Section 1.3

Graphing Linear Equations

Linear equations have the form of $y = mx + b$ or in standard form, $Ax + By + C = 0$

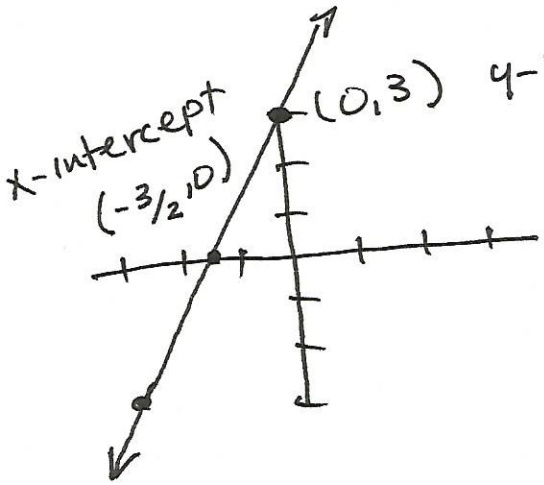
Each equation as a set of ordered pairs, i.e. a domain (x values) and a range (y-values)

$(x_1, y_1), (x_2, y_2), (x_3, y_3)$, etc.

These lines often have a point of intersection for the x-axis and for the y-axis. The point that intersects the x-axis is called an <u>x-intercept.</u> The point that intersects the y-axis is called an <u>y-intercept.</u>

Ex $y = 2x + 3$

x	y
0	3
$-\frac{3}{2}$	0
-3	-3



Slope of a line, $m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{\text{rise}}{\text{run}}$ or $m = \frac{\Delta y}{\Delta x}$

The slope of the previously mentioned line is: $(0, 3)$ $(-3, -3)$
$x_1\ y_1$ $x_2\ y_2$

$$m = \frac{-3-3}{-3-0} = \frac{-6}{-3} = 2 \qquad m = 2$$

The slope of a line is constant and uniform between any two points on the line. This means that any two ordered pairs on a line can be used to find the slope of the line.

Equations of lines are expressed in two different forms:

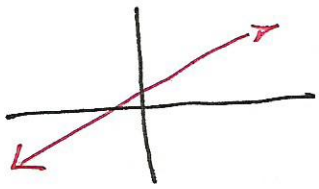
① Standard form $Ax + By = C$ $\quad m = -\frac{A}{B}$

② slope-intercept form $y = mx + b$ $\quad m =$ slope

Types of slopes: 4 different types

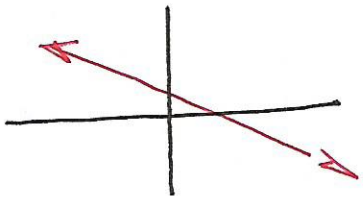
① (+) slope

graph goes up from right to left



② (−) slope

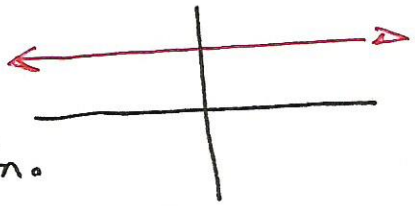
graph goes down from right to left



③ slope = 0

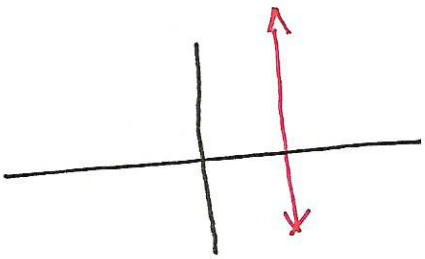
graph is a horizontal line

* This is called a constant function.



④ slope = undefined

graph is a vertical line



When the graph of a line crosses the x-axis, its y-value equals zero. This coordinate is called a zero or root of the function. Since $y = f(x)$ and $y = 0$ then $f(x) = 0$. $f(x) = 0$ when the value of x is on the x-axis.

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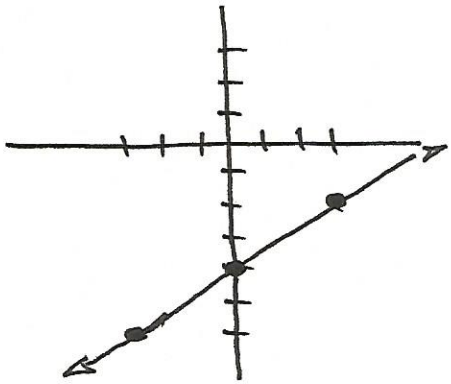
20. $y = \frac{2}{3}x - 4$

x	y
3	-2
0	-4
-3	-6



25. $f(x) = 4x - 12$

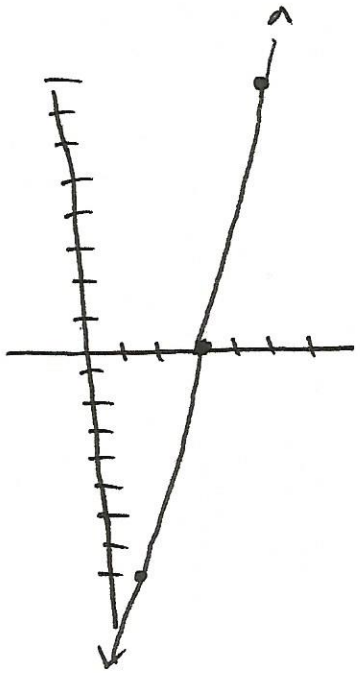
$0 = 4x - 12$

$12 = 4x$

$3 = x$

Zero occurs (3, 0)

x	y
1	-8
3	0
5	8



32. A linear function with no zero
(A horizontal line, ex $y = 5$) or $f(x) = 5$

A linear function with infinite zero's
(A horizontal line on the x-axis, ex $y = 0$ or $f(x) = 0$

39.

56	50
76	67.2

MPC = slope of line

$$MPC = \frac{67.2 - 50}{76 - 56} = \frac{17.2}{20} = 0.86$$

a)

b) A gain of \$1805 in income would result in $(0.86)(\$1805) = \$1552.30$ increase in spending.

c) $MPS = 1 - MPC = 1 - 0.86 = 0.14$

d) A gain of \$1805 causes an increase of \$1552.30 in spending and an increase of $1805 - 1552.30 = \$252.70$ in saving.