

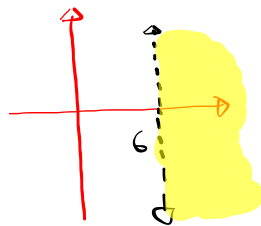
**Math 115**  
**Spring 2019**  
**Lecture 15**

?  $a^2 + b^2 = c^2$  ?  
 $y = mx + b$  ?  $d = rt$

Graph and Shade:

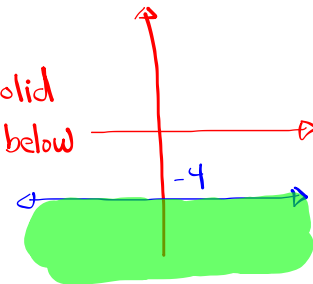
①  $x > 6$

V.L. , Dashed,  
Shade Right



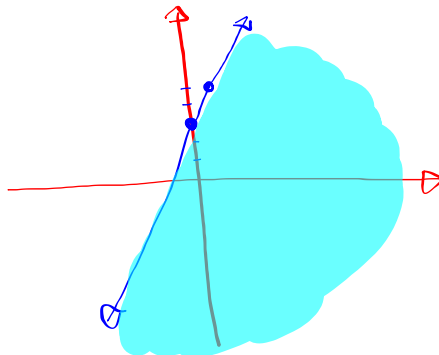
②  $y \leq -4$

H.L. Solid  
Shade below



③  $y \leq 2x + 3$

Slope-Int  
 Y-Int (0,3)  
 Slope  $m = 2 = \frac{2}{1}$   
 Solid slant  
 Shade below



Graph & Shade

$$\begin{cases} y < 3 \\ 2x - y \leq 4 \\ y > -\frac{3}{4}x - 4 \end{cases}$$

$$\begin{cases} y < 3 \\ y \geq 2x - 4 \\ y > -\frac{3}{4}x - 4 \end{cases}$$

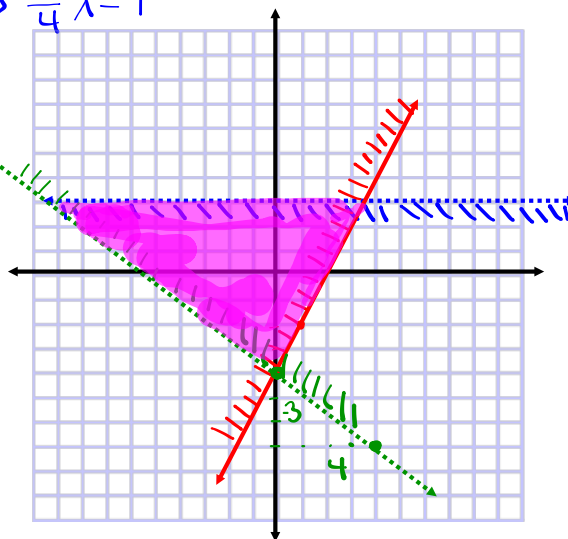
Hint: Convert all slant lines to Slope-Int form.

$$2x - y \leq 4$$

$$-y \leq -2x + 4$$

Divide by -1

$$y \geq 2x - 4$$



Find equation of a line that contains  $(-3, 2)$  and  $(3, 0)$ . Graph the line too.

$$m = \frac{y_1 - y_2}{x_1 - x_2} \quad m = \frac{y_2 - y_1}{x_2 - x_1}$$

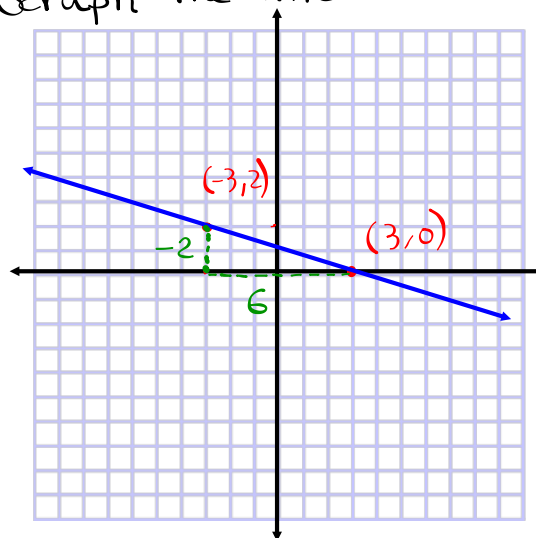
$$= \frac{2 - 0}{-3 - 3} = \frac{2}{-6} = \boxed{-\frac{1}{3}}$$

$$y - y_1 = m(x - x_1)$$

$$y - 0 = -\frac{1}{3}(x - 3)$$

$$\boxed{y = -\frac{1}{3}x + 1} \text{ Slope-Int form}$$

$$3y = -x + 3 \Rightarrow \boxed{x + 3y = 3} \text{ standard form}$$



find equation of a line that contains  $(-7, 5)$   
and is parallel to  $3x - 2y = 12$ .

Graph both lines.

→ Same slope

$$y - y_1 = m(x - x_1)$$

$$y - 5 = \frac{3}{2}(x - 7)$$

$$y - 5 = \frac{3}{2}(x + 7)$$

$$2y - 10 = 3(x + 7)$$

$$2y - 10 = 3x + 21$$

$$2y = 3x + 31$$

Slope-Int

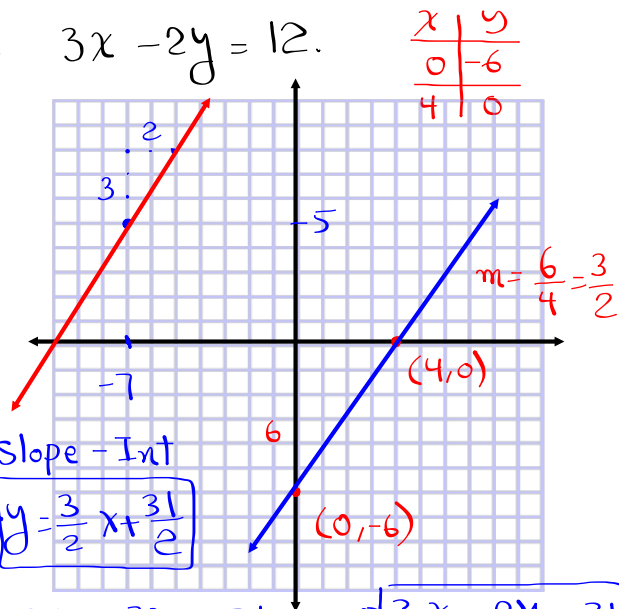
$$y = \frac{3}{2}x + \frac{31}{2}$$

$$2y = 3x + 31$$

$$-3x + 2y = 31$$

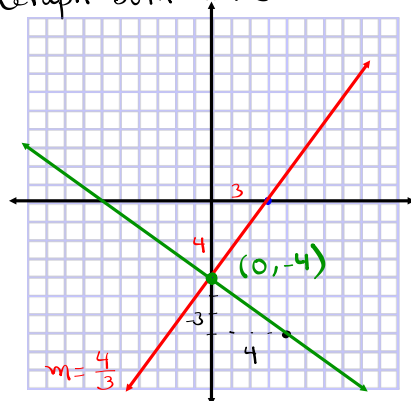
$$3x - 2y = -31$$

Standard form



find equation of a line that contains  $(0, -4)$   
and is perpendicular to the line  $4x - 3y = 12$ .

Graph both lines.



x	y
0	-4
3	0

Perpendicular lines

Slope = -(Reciprocal)

$$= -\left(\frac{3}{4}\right) = \frac{-3}{4}$$

$$y - y_1 = m(x - x_1)$$

$$y - -4 = \frac{-3}{4}(x - 0)$$

$$y + 4 = \frac{-3}{4}x \quad \text{slope-Int}$$

$$y = \frac{-3}{4}x - 4$$

$$4y = -3x - 16$$

$$3x + 4y = -16$$

Standard form

Is  $(3, -\frac{1}{2})$  a Solution of  $\begin{cases} 5x - 6y = 18 & \checkmark \\ 2y - x = -4 & \checkmark \end{cases}$  ?

Checking  $5x - 6y = 18$  ✓

$$5(3) - 6(-\frac{1}{2}) = 18$$

$$15 + 3 = 18$$

$$18 = 18 \checkmark$$

check  $2y - x = -4$

$$2(-\frac{1}{2}) - 3 = -4$$

$$-1 - 3 = -4$$

$$-4 = -4 \checkmark$$

Yes,  $(3, -\frac{1}{2})$  is  
a Solution.

Is  $(\frac{1}{2}, -2)$  a Solution of  $\begin{cases} 4x + y = 0 & \checkmark \\ -8x - 5y = 9 & \times \end{cases}$  ?

Checking  $4x + y = 0$

$$4(\frac{1}{2}) - 2 = 0$$

$$2 - 2 = 0$$

$$0 = 0 \checkmark$$

checking  $-8x - 5y = 9$

$$-8(\frac{1}{2}) - 5(-2) = 9$$

$$-4 + 10 = 9$$

$$6 = 9$$

false

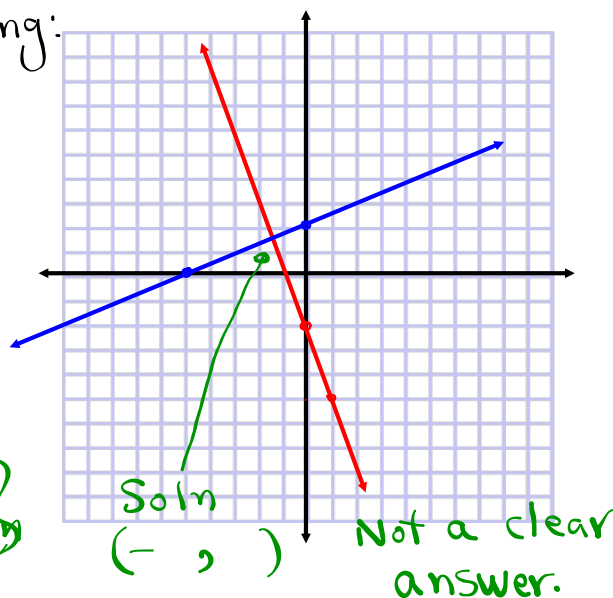
$(\frac{1}{2}, -2)$  is not  
a Solution.

Solve by graphing:

$$\begin{cases} y = -3x - 2 \\ 2x - 5y = -10 \end{cases}$$

x	y
0	2
-5	0

Graphing is  
not the best option



Soln  
(-2, 4)

Not a clear  
answer.

Solve by Subs. method:

$$\begin{cases} y = 2x + 6 \\ 3x - 2y = -11 \end{cases}$$

$$y = 2(-1) + 6$$

$$y = -2 + 6$$

$$y = 4$$

$$3x - 2(2x + 6) = -11$$

$$3x - 4x - 12 = -11$$

$$-x = -11 + 12 \quad -x = 1$$

$$x = -1$$

$$(-1, 4)$$

Solve by addition method:

$$\begin{cases} 2x - 3y = -15 \\ -2 \{ x + 4y = 31 \end{cases} \Rightarrow \begin{cases} \cancel{2x} - 3y = -15 \\ \cancel{-2x} - 8y = -62 \end{cases}$$


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$$-11y = -77$$

$$x + 4(7) = 31$$

$$x = 31 - 28$$

$$\boxed{x = 3}$$

$$\boxed{y = 7}$$

$(3, 7)$

The sum of two numbers is 16.

3 times one of them decreased by the other one is equal to 72. Find both numbers.

Let  $x$  &  $y$  be the numbers,

$$\begin{cases} x + y = 16 \\ 3x - y = 72 \end{cases}$$

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$$\begin{array}{r} 4x \qquad \qquad = 88 \end{array}$$

$$\boxed{x = 22}$$

$$22 + y = 16$$

$$\boxed{y = -6}$$

The numbers are  $-6$  &  $22$ .

At a church concert, 360 tkts were sold.

They collected \$15,150.

Adults paid \$45. Per ticket. How many of  
Kids paid \$35. each?

$$\begin{array}{l} A \rightarrow \text{Adults} \\ K \rightarrow \text{Kids} \end{array} \quad \div 5 \quad \begin{cases} A + K = 360 \\ 45A + 35K = 15150 \end{cases}$$

$$\begin{cases} A + K = 360 \\ 9A + 7K = 3030 \end{cases} \Rightarrow \begin{cases} -7A - 7K = -2520 \\ 9A + 7K = 3030 \end{cases}$$

$$2A = 510$$

$$A = 255$$

$$255 + K = 360$$

$$K = 360 - 255$$

$$K = 105$$

225 Adults  
&  
105 Kids

Maria has \$4.55 in dimes and Quarters only.

The number of quarters is 2 more than  
3 times the # of dimes.

How many of each? \$4.55

$$\begin{array}{l} D \rightarrow \text{Dimes} \\ R \rightarrow \text{Quarters} \end{array} \quad \div 5 \quad \begin{cases} 10D + 25R = 455 \\ R = 3D + 2 \end{cases}$$

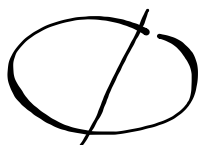
$$\begin{cases} 2D + 5R = 91 \\ R = 3D + 2 \end{cases}$$

$$2D + 5(3D + 2) = 91$$

$$2D + 15D + 10 = 91$$

$$17D = 81$$

$$D = 4.76$$



The # of coins cannot  
be negative or  
decimal.

It has to be  
whole number.

Two angles are Complementary.

3 times one of them increased by 5 times the other one is  $380^\circ$ .

Find both angles.

$x$  &  $y$  are Complementary angles,

angles,

$$\begin{cases} -3x & -3y = -270 \\ 3x & +5y = 380 \end{cases}$$

$$2y = 110$$

$$y = 55$$

$$\begin{cases} x + y = 90 \\ 3x + 5y = 380 \end{cases}$$

$$x + 55 = 90$$

$$x = 35$$

$35^\circ$  &  $55^\circ$

Find two Supplementary angles such that

4 times one of them is equal to  $15^\circ$  less than 3 times the other one.

$x$  &  $y$  are our Supplementary angles

$$\begin{cases} x + y = 180 \\ 4x = 3y - 15 \end{cases}$$

$$\begin{cases} x + y = 180 \\ 4x - 3y = -15 \end{cases}$$

$$\Rightarrow \begin{cases} 3x + 3y = 540 \\ 4x - 3y = -15 \end{cases}$$

$$7x = 525$$

$$x = 75$$

$75^\circ$  &  $105^\circ$

Jose paid \$18 to buy 5 HB and 3 FF.

Lisa = \$11.95 = = 2 HB and 5 FF.

Find the price for 1 FF.

$$\begin{cases} -2 \{ 5H + 3F = 18 \\ 5 \{ 2H + 5F = 11.95 \end{cases} \Rightarrow \begin{cases} -10H - 6F = -36 \\ 10H + 25F = 59.75 \end{cases}$$

$$19F = 23.75$$

$$F = \frac{23.75}{19}$$

$$F = 1.25$$

\$1.25

3 eggs & 4 bacons → \$3.80

2 eggs & 3 bacons → \$2.75

Find the cost for 1 egg.

$$\begin{cases} 3 \{ 3E + 4B = 3.80 \\ 4 \{ 2E + 3B = 2.75 \end{cases} \Rightarrow \begin{cases} 9E + 12B = 11.40 \\ -8E - 12B = -11 \end{cases}$$

$$E = .40$$

\$ .40 or 40¢

Exam II

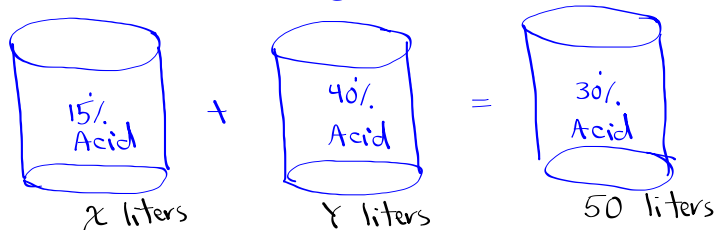
Monday

Due Monday

SG 11

## Mixture Problems

I need 50 liters of 30% acid solution.  
I have unlimited supply of 15% acid and 40% acid. How many liters of each?



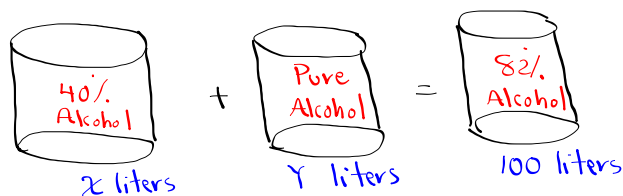
$$\begin{cases} x + y = 50 \\ 100 \cdot .15x + .40y = .30(50) \end{cases} \Rightarrow \begin{cases} x + y = 50 \\ \div 5 \quad 15x + 40y = 30(50) \end{cases}$$

$$-3 \begin{cases} x + y = 50 \\ 3x + 8y = 300 \end{cases} \Rightarrow \begin{cases} -3x - 3y = -150 \\ 3x + 8y = 300 \end{cases}$$

$$\begin{array}{r} 5y = 150 \\ \boxed{y = 30} \\ \boxed{x = 20} \end{array}$$

20 L of 15%  
30 L of 40%

I need 100 liters of 82% alcohol solution.  
I have unlimited supply of 40% alcohol and Pure alcohol soln. How many liters of each?



$$\begin{cases} x + y = 100 \\ 40\% \cdot x + 100\% \cdot y = 82\% \cdot (100) \end{cases} \Rightarrow \begin{cases} x + y = 100 \\ -4x + 1y = 82 \end{cases}$$

$$-1 \begin{cases} x + y = 100 \\ -4x + y = 82 \end{cases} \Rightarrow \begin{cases} x + y = 100 \\ -4x - y = -82 \end{cases}$$

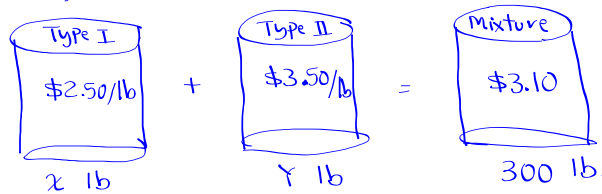
30 L of 40% alcohol  
70 L of Pure alcohol

$$\begin{array}{r} .6x = 18 \\ x = \frac{18}{.6} \\ x = 30 \end{array}$$

Candy store has two types of Candy mix.

Type I: \$2.50/lb. Type II: \$3.50/lb.

I need 300 lb at \$3.10/lb. How do I obtain this?



$$\begin{cases} x + y = 300 \\ 2.50x + 3.50y = 3.10(300) \end{cases} \Rightarrow \begin{cases} x + y = 300 \\ 2.5x + 3.5y = 3.1(300) \end{cases}$$

$$\Rightarrow \begin{cases} x + y = 300 \\ 2.5x + 3.5y = 3.1(300) \end{cases} \xrightarrow{-5} \begin{cases} x + y = 300 \\ 5x + 7y = 31(60) \end{cases}$$

$$\begin{cases} -5x - 5y = -1500 \\ 5x + 7y = 1860 \end{cases}$$


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$$2y = 360$$

$$y = 180$$

180 lb of \$3.50/lb.  
and  
120 lb of \$2.50/lb.