

Notes: Lines in the coordinate plane

Definitions:

- 1) Slope: Distance UP/DOWN and the distance right
- 2) y-intercept: where the line crosses the y axis
- 3) x-intercept: where the line crosses the x axis

Slope-intercept form of a linear equation

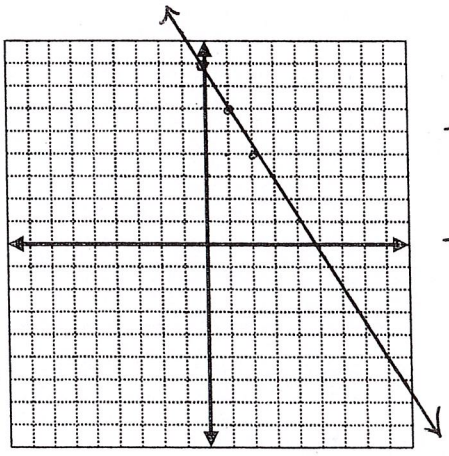
$$y = mx + b$$

$$m = \underline{\text{slope}}$$

$$b = \underline{\text{y-intercept}}$$

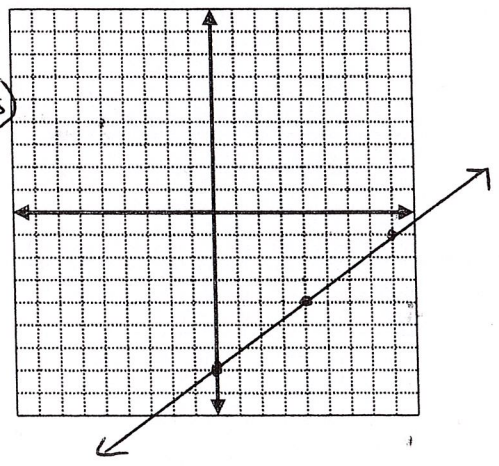
Ex. 1: Graph the equation $y = -2x + 8$

$$m = \underline{-\frac{2}{1}} \quad b = \underline{8}$$



Ex. 2: Graph the equation $y = \frac{3}{4}x - 7$

$$m = \underline{\frac{3}{4}} \quad b = \underline{-7}$$



begin with the B (where the line bangs into the y-axis)
M moves m

UP/down
right

Point-slope form

The point-slope form for a nonvertical line through point (x_1, y_1) with slope m is $y - y_1 = m(x - x_1)$

Ex. 1: Write an equation in point-slope form of the line through point P(-1, 4) with the slope 3.

$$y - 4 = \boxed{3}(x + 1)$$

x_1, y_1

Ex. 2: Write an equation in point-slope form of the line with the slope -8 that contains P(3, -6).

$$y - y_1 = m(x - x_1)$$

$$y + 6 = -8(x - 3)$$

x_1, y_1

What happens when we have two points? 1: Find slope 2: Use 1 point and slope

Ex. 3: Write an equation in point-slope form of the line through that contains the points G(4, -9) and

H(-1, 1)

$$\frac{y_2 - y_1}{x_2 - x_1} = \text{slope formula}$$

Find slope given 2 points.

(-1, 1) (4, -9) (Find slope)
 x_1, y_1 x_2, y_2 (name x_1, y_1 and x_2, y_2)

plug in

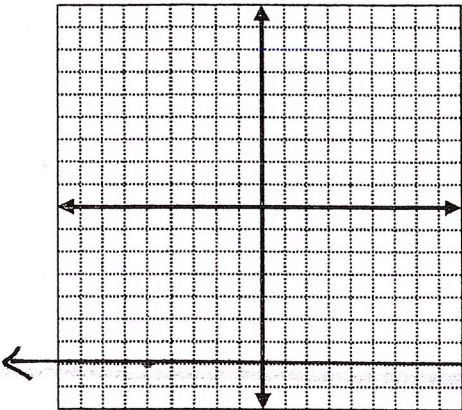
$$\frac{-9 - 1}{4 - (-1)} = \frac{-10}{5} = -2 = \text{slope}$$

Choose one of the points (-1, 1) and use slope -2
 point slope form of a line $y - y_1 = m(x - x_1)$

$$y - 1 = -2(x + 1)$$

Horizontal and Vertical Lines

Ex. 1: Horizontal Line: Draw a horizontal line that goes through the point R(-5, -7)



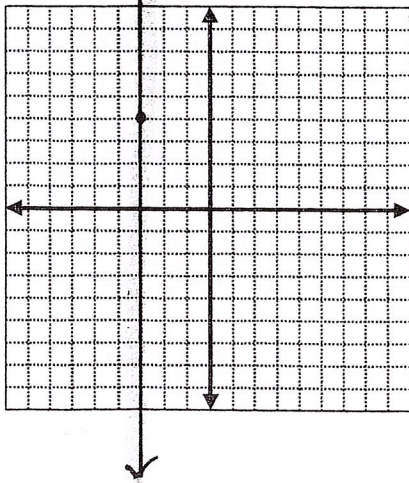
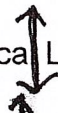
Every point on the horizontal line through R(-5, -7) has a

y value of -7

Equation: $y = -7$

* Slope is Zero

Ex. 2: Vertical Line: Draw a vertical line that goes through the point T(-3, 4)



Every point on the vertical line through T(-3, 4) has an

x value of -3

Equation: $x = -3$

* Slope is undefined