Algebra II: Review from Algebra I, Part II

Linear Equations and Graphs of Linear Equations

A linear equation is an equation with two variables (x and y, for example) that both have degree one.

The examples x=5 and y=3 are still linear equations (even though only one variable is showing), because they can be written as __________________ and _____________________.

The graph of a linear equation is a ____________.

How is a linear equation graphed (in the most basic sense; use the fact that two points determine a line)?

Examples: Determine whether the equation given is a linear equation. If so, graph it. If not, explain why it is not linear. Make sure that (1) your lines are drawn with a straightedge (2) the axes and gridmarks are labeled appropriately.

\[ 2x + y = 5 \]

\[ y = -2 \]
\[ x - 1.5y = -1.6 \]

\[ x + y^2 = 9 \]

\[ x = 5 \]
**x-intercepts and y-intercepts**

Define: \(x\)-intercept:

\(y\)-intercept:

To find the \(x\)-intercept, plug in _________ and solve for _________.

To find the \(y\)-intercept, plug in _________ and solve for _________.

Find the coordinates of the \(x\) and \(y\) intercepts for the following lines:

\[
\begin{align*}
\text{a)} & \quad x - 1.5y = -1.6 \\
\text{b)} & \quad 2x + y = 5 \\
\text{c)} & \quad x = 5 \\
\text{d)} & \quad y = -2
\end{align*}
\]

Do these points match up with the intercepts that you drew on the coordinate plane on the previous page? If they do not, then go back and fix them!

**Slope**

Define slope:

To find the slope between two points \((x_1, y_1)\) and \((x_2, y_2)\), use this formula:_________________________

A positive slope will go _________ and to the ___________.

A negative slope will go _________ and to the ___________.
A horizontal line (like the example $y = -2$) has a slope of ________________.

A vertical line (like the example $x = 5$) has a slope of ________________.

Parallel lines have _____________ slope, while perpendicular lines have _______________________ slope.

Find the slope of the line between the given points using the slope formula:

(a) $(-1, 5), (2, -3)$

(b) $(-1, -2), (2, 4)$

Find the slope of the line by finding two points on the line and using the slope formula:

(a) $2x + y = 5$

(b) $x - 1.5y = -1.6$

**Slope-Intercept Form**

What is the slope intercept form of a linear equation?

Why is this useful?

What is the slope of the line written as the answer to question #1?

What are the coordinates of that line’s $y$-intercept?
Convert the following linear equations to slope intercept form, and then find the slope and $y$-intercept of each line.

(a) $3x - 4y = 4$  
(b) $2x + 10y = 30$

Find a linear equation of the line with a slope of $\frac{1}{4}$ and a $y$-intercept of $(0,-3)$:

What is the slope of any line parallel to $3x - 4y = 4$?  
What is the slope of any line perpendicular to $3x - 4y = 4$?

The Point-Slope Formula

What is the point-slope formula?

Why is this useful?

Find the requested linear equation. Convert all answers to slope-intercept form:

(a) Find the equation of the line with slope 3 that contains the point (-2, -5)

(b) Find the equation of the line parallel to $3x - 4y = 4$ through the point (1,0)

(c) Find the equation of the line perpendicular to $3x - 4y = 4$ through the point (2,-3)