3.7 Equations of Lines in the Coordinate Plane

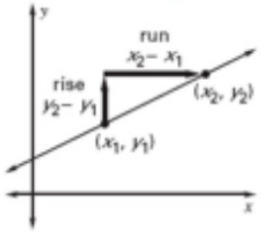
Learning Targets for today

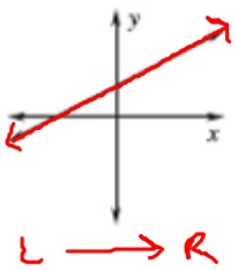
- To be able to write a linear equation when given information about the equations such as its slope and or a point on the line.
- To be able to graph a linear equation when given information about the equation such as its slope and or a point on the line.

Slope – Basic Information You Need to Know!

Calculating Slope	Classifying Slope
When you have two points (x_1, y_1) and (x_2, y_2)…	

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



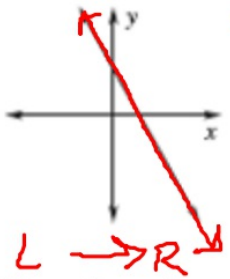


Positive slope
Rises from left to right

$m = +$

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

$m = 2$

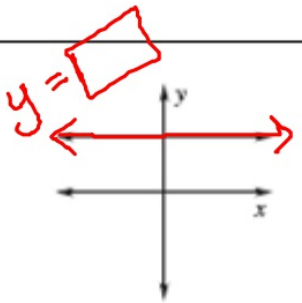


Negative slope
Falls from left to right

$m = -$

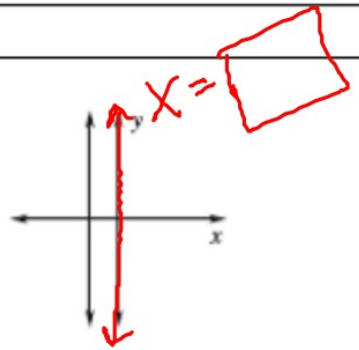
$m = -3$

$m = -\frac{3}{4}$



Zero slope
Horizontal

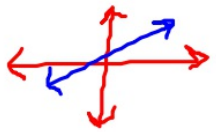
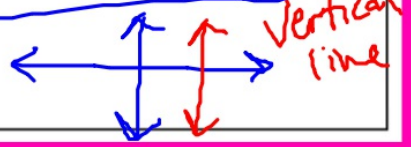
$m = 0$



Undefined slope
Vertical

$m = ?$

Calculating Slope

Example for you…	**Your turn to try…**
Find the slope of the line of the given points and identify the type of line that passes through them.	Find the slope of the line of the given points and identify the type of line that passes through them.
$x_1\ y_1 \quad x_2\ y_2$ 1. (1, 3) and (6, 7)	$x_1\ y_1 \quad x_2\ y_2$ 1. (2, −1) and (2, 2)
$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{7-3}{6-1} = \boxed{\frac{4}{5}}$ Positive 	$m = \frac{2 - (+)1}{2-2} = \frac{3}{0} = \boxed{\text{Undefined}}$  Vertical line

KEY CONCEPTS!

The **slope-intercept form** of an equation of a nonvertical line is $y = mx + b$, where m is the slope and b is the y-intercept.

$$y = mx + b$$

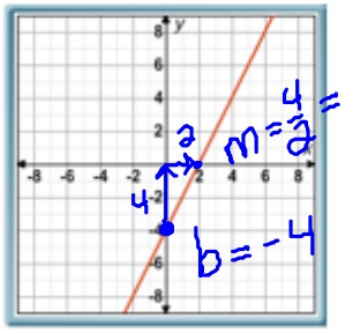
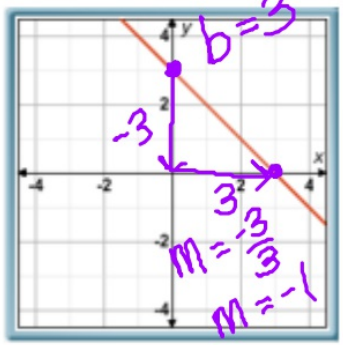
slope — y-intercept

The **point-slope form** of an equation of a nonvertical line is $y - y_1 = m(x - x_1)$, where m is the slope and (x_1, y_1) is a point on the line.

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

y-coordinate — slope — x-coordinate

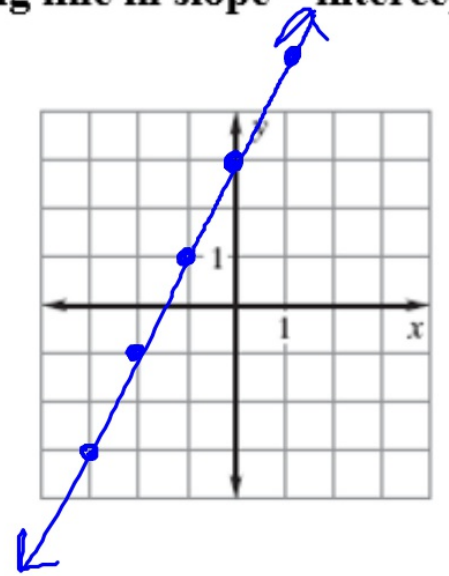
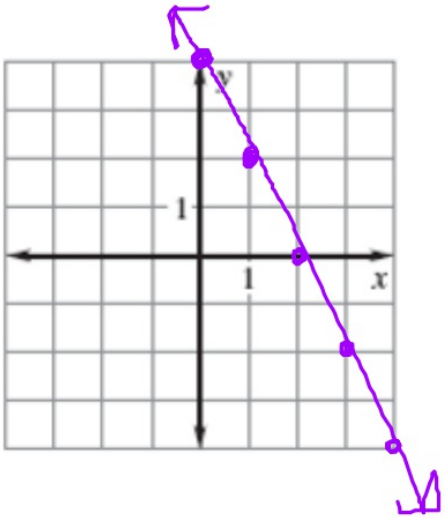
Writing an equation given the slope and y – intercept (slope-intercept form).

Example for you.	**Your turn to try….**
Write an equation of the line.	Write an equation of the line.
1. $y = mx + b$ $y = 2x - 4$ 	1. $y = mx + b$ $y = -x + 3$ 
2. m = 4 and the y – intercept is (0,-3). $b = -3$ $y = mx + b$ $y = 4x - 3$	2. m = -9 and the y – intercept is (0,5). $b = 5$ $y = -9x + 5$

Writing an equation given the slope and a point (point – slope form).

Example for you.	**Your turn to try….**
Write an equation of the line in point – slope form. 1. $m = 4$ and $(4,-3)$. $y - y_1 = m(x - x_1)$ x_1, y_1 $y-(-3) = 4(x-4)$ $y+3 = 4(x-4)$	Write an equation of the line in point – slope form. 1. $m = 6$ and $(8,-2)$. $y - y_1 = m(x - x_1)$ x_1, y_1 $y-(-2) = 6(x-8)$ $y+2 = 6(x-8)$

Graphing a line in slope – intercept form.

Example for you.	Your turn to try….
Graph the following line in slope – intercept form. 1. $y = 2x + 3$ $y = mx + b$  L → R m = + ?	**Graph the following line in slope – intercept form.** m b 1. $y = -2x + 4$ 

Graphing a line in point-slope form.

Example for you.	Your turn to try….
Graph the following line in point – slope form.	**Graph the following line in point – slope form**

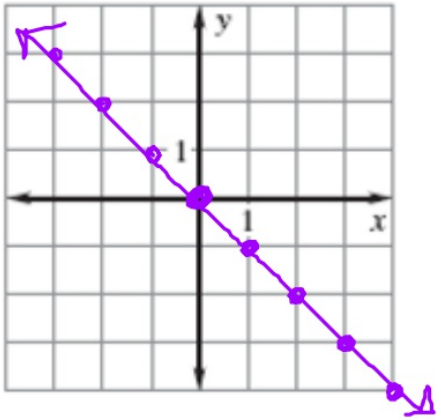
1. $y - 3 = -1(x + 3)$

$y - 3 = -x - 3$

$+3 \qquad +3$

$y = -x$

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

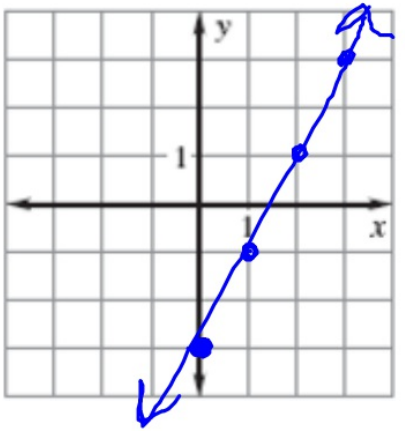


1. $y - 1 = 2(x - 2)$

$y - 1 = 2x - 4$

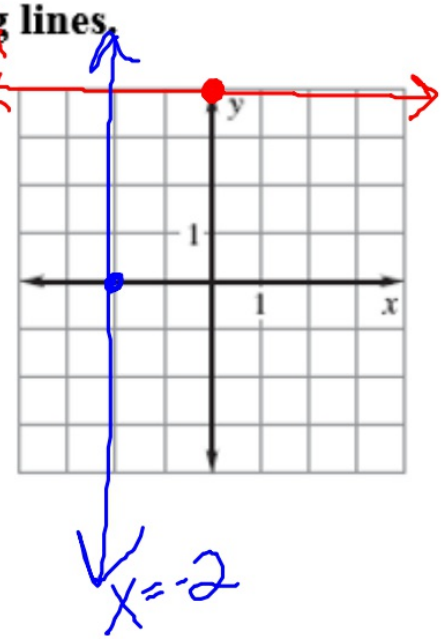
$+1 \qquad +1$

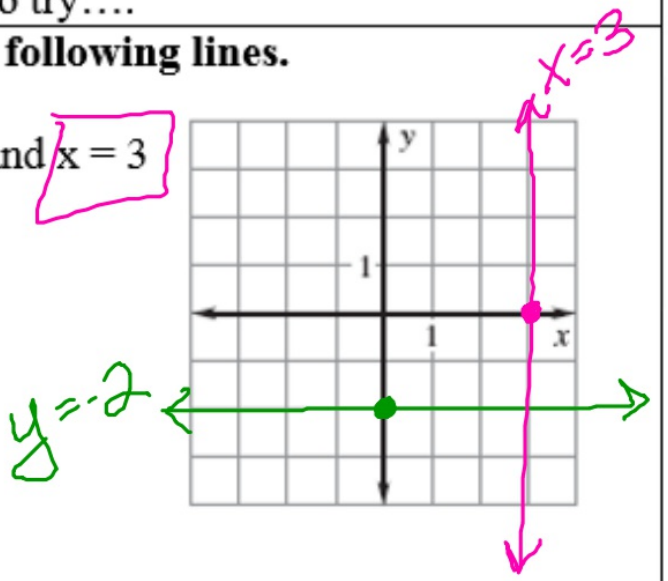
$y = 2x - 3$



Graphing Horizontal and Vertical Lines.

Example for you.	Your turn to try….
Graph the following lines.	**Graph the following lines.**
1. y = 4 and x = -2	1. y = -2 and x = 3





3.5	Parallel Lines and Triangles	❑ To be able to use parallel lines to prove a theorem about triangles. ❑ To be able to find measures of angles of triangles. ❑ To know and understand that the sum of the angle measures of a triangle is always the same.	
3.6	Constructing Parallel and Perpendicular Lines	❑ To be able to use a straightedge and compass to construct parallel and perpendicular lines.	
3.7	Equations of Lines in the Coordinate Plane	❑ To be able to write a linear equation when given information about the equations such as its slope and or a point on the line. ❑ To be able to graph a linear equation when given information about the equation such as its slope and or a point on the line.	**pg. 194 #12 - #26 (even), #34, #36**
3.8	Slopes of Parallel and Perpendicular Lines	❑ To be able to find the slope of a line on a coordinate plane. ❑ To be able to identify parallel and perpendicular lines on a coordinate plane by comparing their slopes. ❑ To be able to write an equation of a line parallel or perpendicular to a given line in a coordinate plane.	