

Writing Linear Equations

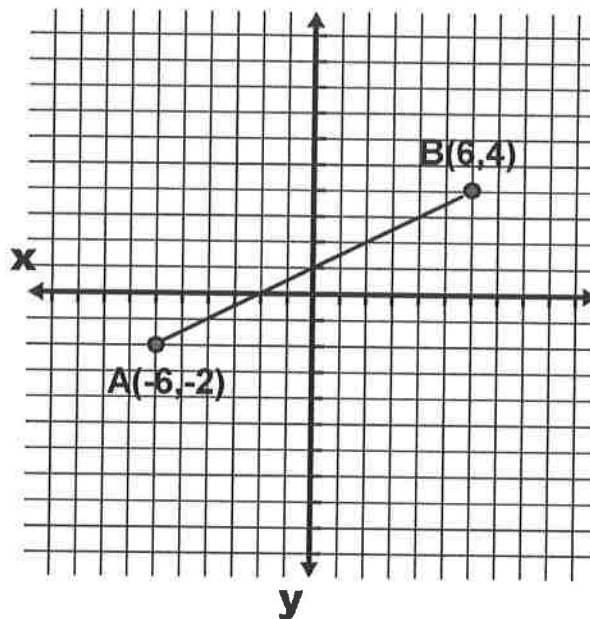
DO IT NOW

What is the slope of the line going through the points
A(8,7) and B(9,3):

$$\begin{aligned} m &= \frac{7-3}{8-9} \\ &= \frac{4}{-1} \\ &= -4 \end{aligned}$$

Example 0: Find the equation of this line in slope y-intercept form:

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



How to write a linear equation in slope-intercept form when given two points on the line:

1. Find the slope of the line using $m = \frac{y_2 - y_1}{x_2 - x_1}$
2. Using the slope and one of the two points, sub values for m x and y into the equation $y = mx + b$
3. Solve for the y-intercept (b-value)
4. Using the slope and y-intercept, write the equation of the line in the form $y = mx + b$

Linear equations (day 2).notebook

Example 1: Find the equation of the line through the points $(-3, 2)$ and $(0, -1)$

$$m = \frac{-1 - 2}{0 - (-3)}$$

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

$$= -1$$

$$y = mx + b$$

$$-1 = (-1)(0) + b$$

$$-1 = b$$

$$y = -x - 1$$

Example 2: Find the equation of the line through the points $(5, 3)$ and $(-2, 4)$

$$m = \frac{4 - 3}{-2 - 5}$$

$$m = \frac{1}{-7}$$

$$4 = \left(-\frac{1}{7}\right)(-2) + b$$

$$4 = \frac{2}{7} + b$$

$$\frac{4}{1} - \frac{2}{7} = b$$

$$\frac{28}{7} - \frac{2}{7} = b$$

$$\frac{26}{7} = b$$

$$y = -\frac{1}{7}x + \frac{26}{7}$$

How to write the equation of a line given one point on the line, and a line with a parallel slope:

1. Find your slope from the parallel line (the slopes will be equivalent)
2. Using the parallel slope and the given point on the line, sub in values for m x and y into the equation $y=mx+b$
3. Solve for the y -intercept (b -value)
4. Using the slope and y -intercept write the equation of the line in the form $y=mx+b$

Example 3: Write the equation of the line that goes through $(5,1)$ and parallel to $y=2x-3$

$$m = 2$$

$$\begin{aligned}y &= mx + b \\1 &= 2(5) + b \\1 &= 10 + b \\-9 &= b\end{aligned}$$

$$y = 2x - 9$$

Example 4: Write the equation of the line that goes through $(-2, 4)$ and parallel to $y = -\frac{3}{2}x + 3$

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

$$y = mx + b$$

$$4 = \left(-\frac{3}{2}\right)\left(-\frac{2}{1}\right) + b$$

$$4 = 3 + b$$

$$1 = b$$

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

How to write the equation of a line given one point on the line, and a line with a perpendicular slope:

1. Find your slope from the perpendicular line (the slopes will be negative reciprocals)
2. Using the slope and the given point on the line, sub in values for m , x and y into the equation $y = mx + b$
3. Solve for the y -intercept (b -value)
4. Using the slope and y -intercept write the equation of the line in the form $y = mx + b$

Linear equations (day 2).notebook

Let's Practise Finding Perpendicular Slopes

Note: to find the perpendicular slope, you must invert the fraction, and change the sign of the fraction (flip and change the sign)

a) $m = -1/2$

$$\perp m = 2$$

b) $m = 5$

$$\perp m = -\frac{1}{5}$$

c) $m = \frac{3}{5}$

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

Example 5: Write the equation of the line that goes through $(-2, 5)$ and perpendicular to $y = -\frac{1}{4}x + 5$

$$m = -\frac{1}{4} \quad \therefore \perp m = 4$$

$$y = mx + b$$

$$5 = 4(-2) + b$$

$$5 = -8 + b$$

$$13 = b$$

$$y = 4x + 13$$

Example 6: Write the equation of the line that goes through $(-3, -3)$ and perpendicular to $y = 2x + 3$

$$m=2 \quad \perp m = -\frac{1}{2}$$

$$-3 = \left(-\frac{1}{2}\right)\left(-\frac{3}{1}\right) + b$$

$$-3 = \frac{3}{2} + b$$

$$\frac{-3 \times 2}{1 \times 2} - \frac{3}{2} = b$$

$$\frac{-6}{2} - \frac{3}{2} = b$$

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

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

Complete the worksheet for tomorrow