

5.1 and 5.2 Review: Write Linear Equations in Slope-Intercept Form

In slope-intercept form ($y = mx + b$), b determines where the line crosses the y-axis, while m determines the steepness and direction of the line. Without these key values, we cannot define (write the equation of) the line.

When asked to find the slope-intercept equation of a line, you must:

1. Determine the slope. This might be given to you or you will be able to find it from a graph or coordinate pairs.
2. Determine the y-intercept. In order to find this, we must plug in coordinates for x and y , leaving only one variable in the equation... b !!!
3. Write the final equation, with m and b filled in!

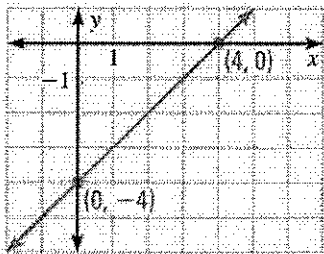
There's one exception- a vertical line!! If your slope is undefined, you cannot use slope-intercept form, but your equation will always take the form $x = \#$, which can be found by looking at the x-coordinate!

Practice- Use the given information to write the linear equation in slope-intercept form:

$$1. m = \frac{4}{4} = 1$$

$$b = -4$$

$$\boxed{y = 1x - 4}$$



$$2. m = -\frac{2}{4} = -\frac{1}{2}$$

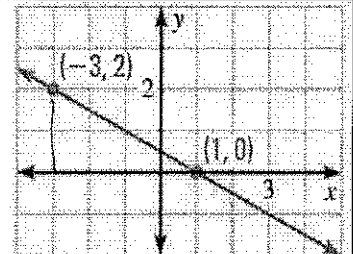
$$y = -\frac{1}{2}x + b$$

$$0 = -\frac{1}{2}(1) + b$$

$$0 = -\frac{1}{2} + b$$

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

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



3. Through the points (10, -5) and (-5, 1)

$$m = \frac{1+5}{-5-10}$$

$$1 = -\frac{2}{6}(-5) + b$$

$$m = \frac{6}{-16}$$

$$1 = \frac{10}{6} + b$$

$$m = \frac{2}{-5}$$

$$1 = 2 + b$$

$$-1 = b$$

$$\boxed{y = -\frac{2}{5}x - 1}$$

4. $f(-4) = -8; f(-8) = -11$

$$(-4, -8) \quad (-8, -11) \quad -8 = \frac{3}{4}\left(\frac{-4}{1}\right) + b$$

$$m = \frac{-11+8}{-8+4}$$

$$-8 = \frac{-12}{4} + b$$

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

$$-8 = -3 + b$$

$$-5 = b \quad \boxed{y = \frac{3}{4}x - 5}$$

5. Through (-7, 3) and (-7, -5)

$$m = \frac{-5-3}{-7+7}$$

$$x = -7$$

$$m = \frac{-8}{0}$$

undefined!

6. Through (-3, 8) and (-6, 0)

$$m = \frac{0-8}{-6+3}$$

$$0 = \frac{8}{3}\left(\frac{-6}{1}\right) + b$$

$$m = \frac{-8}{-3}$$

$$0 = \frac{-48}{3} + b$$

$$m = \frac{8}{3}$$

$$0 = -16 + b$$

$$16 = b \quad \boxed{y = \frac{8}{3}x + 16}$$

Homework... Write the linear equation described:

1. slope of -2 and through the point (10, 3)

$$y = -2x + b$$

$$3 = -2(10) + b$$

$$3 = -20 + b$$

$$23 = b$$

$$y = -2x + 23$$

2. slope of $-\frac{3}{4}$ and through the point (-8, 1)

$$y = -\frac{3}{4}x + b$$

$$1 = -\frac{3}{4}(-8) + b$$

$$1 = \frac{24}{4} + b$$

$$1 = 6 + b \quad -5 = b$$

$$y = -\frac{3}{4}x - 5$$

3. through the points (10, 7) and (5, -3)

$$m = \frac{-3-7}{5-10} \quad y = 2x + b$$

$$m = \frac{-10}{-5} \quad -3 = 2(5) + b$$

$$m = 2 \quad -3 = 10 + b$$

$$-13 = b$$

$$y = 2x - 13$$

4. through the points (4, -2) and (8, -5)

$$m = \frac{-5-2}{8-4} \quad y = -\frac{3}{4}x + b$$

$$m = \frac{-7}{4} \quad -2 = -\frac{3}{4}(4) + b$$

$$-2 = -3 + b$$

$$1 = b$$

$$y = -\frac{3}{4}x + 1$$

5. through the points (5, 6) and (5, -3)

$$m = \frac{-3-6}{5-5}$$

$$m = \frac{-9}{0}$$

$$x = 5$$

6. $f(-2) = -5$ and $f(4) = 4$

$$(-2, -5)(4, 4) \quad y = \frac{3}{2}x + b$$

$$m = \frac{4+5}{4-2} \quad 4 = \frac{3}{2}(4) + b$$

$$m = \frac{9}{2} \quad 4 = 6 + b$$

$$-2 = b$$

$$m = \frac{3}{2} \quad y = \frac{3}{2}x - 2$$

7. horizontal and through the point (3, -7)

$$\hookrightarrow y = \#$$

$$y = -7$$

8. through (-6, -10) and (9, 10)

$$m = \frac{10+10}{9+6} \quad y = \frac{4}{3}x + b$$

$$m = \frac{20}{15} \quad 10 = \frac{4}{3}(9) + b$$

$$m = \frac{4}{3} \quad 10 = 12 + b$$

$$-2 = b$$

$$y = \frac{4}{3}x - 2$$