

Section 1.3 / Lines

Note Title

6/9/2009

Lines : \nearrow Slope (Steepness)
 \searrow y-intercept (where the line crosses y-axis).

Slope !
 \nearrow positive

\searrow negative slope.

Calculating Slope: Given 2 ordered pairs (x_1, y_1) and (x_2, y_2)

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

Slope: $\frac{\text{rise}}{\text{run}}$ or $\frac{\text{change in } y \text{ or } \Delta y}{\text{change in } x \text{ } \Delta x}$

Slope Intercept Form of a Line

$$y = mx + b$$

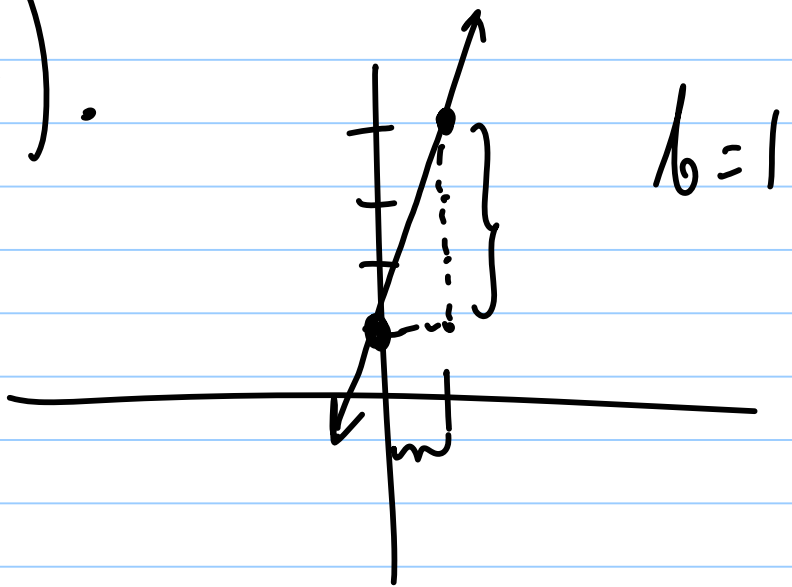
m : slope

b : y -intercept

[ex] Find the equation of a line with a slope of 3, passing through $(1, 4)$.

$$y = mx + b$$

$$\boxed{y = 3x + 1}$$



$$y = mx + b$$

(1, 4).

$$y = 3x + b$$

$$4 = 3(1) + b$$

linear
equation

$$4 = 3 + b$$

$$\begin{array}{r} -3 \quad -3 \\ \hline 1 = b \end{array}$$

Ex2] Find the equation of the line passing through $(2, 4)$ and $(6, 8)$.

$$y = mx + b$$

$$y = 1x + b$$

$$y = x + b$$

$$8 = 6 + b$$

$$b = 2$$

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

$$= \frac{8 - 4}{6 - 2} = \frac{4}{4} = 1$$

Answer: $y = x + 2$

POINT SLOPE FORM

$$y - y_0 = m(x - x_0)$$

m : slope
 (x_0, y_0)

another point on line.

Ex) Find the equation of a line passing through (1,4) with slope of 3; (put in point slope form)

$$y - y_0 = m(x - x_0)$$

$$y - \underline{y_0} = 3(x - \underline{x_0})$$

$$y - 4 = 3(x - 1)$$

point slope

$$y - 4 = 3x - 3$$

$$\begin{array}{r} y - 4 = 3x - 3 \\ + 4 \quad \quad + 4 \\ \hline \end{array}$$

$$y = 3x + 1$$

(slope intercept)

Linear Equations:

Solve for x: $-6x + 8 = 12$

$$\begin{array}{r} -8 \quad -8 \\ \hline -6x = 4 \\ \hline -6 \quad -6 \\ \hline \boxed{x = -\frac{2}{3}} \end{array}$$

Given the following equation and solution, what should go in the box:

$$-6x + 8 = \boxed{}x - 12$$

$x = 3$ is a solution.

$$-6(3) + 8 = \square(3) - 12$$

$$-18 + 8 = 3\square - 12$$

$$-10 = 3\square - 12$$

$$\begin{array}{r} + 12 \\ \hline \end{array} \quad \begin{array}{r} + 12 \\ \hline \end{array}$$

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

$$\boxed{\square = \frac{2}{3}}$$

Practice: Given the points

$(4, 7)$ and $(-3, 5)$

a) Find equation of Line
passing through the 2 points
in point slope form.

Like
online
HW.

b) Slope-Intercept form.

$$y - y_0 = \frac{2}{7}(x - x_0)$$

$$y - 5 = \frac{2}{7}(x + 3)$$

$$y - 5 = \frac{2}{7}x + \frac{6}{7}$$

$$\begin{array}{r} \underline{+ 5} \qquad \qquad \qquad \underline{+ 5} \end{array}$$

$$y = \frac{2}{7}x + \frac{6}{7} + \frac{35}{7}$$

$$y = \frac{2}{7}x + \frac{41}{7}$$