Writing Equations of Lines

SUMMARY:

To write the equation of a line in Standard Form or Slope-Intercept Form, when given….

The slope and the y-intercept, write it first in Slope-Intercept Form.
Then, convert to Standard Form if necessary.

The slope and any point on the line, put the information in the Point-Slope formula. Distribute and isolate the y for Slope-Intercept form or isolate the constant for Standard Form.

Two points on a line, use the two points to find the slope. Then, use that slope and one of the points in the Point-Slope formula. Distribute and isolate the y for Slope-Intercept form or isolate the constant for Standard Form.

TRY:

Write the slope-intercept form of line L with slope $\frac{2}{5}$ that passes through (5, -3).

Write the Standard Form of line L with slope -3 that passes through (-2, -3).

Given two points (3, -2) and (6, 4), write the equation of the line passing through them in Slope-intercept form.

Since neither of the points given is the y-intercept, one cannot use the slope-intercept form.
The Point-Slope formula needs a slope, so the first step is to find the slope.

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

[Notice if one were to think of this equation as a proportion and cross multiply, one develops the Point-Slope formula!]

$$m = \frac{4-(-2)}{6-3} = \frac{6}{3} = 2$$

Now, pick one of the points, it doesn't matter which one, and use it for (x_1, y_1)

Using (3, -2)	Using (6, 4)
$y-(-2) = 2(x-3)$	$y-4 = 2(x-6)$
$y+2 = 2x-6$	$y-4 = 2x-12$
$y = 2x-8$	$y = 2x-8$

TRY:
Write the slope-intercept form of line L that passes through (-1, 3) and (4, -2).

Special forms:

The equation of a **horizontal** line containing the point (c,d) is y = d.
(The middle example, $y-4=0$, of the slope-intercept form section. $y=4$)

The equation of a **vertical** line containing the point (c, d) is x = c.
Ex: $x=-2$ would be a line through (-2,0)

TRY:
Write the standard form of line L that passes through (2, -3) and (2, 4).

Find the **equation** of each of the following lines. State it in slope-intercept form.

L has y-intercept (0,3) and is parallel to a line with equation $y = 3x - 5$

Since L is parallel to the line $y = 3x - 5$, the slope of L must be 3. Use that information along with the y-intercept point to find the equation of line L.

L passes through (-4,5) and is parallel to a line with equation $y = -4x + 5$.

This information provides a slope and a point to determine the equation of line L.

L passes through (-2,-1) and is perpendicular to a line with equation $y = 3x + 1$

L is perpendicular to the line $y = 3x + 1$, so the slope of L must be $-\frac{1}{3}$ (the negative reciprocal of 3).

Use this slope and the point to determine the equation of line L.

L passes through (3,-1) and perpendicular to a line with equation $y = -\frac{2}{3}x + 5$

Determine the slope of line L (remember it is perpendicular) and use that slope along with the point.

L passes through (-3,5) and parallel to the x-axis

All lines parallel to the x-axis are horizontal lines. Use the point given to write the equation of the line.

L passes through (2,-4) and parallel to a line through (6,2) and (-2,6)

First find the slope of a line through the two points. The slope of line L is the same. Write the equation using the information in the point given.