## 6.2/3 Solving Situational Problems of Systems of Linear Inequalities – Day2 (Concept #3)

**Example #1** A cupcake requires 35 grams of sugar and 50 grams of flour, and a muffin requires 30 grams of sugar and 65 grams of flour. Emily needs to use at least 460 grams of sugar to make cupcakes and muffins, and she wants to use at most 970 grams of flour. Use a graph to display all possible combinations of cupcakes and muffins to meet the inequalities.

Step 1: Define your variables let C = number of cupcakes

let M = number of muffins

Step 2: State the domain and range and any restrictions.

$X \in W,\ Y \in W$

Step 3: Write a system of inequalities. (Also known as constraints)

$35c + 30m \geq 460$ ← inequality represents grams of sugar

$50c + 65m \leq 970$

inequality representing grams of flour

Step 4: Graph the inequalities.

Be sure it is fully labelled.

① $35c + 30m \geq 460$

$30m \geq -35c + 460$

$m \geq -\frac{7}{6}c + \frac{46}{3}$

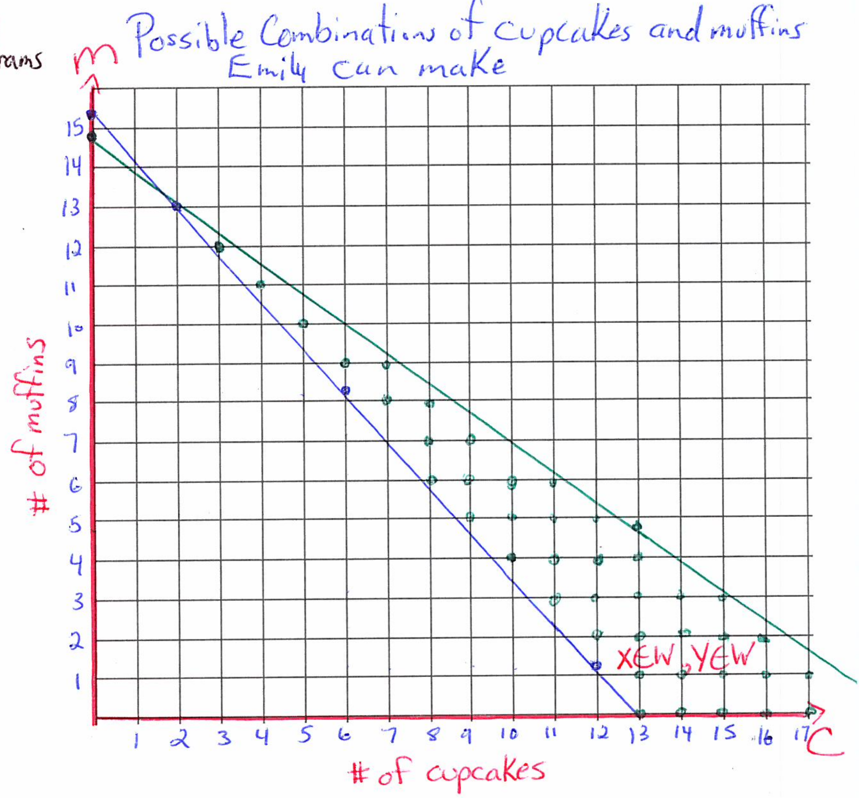
y-int $\approx 15.3$

② $50c + 65m \leq 970$

$65m \leq -50c + 970$

$m \leq -\frac{10}{13}c + \frac{194}{13}$

y-int $\approx 14.9$




Step 5: Find two coordinates that satisfy both inequalities.

(12 cupcakes, 4 muffins) (9 cupcakes, 7 muffins)

Questions:

a) Verify one point and explain what the point means within the context of this situation.

$35(12) + 30(4) \geq 460$

$420 + 120 \geq 460$

$540 \geq 460$ ✓ True

$50(12) + 65(4) \leq 970$

$600 + 260 \leq 970$

$860 \leq 970$ ✓ True

This means that if Emily makes 12 cupcakes and 4 muffins she will use 825g of flour and 560g of sugar.

b) What is the minimum amount of cupcakes and muffins that she can bake that satisfy both inequalities?

13 cupcakes + 0 muffins.

**Example #2** A parkade can fit at most 100 cars and trucks on its lot. A car covers 100 $ft^2$ and a truck covers 200 $ft^2$. The lot has 12,000 $ft^2$ of space. Use a graph to display all possible combinations of trucks and cars that meet the constraints.

Step 1: Define the variables

Let x = # of cars

Let y = # of trucks

Step 2: State the domain and range and any restrictions

$x \in W$ , $y \in W$

Step 3: Write the inequalities (Note: in the future these will be called the constraint inequalities)

$x + y \leq 100$

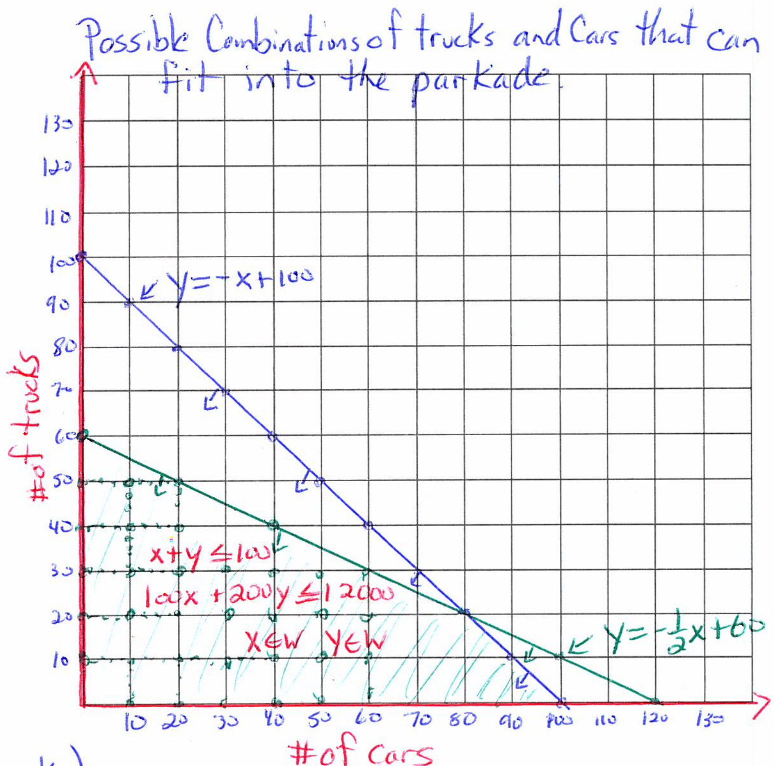
$100x + 200y \leq 12\,000$

Step 4: Graph the system of inequalities within the restrictions. Fully label the graph!

$y \leq -x + 100$ (slope, y-int)

$\frac{200y}{200} \leq \frac{-100x}{200} + \frac{12000}{200}$

$y \leq -\frac{1}{2}x + 60$ (slope, y-int)




Step 5: Determine two possible combinations of trucks and cars possible on the lot.

(25 cars, 10 trucks) (50 cars, 30 trucks)

Question:

a) What do you think the points of intersection on the graph mean?

The amount of cars to maximize the area and/or the total # of vehicles allowed, which is 100 cars + trucks.

## Assignment Pg 318 #6,8,12 Pg 323 #7

***NOTE: The question below will be considered fully answered only by following all of the five steps in the examples in today's lesson.***

1. Your company makes Ipods and MP3 players. Each one must be processed by 2 machines. An Ipod takes 1 hour at the moulding station and 1 hour at the wiring station. An MP3 player it takes 2 hours at the moulding station and 1 hour at the wiring station. The moulding station is available for 16 hours and the wiring for 10 hours. What combinations of each music item can be made to meet the constraints?