FINDING THE EQUATIONS OF LINES

An equation of a line written in slope y-intercept form: $y = mx + b$

To find the equation of a line you need two things: 1) slope and 2) y int

METHOD 1 (Given Slope and y-intercept)

Substitute the slope and y-intercept variables into the equation $y = mx + b$

Ex 1: Slope = -2 (m), y-intercept = 5 (b)

$y = -2x + 5$

Ex 2: $m = \frac{4}{7}$, $b = -3$

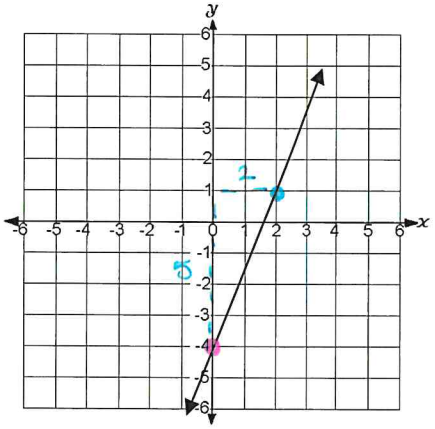
$y = \frac{4}{7}x - 3$

METHOD 2 (Given a Graph)

Find the y-intercept. Find the closest coordinate point.

Calculate the slope using $m = \frac{rise}{run}$

Ex 3: Find the equation of the line shown in the graph.



$b = -4$

$m = \frac{rise}{run} = \frac{5}{2}$

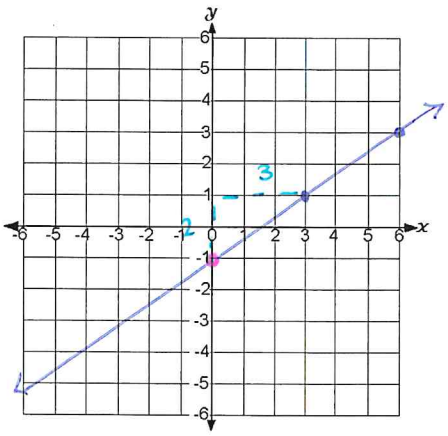
$y = \frac{5}{2}x - 4$

METHOD 3 (Given two points and using a Graph)

Plot the two coordinates on the graph.

Draw a line between the two points and across the y-axis (if it does not already cross). Note the y-intercept.

Calculate the slope between the two points using $m = \frac{rise}{run}$



Ex 4: Find the equation of the line passing through points (3, 1) and (6, 3)

$b = -1$

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

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

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

METHOD 4 (Given slope and one point, no graphing)

Calculate y-intercept using the slope and the point given.
Substitute all values into $y = mx + b$ and solve to get b.
Rewrite the equation using values for **m** and **b** only.

Ex 5: Slope = 4, passing through point (3,2)
m x y

$y = mx + b$
$2 = 4(3) + b$
$2 = 12 + b$
$2 - 12 = b$
$-10 = b$

$y = 4x - 10$

Ex 6: Slope = -3, passing through point (1,4)
$m = -3$ x y

$y = mx + b$
$4 = -3(1) + b$
$4 = -3 + b$
$4 + 3 = b$
$7 = b$

$y = -3x + 7$

Ex 7: Find the equation of a line with a slope of $-\frac{1}{2}$ passing through the point (1,4).
$m = -\frac{1}{2}$ x y

$y = mx + b$
$4 = -\frac{1}{2}(1) + b$
$4 = -\frac{1}{2} + b$ (×2 ×2 ×2)
$8 = -1 + 2b$
$8 + 1 = 2b$
$\frac{9}{2} = \frac{2b}{2}$

$b = \frac{9}{2}$

$y = -\frac{1}{2}x + \frac{9}{2}$