

Lesson 2.2 Linear Function Notes

Main Ideas/Questions	Notes/Examples	
Linear Relations	<ul style="list-style-type: none"> When points on a graph lie along a straight line, it is called a linear relation. Linear relations can be represented by an equation, for example, the equation of this graph can be written as $x + y = 8$. 	

Standard Form	Linear equations are often written in standard form : $Ax + By = C$ where A, B, and C are integers.	
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Directions: Write each equation in **standard form**.

1. $9x + 6y - 24 = 0$ $\begin{array}{r} 9x + 6y - 24 = 0 \\ + 24 + 24 \\ \hline 9x + 6y = 24 \end{array}$	2. $y = 2x - 9$ $\begin{array}{r} y = 2x - 9 \\ -2x -2x \\ \hline -2x + y = 9 \end{array}$	3. $\frac{3}{4}x - \frac{1}{3}y = 1$ multiply by LCD: 12 $12(\frac{3}{4}x) - 12(\frac{1}{3}y) = 12(1)$ $9x - 4y = 12$
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Slope-Intercept Form	Linear equations are often written in slope-intercept form : $y = mx + b$ (or) $f(x) = mx + b$ (where m is the <u>slope</u> and b is the <u>y coordinate of intercept</u> $(0, b)$)	
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Slope is the constant **rate of change**. The slope is the $\frac{\Delta y}{\Delta x}$.
 Change in y values divided by change in x values.

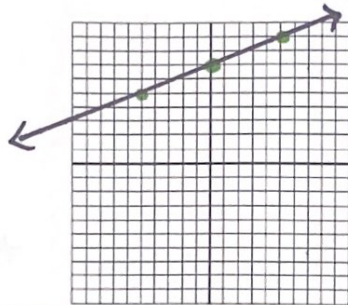
positive	negative	zero	undefined
Lines rise from left to right	Lines fall from left to right.	Horizontal line $\frac{0}{\Delta x}$	Vertical line $\frac{\Delta y}{0}$

$y = b$ $x = x$ intercept #

Directions: Write the equation in **slope-intercept form**, then graph the line.

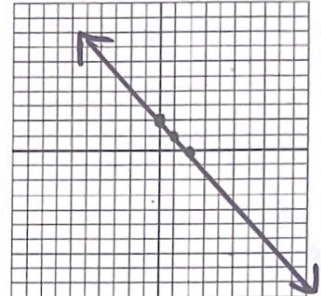
4. $f(x) = \frac{2}{5}x + 7$

$m = \frac{2}{5}$
 $b = 7$
 $(0, 7)$



5. $y = -x + 2$

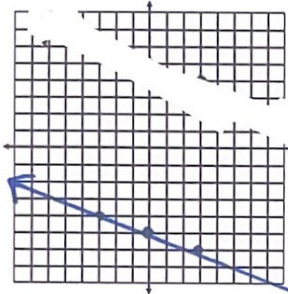
$m = -1$
 $b = 2$
 $(0, 2)$



6. $x + 3y = -15$

$$\frac{-x}{3} = \frac{-x}{3} - \frac{15}{3}$$

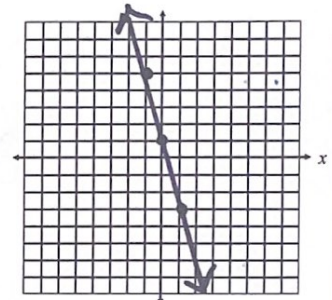
$$y = -\frac{1}{3}x - 5$$
 $m = -\frac{1}{3}$
 $b = -5$
 $(0, -5)$



7. $4x + y - 1 = 0$

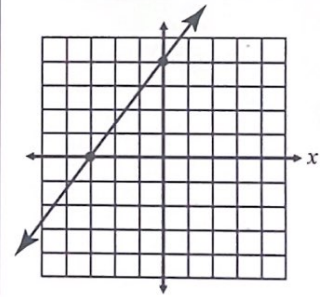
$$\frac{4x + y - 1}{+1 + 1} = \frac{4x + y}{1} = 1$$

$$y = -4x + 1$$
 $m = -4$
 $b = 1$
 $(0, 1)$



X- and Y-Intercepts

- The point at which the graph intersects the x-axis is called the **x-intercept**. Likewise, the point at which the graph intersects the y-axis is called the **y-intercept**.
- Identify the x- and y-intercept of the graph shown on the right.



The x-intercept is also referred to as a root, zero, or solution to the equation.

Finding Intercepts Algebraically

To find the x-intercept of an equation, set y equal to 0 and solve for x. To find the y-intercept of an equation, set x equal to 0 and solve for y. You can use these points to graph the equation.

Example: Find the x- and y-intercepts of the equation $y = -2x + 5$

x-intercept $y = 0$
 $0 = -2x + 5$
 $-5 = -2x$
 $x = \frac{5}{2}$
 $(\frac{5}{2}, 0)$

y-intercept $x = 0$
 $y = -2(0) + 5$
 $y = 5$
 $(0, 5)$

Directions: Find the x- and y-intercept of each equation. Then, graph the equation using the intercepts.

8. $y = 5x - 1$

x-intercept

$$0 = 5x - 1$$

$$1 = 5x$$

$$\frac{1}{5} = x$$

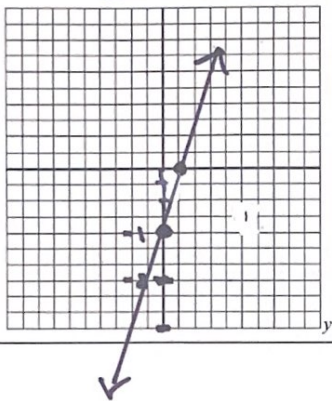
$$\left(\frac{1}{5}, 0\right)$$

y-intercept

$$y = 5(0) - 1$$

$$(0, -1)$$

scale
different



9. $-5x - 4y = -24$

x-int $y=0$

$$-5x - 4(0) = -24$$

$$-5x = -24$$

$$x = \frac{24}{5}$$

y-int $x=0$

$$-5(0) - 4y = -24$$

$$-4y = -24$$

$$y = 6$$

$$(0, 6)$$

