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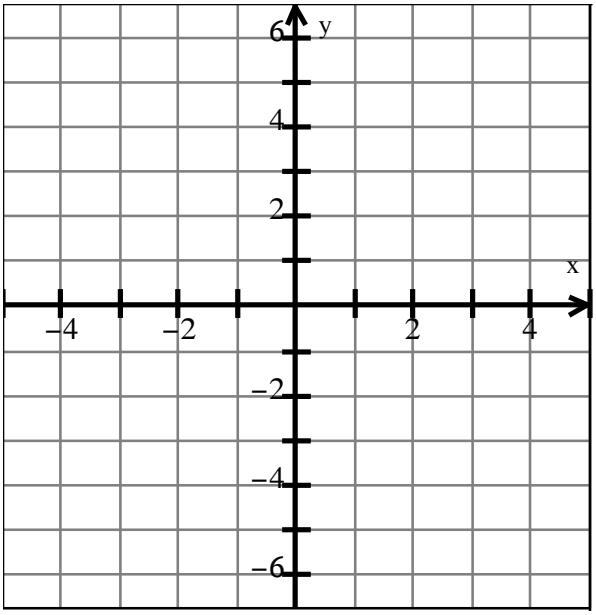
The Equation of a Line in Slope y-intercept Form: $y = mx + b$

In the previous unit, we learned that a partial variation represents a linear relation with the form $y = mx + b$. We concluded:

1

A diagonal line has an equation in the form of $y = mx + b$ where m is the _____ and b is the _____. A line sloping down towards the right has a _____ slope whereas a line sloping up towards the right has a _____slope. *The value of the slope is the* _____ *of* x .

Example A: Graph the lines $y = 3x + 2$ and $y = -\frac{1}{2}x + 5$



Steps on Graphing Lines

1. Plot the y-intercept.

2. Start at the y-intercept and plot two more points using the slope.

   Remember:
   (i) a negative rise means you travel down from the y-intercept.
   (ii) A negative run means you travel left from the y-intercept.

Example B: Consider $y = -\frac{1}{2}x + 5$, do the points $(4,3)$ and $(-6,8)$ lie on the line? Justify your answer in more than 1 way.

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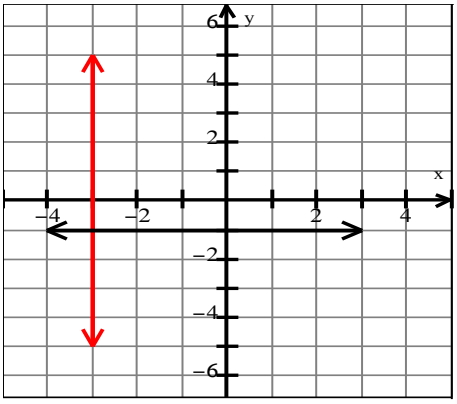
Example C: Given the graphs below, determine their equations.



Horizontal Line:

Vertical Line:

Key Concepts

2

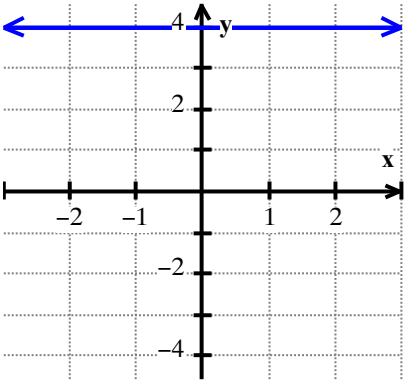
All horizontal lines always have a slope of _____ because the rise = _____.

The equation $y = mx + b$ becomes

$y = b$ because $m =$ _____

Another way of thinking about it is:

All the coordinates on the line have the *same y-value* and different x-values, thus $y = b = y - intercept$.

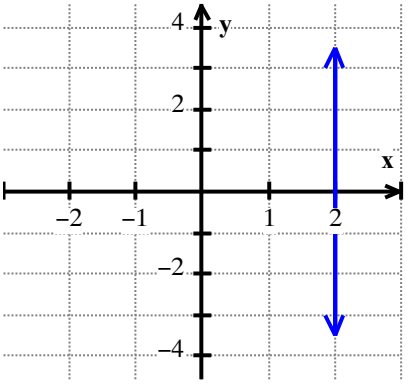


3

All vertical lines always have an _____ slope because the _____ = 0. You cannot divide by 0.

This equation does **not** follow the form $y = mx + b$.

⇨⇨The equation is in the form $x = L$, where L is the number that crosses the x-axis since all the x-values on the line are the same.



Example C: Graph the lines $y = 2$ and $x =$-1 on the grids above.

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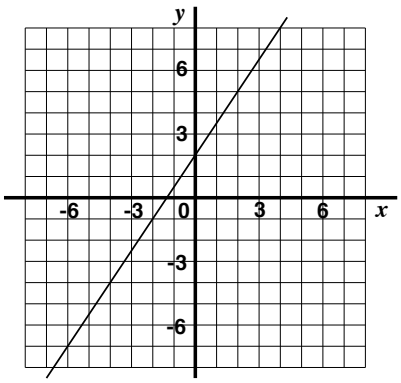
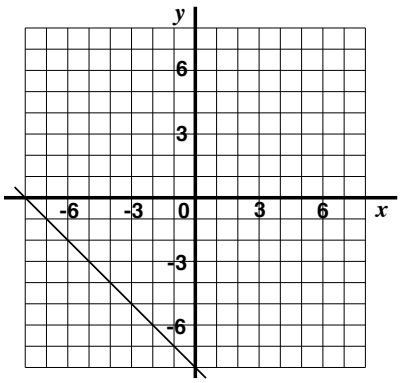
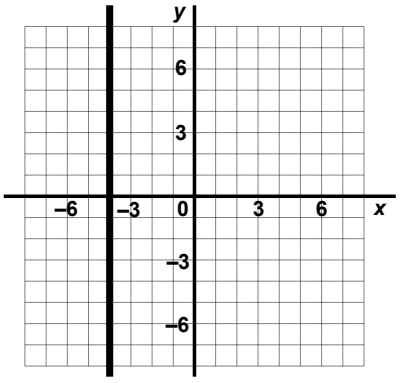
Example D: State the equation of each line below.

a)	b)	c)
		
***m* =** ***b* =**	***m* =** ***b* =**	***m* =** ***b* =**
Equation of line:	Equation of line:	Equation of line:

Example E: Given the value of the slope and y-intercept, determine the equation of the line for each set.

	m	b	Equation	Type of Line
(i)	-2	5		
(ii)	0	7		
(iii)	$\frac{4}{3}$	-2		
(iv)	$-\frac{1}{2}$	0		

Using the equation from question D (iii), does the point $(-6,-10)$ satisfy the equation? Show your work algebraically.

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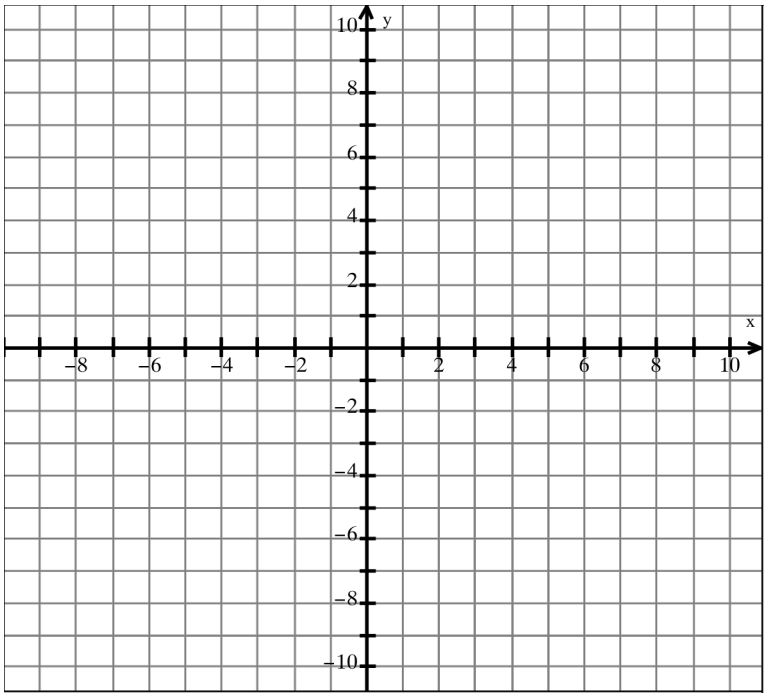
Example E: If they exist, find the slope and y-intercept for each equation given in the table below then graph all the lines on the grid provided. Show at least three points on the line.

	Equation	m	b
(i)	$y = \frac{x}{4} - 5$		
(ii)	$y = 8 - 3x$		
(iii)	$y = \frac{2}{3}x - 1$		
(iv)	$y = -4$		
(v)	$x = -7$		



Example F:

A) Identify the slope and the vertical intercept of each linear relation and explain what they mean.

B) Write an equation to describe the relationship.

C) Identify the x-intercept and interpret its meaning.