

1.3 Linear Equations with 2 Variables

Slope-Intercept Form: $y = mx + b$ where m is the slope and b is the y-intercept

Types of Lines:

Vertical line: only has a x, no y

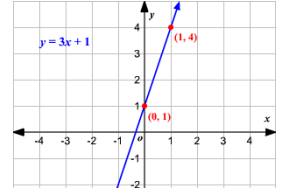
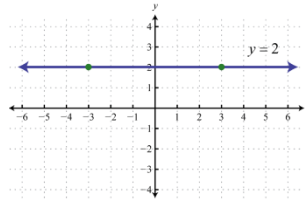
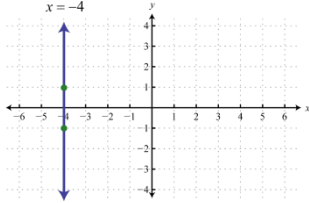
Horizontal line: only has a y, no x

Diagonal line: has both x and y

Ex: $x = -4$

Ex: $y = 2$

Ex: $y = 3x + 1$



Graphing a Linear Equation

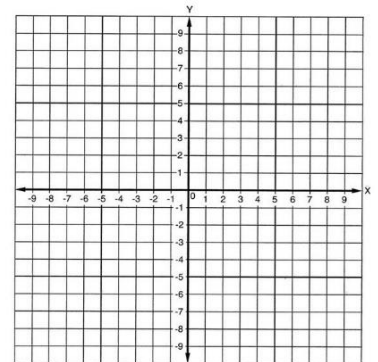
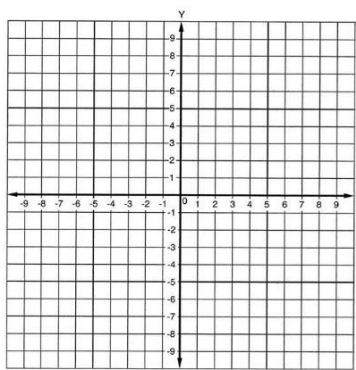
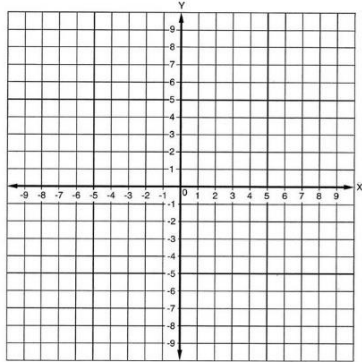
If it's in slope-intercept form, plot your y-intercept (b value) on the y axis. Then, use the slope to create new points $\text{slope } (m) = \frac{\text{rise (up and down)}}{\text{run (left and right)}}$

Sketch the graphs of each linear equation. Plot at least 3 points.

a.)

b.)

c.)



Finding the Slope of a Line

The slope, m, of the line that passes through 2 points is:

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

where $x_1 \neq x_2$.

Given 2 points on the line:

label the numbers in the first point (x_1, y_1)

and in the second point (x_2, y_2) , and plug

them into the formula for slope

Given a point on the line and the y-intercept (b):

label the numbers in the given point (x, y) ,

and plug those 2 points as well as your b

value into $y = mx + b$ and solve for m

Exs) Find the slope of each using the given information.

d.)

e.)

Writing Linear Equations - you must know what the slope (m) and the y-intercept (b) are to write a linear equation

Point-Slope Form of the Equation of a Line

The equation of the line with slope m passing through the point (x_1, y_1) is

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

Analyze the info you are given, and use them as well as the slope formula, point-slope formula, and/or the slope-intercept form of a line **to find m and b**. Then, write the equation of the line (in slope-intercept form unless indicated otherwise) by plugging m and b into $y = mx + b$ and leaving x and y as is.

**** Your goal is to find m and b, so that you can write the equation. There is more than one way to find them ****

Exs) Write the slope-intercept form of the equation for each line whose information is given.

f.)

Parallel and Perpendicular Lines

Parallel lines: 2 lines are parallel ONLY IF their *slopes are EXACTLY the same*. Their y-intercepts (b) must be different, because if they were also the same, they would both be the same exact line.

Perpendicular lines: 2 lines are perpendicular ONLY IF their *slopes are OPPOSITES AND RECIPROALS* of one another. BOTH things must be true. Their y-intercepts (b) make no difference, they can be the same or different.

g) Find the slope-intercept forms of the equations of the lines that pass through the point _____, and are (a) parallel to and (b) perpendicular to the line _____