A. Bay
Algebra 1

Name: Key
Date:

Graphing Linear Equations in Standard Form
3.4

The **standard form** of a linear equation is $Ax + By = C$, where A, B, and C are integers and A and B are not both zero.
Consider what happens when $A = 0$ or when $B = 0$.

When $A=0$

$(0)x+By=C$

$\frac{By}{B}=\frac{C}{B}$

$y=\frac{C}{B}$ - constant

$y=b$

When $B=0$

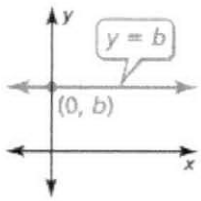
$Ax+(0)y=C$

$\frac{Ax}{A}=\frac{C}{A}$

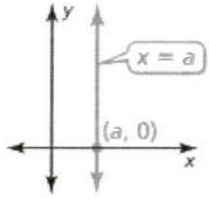
$x=\frac{C}{A}$ - constant

$x=a$

Horizontal and Vertical Lines

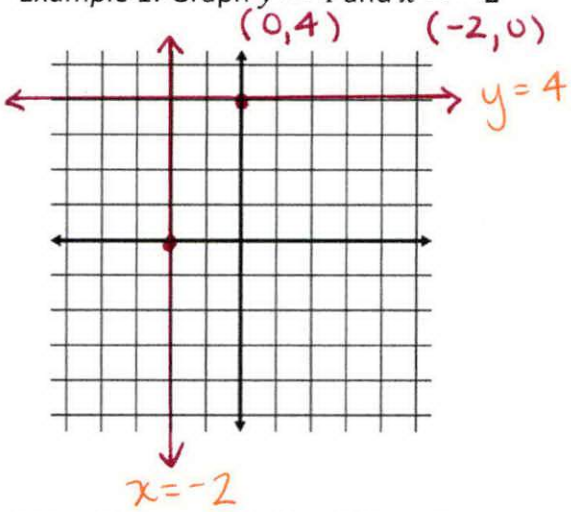


The graph of $y = b$ is a horizontal line. The line passes through the point $(0, b)$.

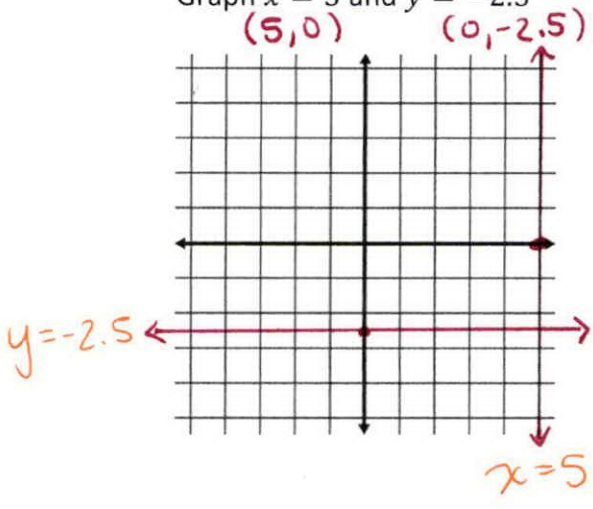


The graph of $x = a$ is a vertical line. The line passes through the point $(a, 0)$.

Example 1: Graph $y = 4$ and $x = -2$



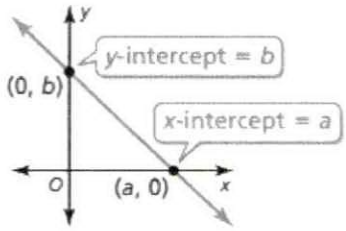
Graph $x = 5$ and $y = -2.5$



Using Intercepts to Graph Equations

The ***x*-intercept** of a graph is the x-coordinate of a point where the graph crosses the x-axis. It occurs when $y = 0$.

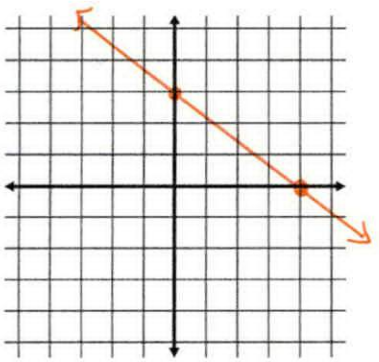
The ***y*-intercept** of a graph is the y-coordinate of a point where the graph crosses the y-axis. It occurs when $x = 0$.



To graph the linear equation $Ax + By = C$, find the intercepts and draw the line that passes through the two intercepts.

- To find the x-intercept, let $y = 0$ and solve for x.
- To find the y-intercept, let $x = 0$ and solve for y.

Example 2: Use intercepts to graph the equation $3x + 4y = 12$.



x-intercept
$y = 0$

$3x + 4(0) = 12$

$\frac{3x}{3} = \frac{12}{3}$

$x = 4$

(4,0)

y-intercept
$x = 0$

$3(0) + 4y = 12$

$\frac{4y}{4} = \frac{12}{4}$

$y = 3$

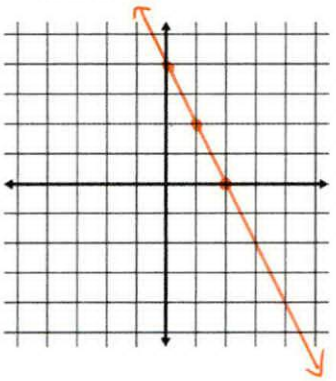
(0,3)

Finding Zeros of Functions

A **zero of a function** f is an x-value for which $f(x) = 0$ (or $y = 0$). A zero of a function is an x-intercept of the graph of the function.

* plug in 0 for f(x) and solve

Example 3: Find the zero of the function for $f(x) = -2x + 4$.



$0 = -2x + 4$

$-4 \quad -4$

$\frac{-4}{-2} = \frac{-2x}{-2}$

$2 = x$

(2,0)

Example 4: An artist rents a booth at an art show \$300. The function $f(x) = 50x - 300$ represents the artist's profit, where x is the number of paintings the artist sells. Find the zero of the function. Explain what the zero means in this situation.

$0 = 50x - 300$

$+300 \quad +300$

$\frac{300}{50} = \frac{50x}{50}$

$6 = x$

(6,0)

f(x) represents the artist's profit, so 6 is the # of paintings the artist needs to sell to break even (cover the cost of the booth @ the art show)

Example 5: You are planning an awards banquet for your school. You need to rent tables to seat 180 people. Tables come in two sizes. Small tables seat 6 people, and large tables seat 10 people. The equation $6x + 10y = 180$ models this situation, where x is the number of small tables and y is the number of large tables.

a. Graph the equation. Interpret the intercepts.
b. Find four possible solutions in the context of the problem

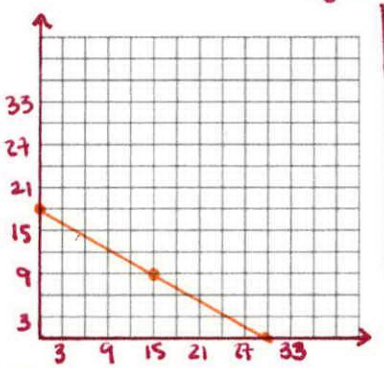
only graph in quadrant I since you cannot have negative number of tables

@ $6x + 10y = 180$

$\frac{6x}{6} = \frac{180}{6}$ $\quad$ $\frac{10y}{10} = \frac{180}{10}$

$x = 30$ $\quad$ $y = 18$

(30,0) $\quad$ (0,18)



Possible solutions
30 sm & 0 Lg
0 sm & 18 Lg
15 sm & 9 Lg
25 sm & 3 Lg

$6(15) + 10y = 180$

$90 + 10y = 180$

$\frac{10y}{10} = \frac{90}{10}$

$y = 9$

$6x + 10(3) = 18$

$6x + 30 = 180$

$-30 \quad -30$

$\frac{6x}{6} = \frac{150}{6}$

$x = 25$

It is possible to have 30 small tables w/ no big tables or 18 big tables with no small tables

Homework: pg 120: 4-12 even, 19-27 odd, 32-44 even, 45-47