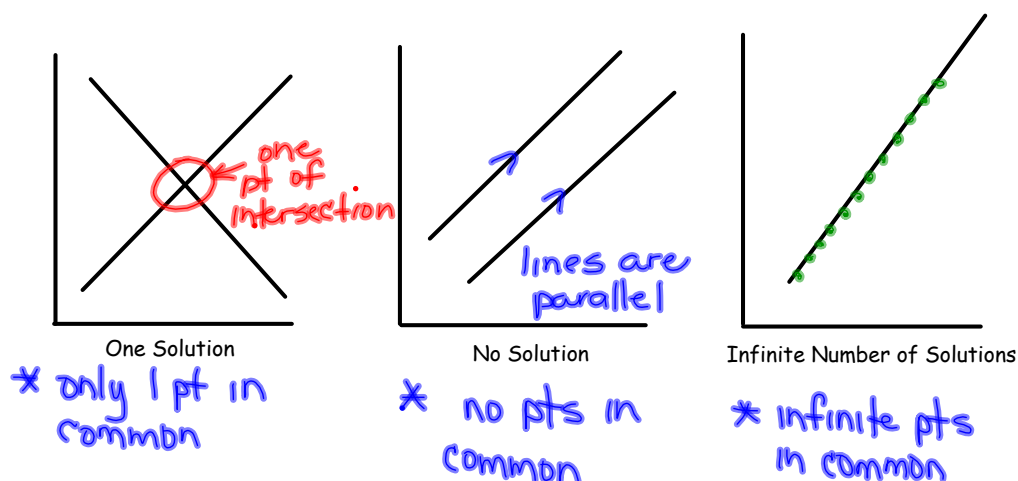# Learning Goals

1. To understand graphically what one solution looks like.

2. To understand graphically what no solution looks like.

3. To understand graphically what an infinite number of solutions look like.

4. For a word problem, to be able to interpret what the intersection of the two lines means in the context of the question.

4.5 Solving Linear Systems Graphically

System of Linear Equations - a set of equations (at least two) that represent linear relations between the same two variables.

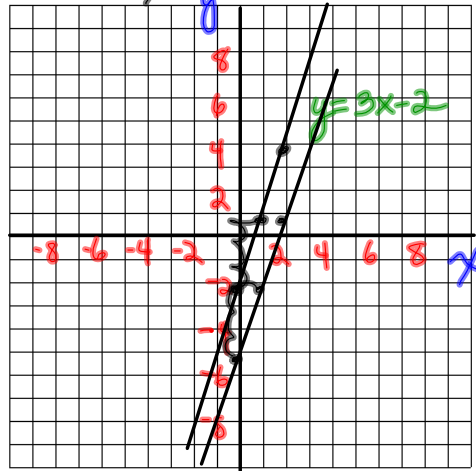A system of linear equations can have:

| One Solution | No Solution | Infinite Number of Solutions |

one pt of intersection

lines are parallel

* only 1 pt in common

* no pts in common

* infinite pts in common

Example One
Determine the number of solutions for the following:

a) $3x - y = 5$ and $y = 3x - 2$

$3x - 5 = y$

∗ To use slope/y-intercept method eqn must be in:

$$y = mx + b$$

form.

$y = 3x - 2$
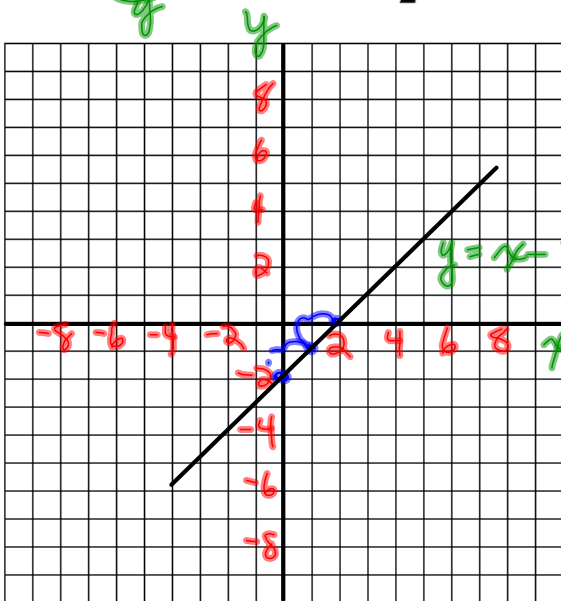
Starting pt: -2

Slope: $\dfrac{3}{1}$ (up) (right)

$y = 3x - 5$

Starting pt: -5

Slope: $\dfrac{3}{1}$ (up) (right)

∴ no solution. The lines are parallel b/c they both have the same slope.

b) $x - y = 2$ and $y = \dfrac{(2x-4)}{2}$

$y = x - 2$

Starting pt: -2

Slope: $\dfrac{1}{1}$ (up) (right)

$y = \dfrac{2x}{2} - \dfrac{4}{2}$

$y = x - 2$

∴ infinite # of solution. Equations are exactly the same.

Example Two

Mary Claire is choosing between 2 music downloading clubs. The first club charges a member of $5 plus $2.50/song while the second club charges a membership of $3 plus $3/song.
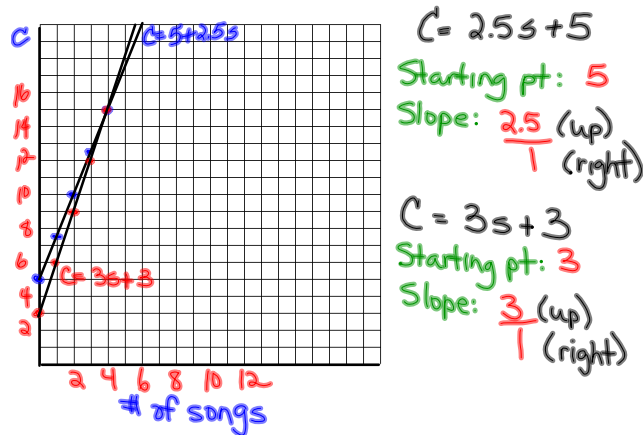
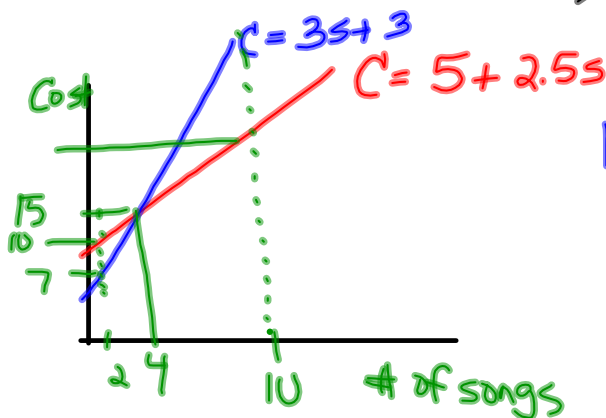a) Write the equations that represents both clubs.

$$y = mx + b$$
$$C = 2.5s + 5$$
$$C = 3s + 3$$

$C = $ cost
$s = $ # of songs

b) Which club should Mary Claire join?

$C = 2.5s + 5$
Starting pt: 5
Slope: $\dfrac{2.5 \text{ (up)}}{1 \text{ (right)}}$

$C = 3s + 3$
Starting pt: 3
Slope: $\dfrac{3 \text{ (up)}}{1 \text{ (right)}}$

Note: You know your intersection point is correct if you plug your point into both equations and LS = RS.

Intersection pt is: $(4, 15)$

$C = 3s + 3$
$C = 5 + 2.5s$

$s < 4$
Buy from $C = 3s + 3$
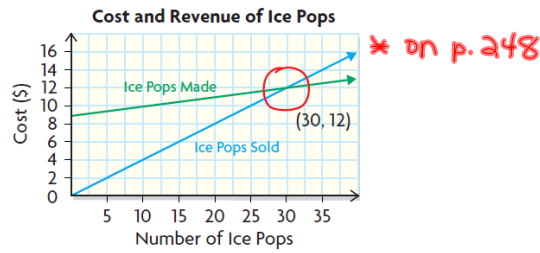
$s = 4$
Buy from either

$s > 4$
Buy from $C = 2.5s + 5$

Complete: p. 245 - 247 #2, 6, plus question below.

Look at the graph below and describe the companies financial situation. At what point are they making a profit? When do they break-even?

Cost and Revenue of Ice Pops

Ice Pops Made

Ice Pops Sold

(30, 12)

Cost ($)

Number of Ice Pops

✱ on p. 248

Sketch the graph below to help you answer the questions in #2, p. 245.

— Revenue
— Cost

✱ assume intersection is at: (30, 3)

$

10 20 30 40 50

# of glasses