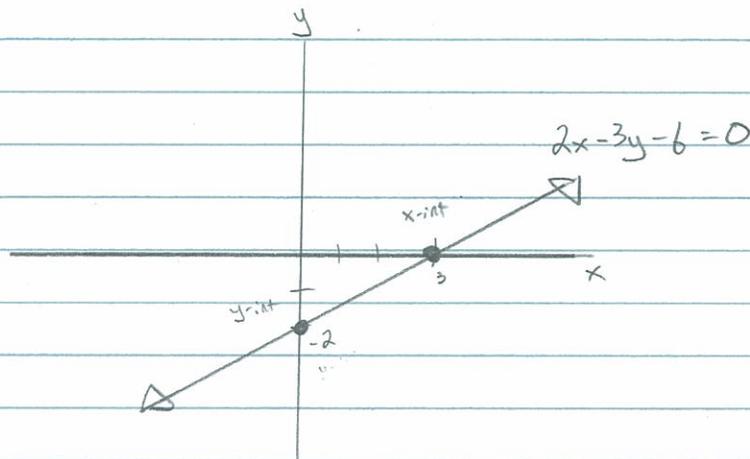
Step #1: Calculate y-int by making $x=0$ and solving for y.

$$\begin{aligned}
 \text{y-int}(x=0) &\rightarrow 2(0) - 3y - 6 = 0 \\
 &-3y - 6 = 0 \\
 &-3y = 6 \qquad \text{y-int} \\
 &\boxed{y = -2} \qquad (0, -2)
 \end{aligned}$$

Step #2: Calculate x-int by making $y=0$ and solving for x.

$$\begin{aligned}
 \text{x-int}(y=0) &\rightarrow 2x - 3(0) - 6 = 0 \\
 &2x - 6 = 0 \\
 &2x = 6 \qquad \text{x-int} \\
 &\boxed{x = 3} \qquad (3, 0)
 \end{aligned}$$

Step #3: Plot the x-int and y-int on a grid and use a ruler to draw a straight line through both points.



Graphing a Line Strategy #2 - Slope Intercept Form

To explain this strategy I will show the steps required to graph $2x - 3y - 6 = 0$.

Step #1: Rearrange equation into slope intercept form ($y = mx + b$) and identify slope and y-int.

$$2x - 3y - 6 = 0$$

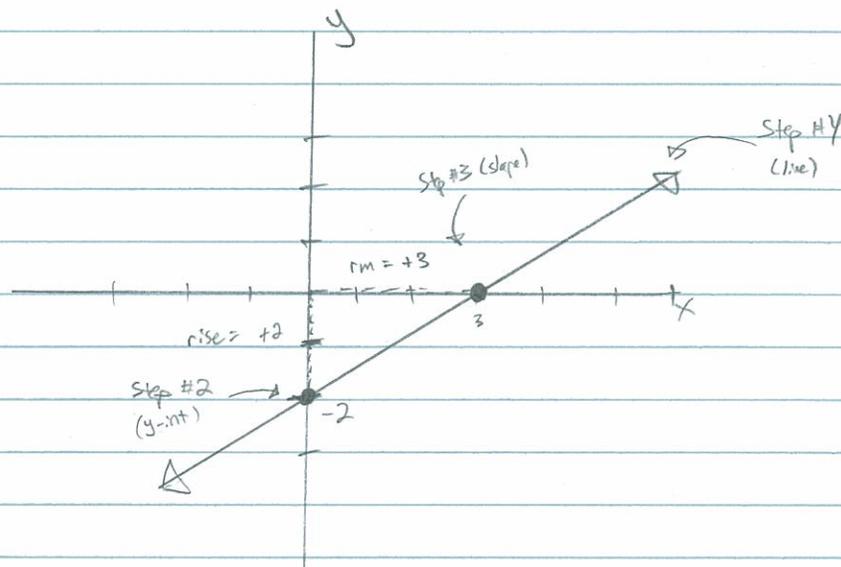
$$\frac{-3y}{-3} = \frac{-2x + 6}{-3}$$

$$y = \frac{2}{3}x - 2$$

$$m = \frac{2}{3}$$

$$b = -2$$

Step #2: Plot y-int on a grid.



Step #3: Start at the y-int and use the rise and run of the slope to plot another point on the line.

$$m = \frac{\text{rise}}{\text{run}} = \frac{2}{3}$$

rise = 2 (up 2)

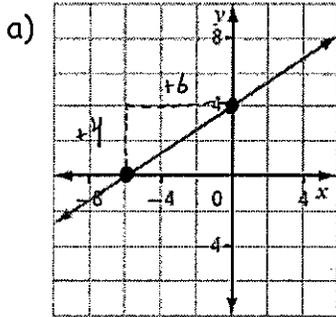
run = 3 (right 3)

Step #4: Use a ruler to draw a straight line through the points.

M10-C Lin Eqs & Graphs Quick Check
C1-C2 Linear Relations & Graphing Lines

Name: KEY

1. Determine the slope for each of the following. (MHR pg. 324-326)



$$m = \frac{y}{x} = \frac{2}{3}$$

Slope = $\frac{2}{3}$

b)

Time (s)	Distance (m)
1	4
2	7
3	10
4	13
5	16
6	19
7	22

+1 (} +3
+1 (} +3
+1 (} +3

$$m = \frac{3}{1}$$

Slope = 3

c) A line passing through the points $(3, 6)$ and $(-3, -12)$.

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{-12 - 6}{-3 - 3}$$

$$= \frac{-18}{-6}$$

$$= 3$$

Slope = 3

d) In Manitoba, the number of people aged 12 and older who have asthma was 63 028 in 1996 and 73 427 in 2005. Round your answer to the nearest person.

$$m = \frac{73\,427 - 63\,028}{2005 - 1996}$$

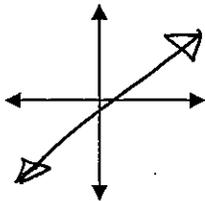
$$= \frac{10\,399}{9}$$

$$= 1155 \frac{\text{people}}{\text{year}}$$

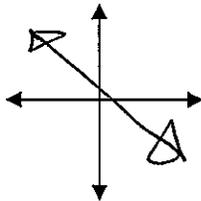
Slope = 1155

2. Sketch a line with each of the given slopes.

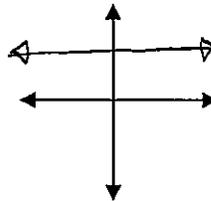
a) Positive Slope



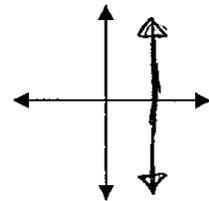
b) Negative Slope



c) Slope is 0



d) Slope is Undefined



3. Complete the table below.

Equation: $y = \frac{1}{2}x + 2$	Table of Values <table border="1"> <thead> <tr> <th>x</th> <th>y</th> </tr> </thead> <tbody> <tr><td>-2</td><td>1</td></tr> <tr><td>-1</td><td>1.5</td></tr> <tr><td>0</td><td>2</td></tr> <tr><td>1</td><td>2.5</td></tr> <tr><td>2</td><td>3</td></tr> <tr><td>3</td><td>3.5</td></tr> <tr><td>4</td><td>4</td></tr> </tbody> </table>	x	y	-2	1	-1	1.5	0	2	1	2.5	2	3	3	3.5	4	4	Graph
x		y																
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0	2																	
1	2.5																	
2	3																	
3	3.5																	
4	4																	
Domain: $\{x -2 \leq x \leq 4, x \in R\}$																		
Range: $\{y 1 \leq y \leq 4, y \in R\} = [1, 4]$																		
Linear or Non-Linear (Circle One)																		
Slope: (If linear) $m = \frac{1}{2}$																		

4. The equation $2x + 3y - 12 = 0$ defines a line.

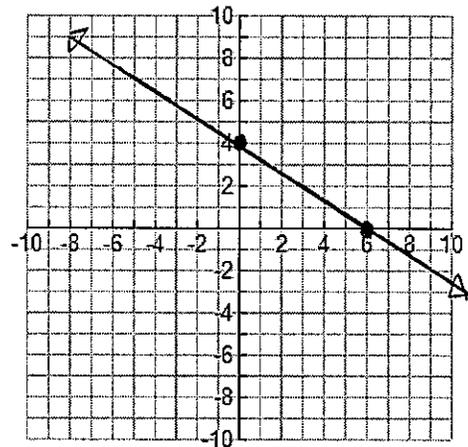
(a) Determine the x-intercept of the line.

$$\begin{aligned}
 \text{x-int (y=0)} &\rightarrow 2x - 12 = 0 \\
 &2x = 12 \\
 &\boxed{x = 6}
 \end{aligned}$$

(b) Determine the y-intercept of the line.

$$\begin{aligned}
 \text{y-int (x=0)} &\rightarrow 3y - 12 = 0 \\
 &3y = 12 \\
 &\boxed{y = 4}
 \end{aligned}$$

(c) Graph the line.



5. The equation $4x - 3y + 15 = 0$ defines a line.

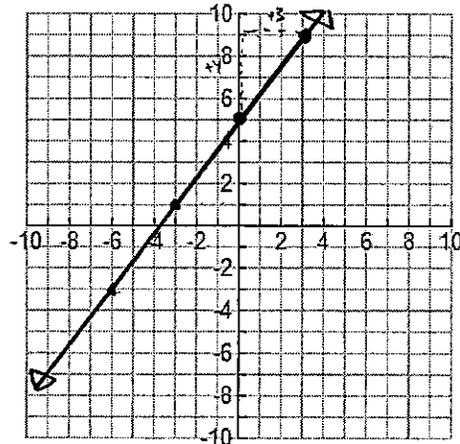
a) Write the equation in slope-intercept form.

$$\begin{aligned}
 -3y &= -4x - 15 \\
 \frac{-3y}{-3} &= \frac{-4x}{-3} - \frac{15}{-3} \\
 y &= \frac{4}{3}x + 5
 \end{aligned}$$

b) State the slope and y-intercept of the line.

$$\boxed{m = \frac{4}{3}} \quad \boxed{b = 5}$$

c) Graph the line.



M10-C C3- Determine Equations Assignment

1. a) $m=4$ $b=-3$

$$y = 4x - 3$$

$$4x - y - 3 = 0$$

b) $m = -\frac{1}{2}$ $b=1$

$$y = -\frac{1}{2}x + 1$$

$$2(y) = 2\left(-\frac{1}{2}x\right) + 2(1)$$

$$2y = -x + 2$$

$$x + 2y - 2 = 0$$

c) $(5,1)$ $(3,-7)$

$$m = \frac{-7-1}{3-5}$$

$$= \frac{-8}{-2}$$

$$= 4$$

$$y = mx + b$$

$$1 = 4(5) + b$$

$$1 = 20 + b$$

$$-19 = b$$

$$y = 4x - 19$$

$$4x - y - 19 = 0$$

d) $(5,-8)$ $(1,4)$

$$m = \frac{4 - (-8)}{1 - 5}$$

$$= \frac{12}{-4}$$

$$= -3$$

$$m = \frac{y - y_1}{x - x_1}$$

$$-3 = \frac{y - 4}{x - 1}$$

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

$$y = -3x + 7$$

$$3x + y - 7 = 0$$

e) $m = 3$ $(4, 0)$

$y = mx + b$
 $0 = 3(4) + b$
 $0 = 12 + b$
 $-12 = b$

$y = 3x - 12$

$3x - y - 12 = 0$

f) $3x + y = 5$

$y = -3x + 5$

$m = -3$ $(-2, 4)$

$y = mx + b$

$4 = -3(-2) + b$

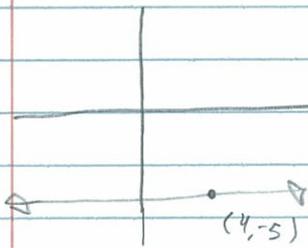
$4 = 6 + b$

$-2 = b$

$y = -3x - 2$

$3x + y + 2 = 0$

g) $m = 0$ $(4, -5)$



$y = -5$

$y + 5 = 0$

h) $(2, 0)$ $(0, -6)$

$m = \frac{-6 - 0}{0 - 2}$
 $= \frac{-6}{-2}$
 $= 3$

$b = -6$

$y = mx + b$
 $y = 3x - 6$

$3x - y - 6 = 0$

i) $x - 2y + 6 = 0$

$-2y = -x - 6$
 $\frac{-2y}{-2} = \frac{-x - 6}{-2}$
 $y = \frac{1}{2}x + 3$

$m = \frac{1}{2}$

$3x - 2y = 24$

x-int (y=0)
 $3x = 24$
 $x = 8$

$(8, 0)$

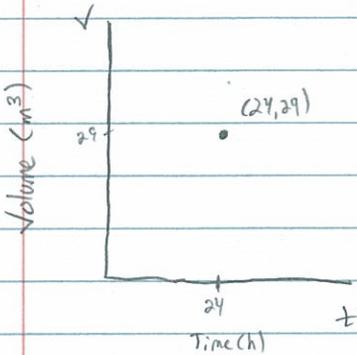
$m = \frac{y_2 - y_1}{x_2 - x_1}$
 $\frac{1}{2} = \frac{y - 0}{x - 8}$

$2y = x - 8$

$y = \frac{1}{2}x - 4$

$x - 2y - 8 = 0$

2. a) $m = 1.2 \frac{\text{m}^3}{\text{h}}$ (24, 29)



$$V = mt + b \rightarrow \boxed{V = 1.2t + 0.2}$$

$$29 = 1.2(24) + b$$

$$29 = 28.8 + b$$

$$0.2 = b$$

b) Make $V = 155 \text{ m}^3$ and solve for t .

$$V = 1.2t + 0.2$$

$$155 = 1.2t + 0.2$$

$$\frac{154.8}{1.2} = \frac{1.2t}{1.2}$$

$$\boxed{t = 129 \text{ h}}$$

It would take 129 hours to fill the tank.

c) The tank was not empty at the beginning. The y-int is 0.2 which means that at $t = 0$ the tank had 0.2 m^3 of oil in it.

3. a) (6, 335) (16, 341)

b) $m = 0.6 \frac{\text{m/s}}{^\circ\text{C}}$

$$m = \frac{341 - 335}{16 - 6}$$

$$= \frac{6}{10}$$

$$= \boxed{0.6}$$

The speed of sand increases by 0.6 m/s for every change of 1°C .

c) $m = 0.6$ (6, 335)

$$y = mx + b \rightarrow$$

$$\boxed{v = 0.6t + 331.4}$$

$$335 = 0.6(6) + b$$

$$335 = 3.6 + b$$

$$331.4 = b$$

d) $t = 35^\circ\text{C}$ $v = ?$

$$v = 0.6(35) + 331.4$$

$$\boxed{v = 352.4 \frac{\text{m}}{\text{s}}}$$

The velocity of sand at 35°C is $352.4 \frac{\text{m}}{\text{s}}$.

e) $v = 348 \frac{\text{m}}{\text{s}}$ $t = ?$

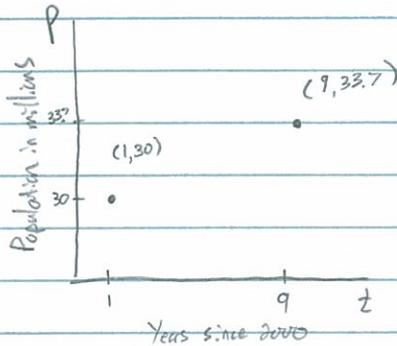
$$348 = 0.6t + 331.4$$

$$\frac{16.6}{0.6} = \frac{0.6t}{0.6}$$

$$\boxed{t = 27.7^\circ\text{C}}$$

The air temp. is 27.7°C when the velocity of sand is $348 \frac{\text{m}}{\text{s}}$.

$$4. a) (t, p) \rightarrow (1, 30) \quad (9, 33.7)$$



$$b) m = \frac{33.7 - 30}{9 - 1}$$

$$= \frac{3.7}{8}$$

$$m = 0.46$$

$$c) m = 0.46 \frac{\text{million}}{\text{year}}$$

The population increases by 0.46 million each year.

$$d) m = 0.46 \quad (1, 30)$$

$$y = mx + b \rightarrow p = 0.46t + 29.54$$

$$30 = 0.46(1) + b$$

$$30 = 0.46 + b$$

$$29.54 = b$$

$$e) t = 17 \quad p = ?$$

$$p = 0.46(17) + 29.54$$

$$p = 37.36$$

The predicted population of Canada in 2017 is 37.36 million.

Slopes of Parallel and Perpendicular Line Segments

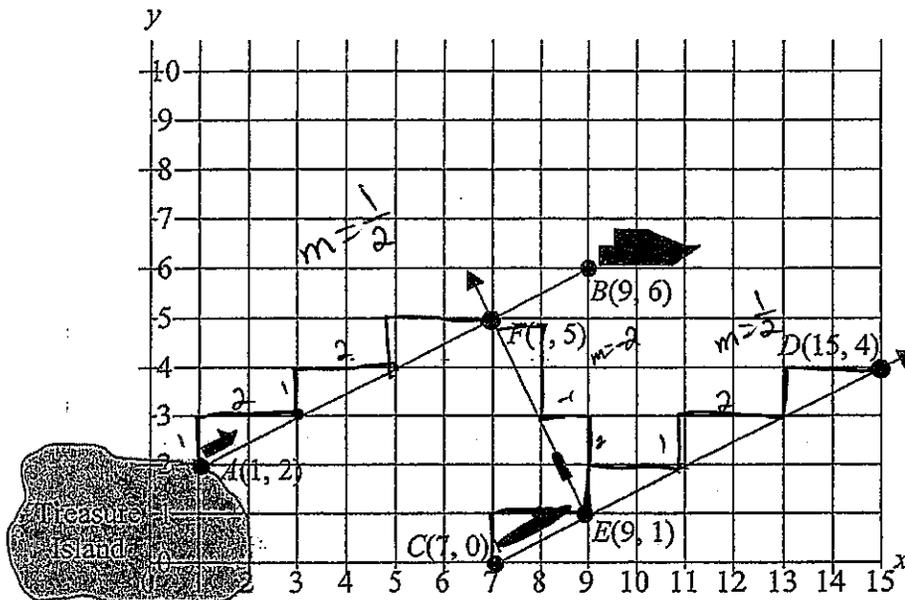
4.4 Solve problems using slopes of parallel lines and perpendicular lines. [CN, PS, V]

Investigation

To complete this investigation you will need to recall two definitions from plane geometry.

- *Parallel lines* are lines that do not intersect.
- *Perpendicular lines* are lines that intersect at right angles.

The pirate Bartholomew Robert was rumored to have hid a treasure of gold coins on a small island. You are part of a Discovery Channel expedition that found the treasure and is transporting it from the island to an awaiting ship. A grid of the area around the island is shown below. The scales on the axes are in kilometres.



Your motor boat is leaving the island at point A(1, 2) and traveling to point B(9, 6) to rendezvous with the ship. Unbeknownst to you, a submerged submarine has approached your boat and is now traveling at the same speed as you. The path of the submarine follows a line from point C(7, 0) to D(15, 4).

1. a) How is the path of the submarine related to the path of your boat?

Parallel

- b) Calculate the slope of your boat's path.

$$m = \frac{1}{2}$$

- c) Calculate the slope of the submarine's path.

$$m = \frac{1}{2}$$

- d) How are the slopes of the paths of the two vessels related?

Equal!

2. The submarine fires a torpedo from point $E(9, 1)$ and it hits your boat when your boat is at point $F(7, 5)$.

a) How is the path of the torpedo related to the path of your boat?

Perpendicular

b) Calculate the slope of the torpedo's path.

$$m = -2$$

c) How is the slope of the torpedo's path related to the slope of your boat's path?

$$m_{\text{boat}} = \frac{1}{2} \quad m_{\text{torpedo}} = -2 \quad \text{Negative Reciprocals}$$

d) This is the final chapter in the story of the treasure hunt. From a literary perspective, how should the story end?

Tutorial

Complete the following statements by filling in the blanks.

- Parallel lines do not intersect and perpendicular lines meet at right angles.
- The slopes of parallel lines are equal.
- If two lines are perpendicular then their slopes are negative reciprocals of each other. That is, the slopes of two lines have opposite signs and are reciprocals of each other.

Examples

Example 1: *Slopes of Parallel and Perpendicular Lines*

Determine the slope of a line segment parallel and perpendicular to a segment with each given slope.

Given Slope	Slope of Parallel Lines	Slope of Perpendicular Lines
$\frac{3}{5}$	$\frac{3}{5}$	$-\frac{5}{3}$
7	7	$-\frac{1}{7}$
$-\frac{4}{3}$	$-\frac{4}{3}$	$\frac{3}{4}$
-0.5	-0.5	2
undefined	undefined	0

Holt's Hundred

Answers

1. 5

2. 6

3. 7

4. -4

5. 5

6. 6

7. 1

8. (7,8)

9. (9,10)

10. $slope = \frac{(y_2 - y_1)}{(x_2 - x_1)}$

11. Slope = 2

12. Slope = 2

13. Slope = -2

14. Slope = $\frac{-14}{5}$

15. Slope = $\frac{3}{2}$

Math 10 Linear Functions Review

16. Slope = $\frac{-2}{3}$

17. Slope = undefined

18. Slope = 0

19. $y = mx + b$

20. $y = 4x + 6$

21. $y = -4x - 6$

22. $y = 2x + 3$

23. $y = \frac{-4}{3}x - 2$

24. 3

25. -9

26. -4

27. 5

28. 1

29. 9

30. 4

31. -2

32. $3x - y + 1 = 0$

33. $3x + y + 2 = 0$

34. $3x - 2y - 4 = 0$

35. $4x + 3y - 6 = 0$

36. $\frac{-1}{2}$

37. -2

38. -2

39. $\frac{3}{2}$

40. 7

41. -2

42. 8

43. -6

44. 9

45. 3

46. -2

47. 4

48. (4, 5)

49. (-1, 2)

50. -2

51. Undefined

52. $2\sqrt{2}$

53. [-2,4] or
 $-2 \leq x \leq 4$

54. [0,4] or
 $0 \leq x \leq 4$

55. [-1, ∞) or
 $x \geq -1$

56. ($-\infty$, 3] or
 $x \leq 3$

57. [-1,3] or
 $-1 \leq y \leq 3$

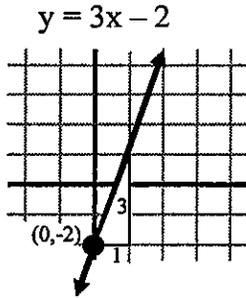
58. ($-\infty$, 4] or
 $y \leq 4$

59. [3,3] or $y = 3$

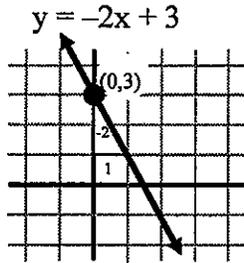
60. ($-\infty$, ∞) or
 $y \in R$

Sketch using the slope and y-intercept. Label both.

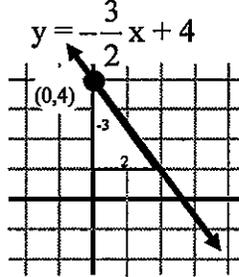
61.



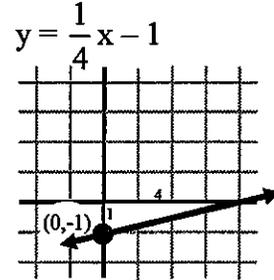
62.



63.

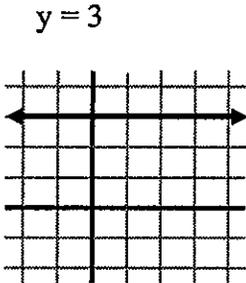


64.

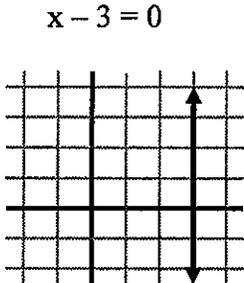


Sketch the following.

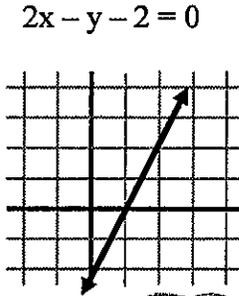
65.



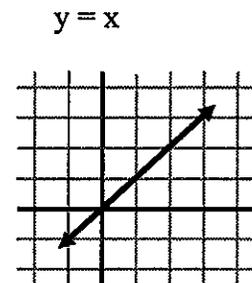
66.



67.



68.



69. $y = 2x + 3$

70. $y = 4x - 5$

71. $y = 6x + 34$

72. $y = \frac{1}{2}x - \frac{11}{2}$

73. $y = x + 1$

74. $y = \frac{3}{2}x - 1$

75. $y = \frac{3}{5}x + 1$

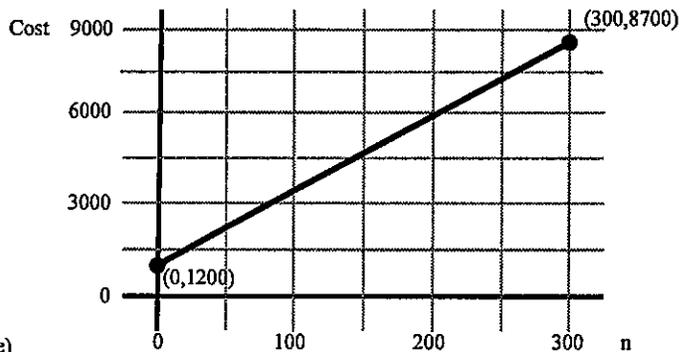
76. number of guests

77. Cost

78. $0 \leq n \leq 300$

79. $1200 \leq C \leq 8700$

80. discrete (can't have 1.5 people)
(graph is drawn continuous based on the scale used)



81. $C = 25n + 1200$

83. number of airplanes

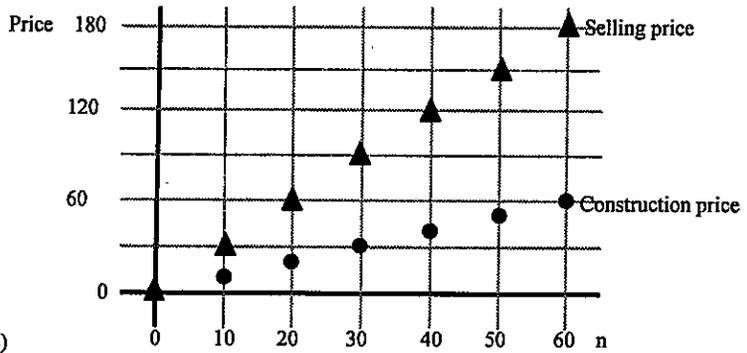
84. Price

85. $0 \leq n \leq 6$

86. $0 \leq P \leq 18$

87. discrete (can't have 1.5 planes)

88. $P = 1n$ $P = 3n$



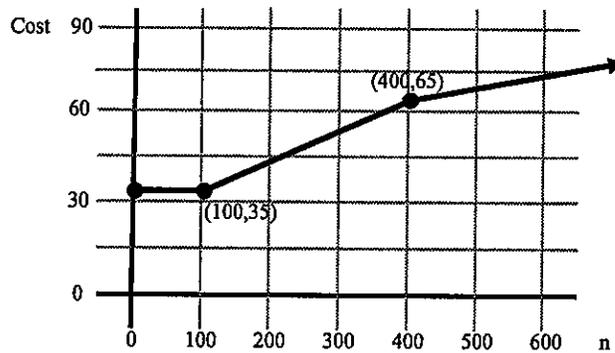
90. number of minutes

91. Cost

92. $n \geq 0$

93. $C \geq 35$

94. continuous

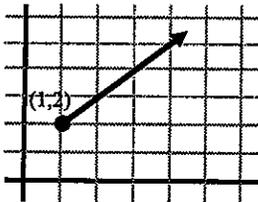


95. $C = 35$; $0 \leq n \leq 100$

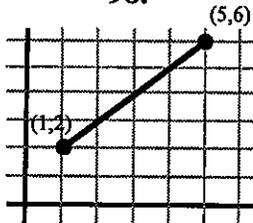
$C = 0.10n$ (start at 100 minutes) ; $100 \leq n \leq 400$

$C = 0.05n$ (start at 400 minutes) ; $n \geq 400$

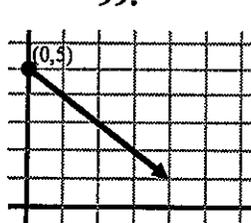
97.



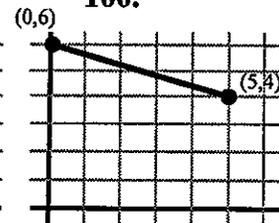
98.



99.



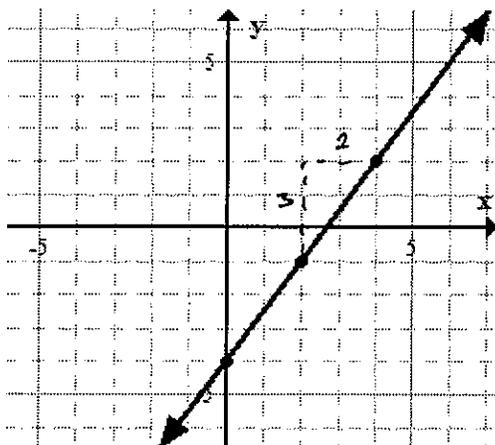
100.



Math 10-C Linear Equations & Graphs Quick Check
 C3-C4 Determine Equations & Parallel/Perpendicular Lines

Name: KEY

1. The equation of the graph below in slope-intercept form is $y = \frac{3}{2}x - 4$.



$$m = \frac{3}{2}$$

$$b = -4$$

2. The equation of a line, with a slope of 3 and a y-intercept of -2, in slope-intercept form is $y = 3x - 2$.

3. A line has a slope of -2 and passes through the point (-8,21). Write the equation of the line in slope-intercept form. [1 mark]

$$y = -2x + b$$

$$21 = -2(-8) + b$$

$$21 = 16 + b$$

$$5 = b$$

$$y = -2x + 5$$

4. A line passes through the points (-6,10) and (-2,0). Write the equation of the line in slope-intercept form. [2 marks]

$$m = \frac{0 - 10}{-2 - (-6)}$$

$$y = -\frac{5}{2}x + b$$

$$m = \frac{-10}{4}$$

$$10 = -\frac{5}{2}(-6) + b$$

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

$$m = -\frac{5}{2}$$

$$10 = 15 + b$$

$$-5 = b$$

5. Write each of the following linear equations in general form ($Ax + By + C = 0$).

a) $y = -6x + 7$

$$6x + y - 7 = 0$$

b) $y = \frac{7}{3}x + 6$

$$3y = 7x + 18$$

$$0 = 7x - 3y + 18$$

c) $y = -\frac{4}{5}x + \frac{1}{2}$

$$10y = -8x + 5$$

$$8x + 10y - 5 = 0$$

6. The slope of a line is 3. The slope of a line that is parallel is 3.

7. The slope of a line is $\frac{4}{5}$. The slope of a line that is perpendicular is $-\frac{5}{4}$.

8. Write the slope-intercept form and general form for the equation of a line that is perpendicular to $x + 6y - 12 = 0$ and passes through the point (2,4). [3 marks]

$$6y = -x + 12$$

$$y = -\frac{1}{6}x + 2$$

$$m = -\frac{1}{6}$$

$$m_{\perp} = 6$$

$$y = 6x + b$$

$$4 = 6(2) + b$$

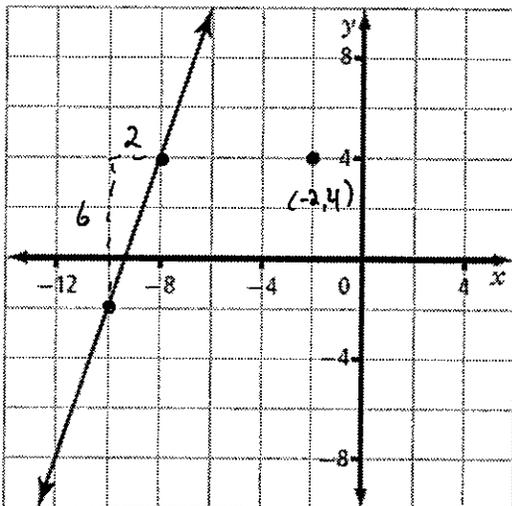
$$4 = 12 + b$$

$$-8 = b$$

$$y = 6x - 8$$

$$0 = 6x - y - 8$$

9. Write the slope-intercept form and general form for the equation of a line that is parallel to the given line and passes through the given point. [2 marks]



$$m = \frac{6}{2}$$

$$m = 3 \quad m_{\parallel} = 3$$

$$y = 3x + b$$

$$4 = 3(-2) + b$$

$$4 = -6 + b$$

$$10 = b$$

$$y = 3x + 10$$

$$0 = 3x - y + 10$$