

Lesson 9: Linear Functions
 Linear function: an equation whose graph is a straight line

3 Forms an Equation Can Take
 * Slope-Intercept Form: $y = mx + b$
 - easier to graph
 * Standard Form: $ax + by = c$
 - change to slope-intercept form to graph
 * Point-Slope Form: $y - y_1 = m(x - x_1)$
 - only to plug in line and write equation, not used very often

(Sloping Equations)
Ex 1: Slope-Intercept Form $Y = mX + b$
Graph $y = 2x + 3$
 This graph has a slope of 2 and a y-intercept of 3. To graph the line, start at the y-intercept (0, 3) and use the slope to find other points. For every 1 unit you run to the right, you rise 2 units up.

a) Graph $y = -4x + 5$

b) Graph $y = 2x + 0$

Ex 2: Standard Form
 - You have to re-arrange the equation to get y by itself

a) Graph $4x + 2y = 10$

b) Graph $5x + 3y = 15$

Ex 3: Special Graphs
a) Graph $x = 3$
 (makes a straight VERTICAL line)

b) Graph $y = 2$
 (makes a straight HORIZONTAL line)

(Slopes)
 - Describes how much rise/run a line has

4 Types of Slope

Positive	Negative	Zero	Undefined
rise > 0, run > 0	rise < 0, run > 0	rise = 0, run > 0	rise > 0, run = 0
positive slope	negative slope	zero slope	undefined slope

Ex 1: Finding slope from an equation
 * Slope-Intercept Form: $y = 2x + 4$ - It is the # stuck to x. Slope = 2
 * Standard Form: $3x + 4y = 16$ - Get y alone. The # stuck to y is the slope. $4y = -3x + 16$ $y = -\frac{3}{4}x + 4$ slope = $-\frac{3}{4}$

Ex 2: Finding slope from a graph
 - count rise over run
a) Find the slope
 rise = 2, run = 3
 $m = \frac{2}{3}$

Ex 3: Finding slope from 2 ordered pairs
 use the formula $m = \frac{y_2 - y_1}{x_2 - x_1}$ /remember y is always on top

a) Find the slope (3, 2) (5, 4)
 $m = \frac{4 - 2}{5 - 3} = \frac{2}{2} = 1$

b) Find the slope (7, 8) (2, 3)
 $m = \frac{3 - 8}{2 - 7} = \frac{-5}{-5} = 1$

Ex 4: Finding Slope from Other Lines
 - parallel lines have the same slope
 - perpendicular lines have reciprocal slope with opposite signs

a) Find the slope of a line parallel to $y = -\frac{1}{2}x - 6$
 $m = -\frac{1}{2}$

b) Find the slope of a line perpendicular to $y = \frac{2}{3}x + 4$
 $m = -\frac{3}{2}$

(Writing an Equation From a Graph)
 - have to know 2 things: 1) slope and 2) y-intercept

a) Slope $\frac{2}{3}$, y-intercept $-\frac{1}{2}$
 Equation: $y = \frac{2}{3}x - \frac{1}{2}$

b) Slope $\frac{5}{6}$, y-intercept $-\frac{1}{2}$
 Equation: $y = \frac{5}{6}x - \frac{1}{2}$

(Writing an Equation Given the Slope and Y-Intercept)
 simply plug into slope + b

a) slope = 4, y-intercept = 2
 $y = 4x + 2$

b) slope = -2/7, y-intercept = 0
 $y = -\frac{2}{7}x$

(Writing an Equation From Standard Form)
 - re-arrange the equation to get y by itself

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

b) $6x + 4y = 8$
 $4y = -6x + 8$
 $y = -\frac{3}{2}x + 2$