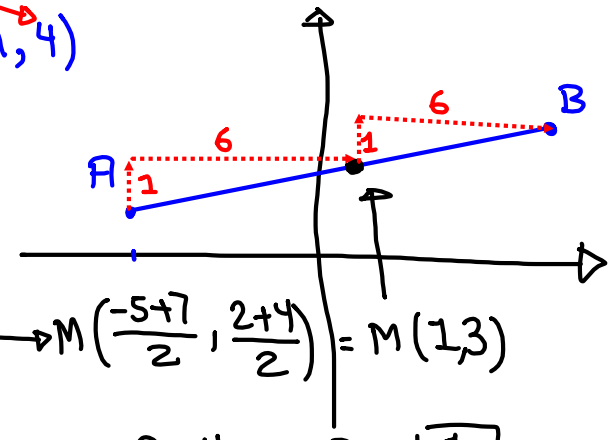
Math 115

Summer 2017

Lecture 9

$A(-5,2)$, $B(7,4)$

① Draw $\overline{AB}$



② Find M

$$M\left(\frac{-5+7}{2}, \frac{2+4}{2}\right) = M(1,3)$$

③ Find m

$$m = \frac{2-4}{-5-7} = \frac{-2}{-12} = \boxed{\frac{1}{6}}$$

④ Find d

$$d = \sqrt{(-5-7)^2 + (2-4)^2}$$

$$= \sqrt{(-12)^2 + (-2)^2} = \sqrt{148}$$

$$\approx \boxed{12.1}$$

$A(-3, 5)$, $B(0, 1)$ ← Y-Int

① Find $M\left(\frac{-3+0}{2}, \frac{5+1}{2}\right)$

$= M(-1.5, 3)$

② Find $m = \frac{1-5}{0-(-3)} = \frac{-4}{3}$

③ Find $d = \sqrt{(-3-0)^2 + (5-1)^2}$

$= \sqrt{25}$

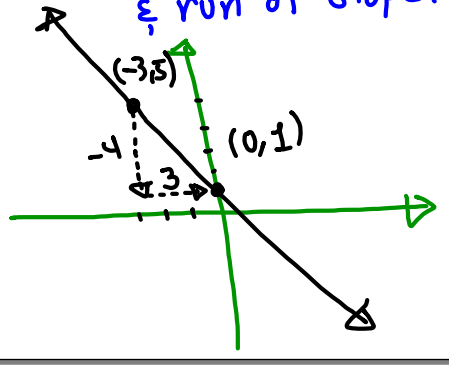
$= 5$

④ Find eqn of the line $\overleftrightarrow{AB}$.

$y = mx + b$

$y = \frac{-4}{3}x + 1$

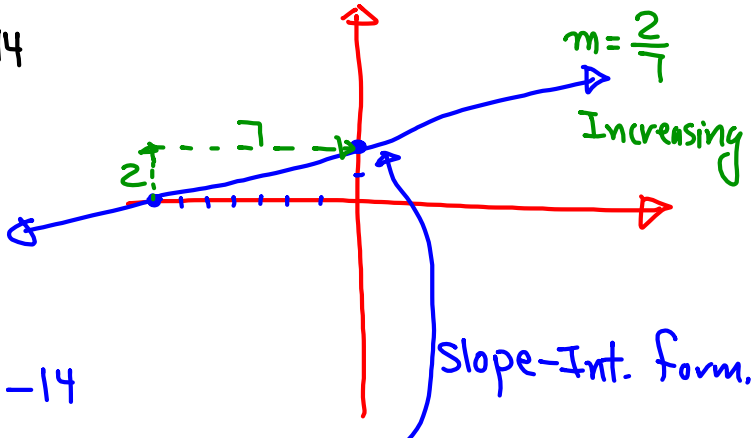
⑤ Draw, show rise & run of slope.



Graph using the intercept method:

$2x - 7y = -14$

x	y
0	2
-7	0



$-7y = -2x - 14$

$y = \frac{-2}{-7}x - \frac{14}{-7}$

$y = \frac{2}{7}x + 2$

Slope-Int. form.

Graph using slope-Int form.

$2x - 3y = 9$

Standard form

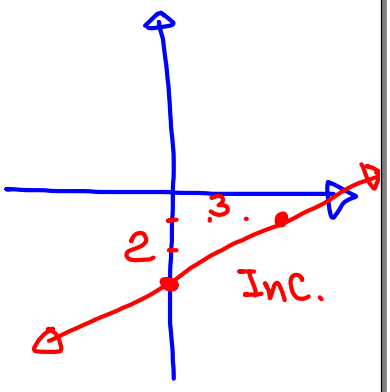
$-3y = -2x + 9$

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

$y = mx + b$

$m = \frac{2}{3}$

Y-Int $(0, -3)$



Graph using slope-Int. form

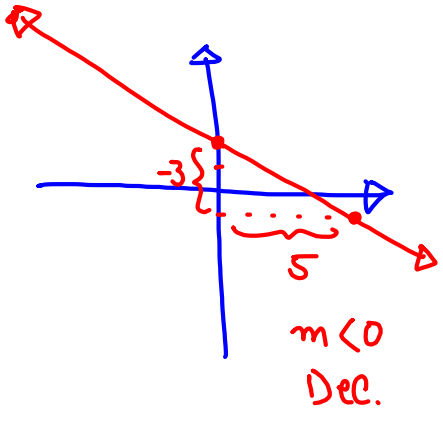
$3x + 5y = 10.$

$5y = -3x + 10$

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

$m = \frac{-3}{5}$

Y-Int $(0, 2)$



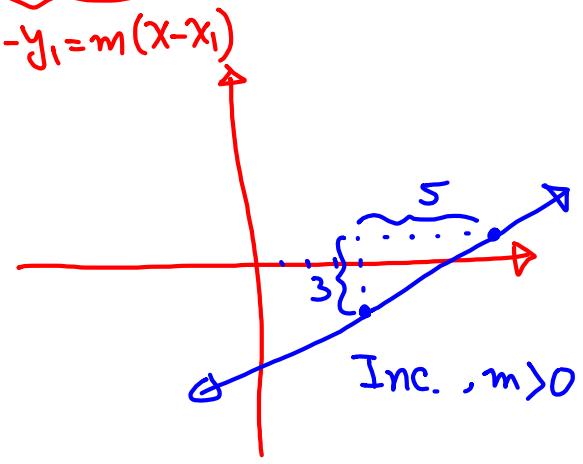
Graph using Point-Slope form.

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

$y + 2 = \frac{3}{5}(x - 4)$

Point $(4, -2)$

Slope $\frac{3}{5}$



Graph using Point-slope. $y - y_1 = m(x - x_1)$

$y - 3 = \frac{-3}{7}(x + 4)$

Point $(-4, 3)$

$m = \frac{-3}{7}$

write the eqn in slope-Int. form.

$y - 3 = \frac{-3}{7}(x + 4)$

LCD = 7

$7y - 21 = -3(x + 4)$

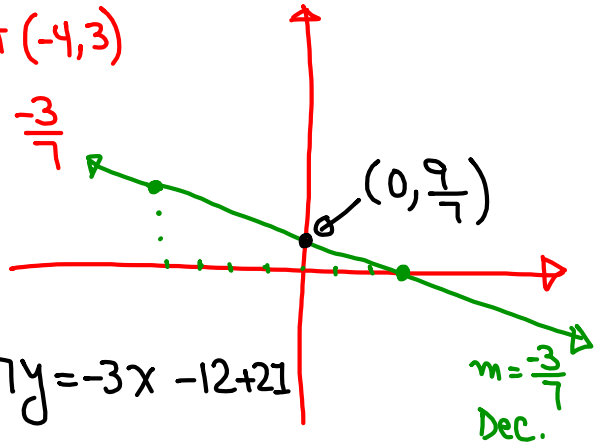
$7y - 21 = -3x - 12$

$7y = -3x - 12 + 21$

$7y = -3x + 9$

Isolate Y

$y = \frac{-3}{7}x + \frac{9}{7}$

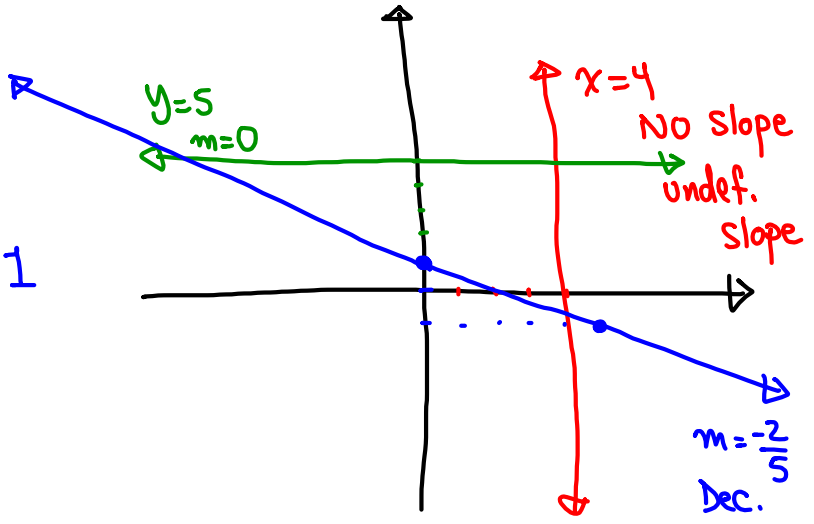


$m = \frac{-3}{7}$

Y-Int $(0, \frac{9}{7})$

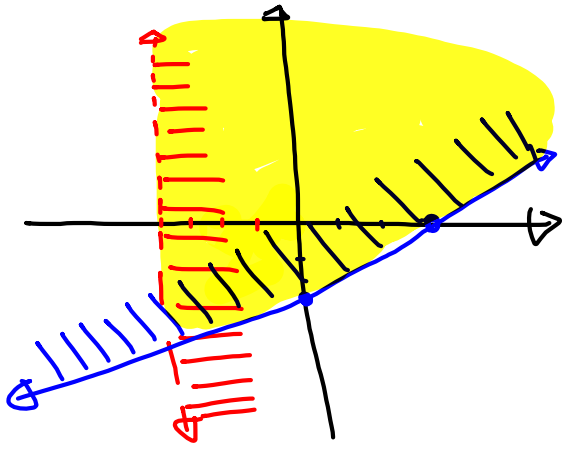
Graph

$$\begin{cases} x = 4 \\ y = 5 \\ y = \frac{-2}{5}x + 1 \end{cases}$$



Graph & Shade:

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



Graph & Shade

$$\begin{cases} y \le 3 \\ 2x - 3y < 6 \\ y > \frac{-3}{4}x - 2 \end{cases}$$

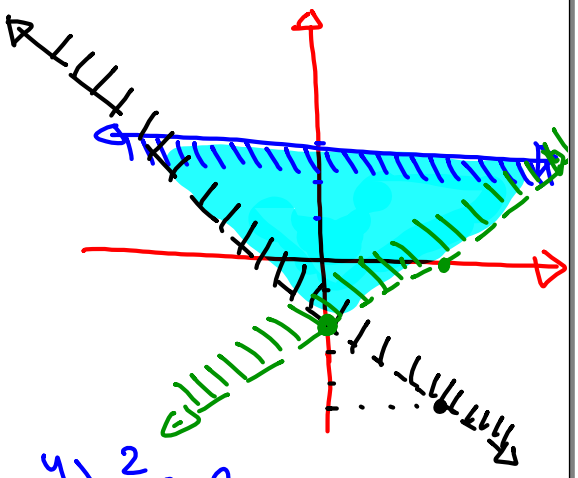
Hint: change 2nd line to Slope-Int. form.

$2x - 3y < 6$

$-3y < -2x + 6$

$\frac{-3}{-3}y > \frac{-2}{-3}x + \frac{6}{-3}$

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



$\frac{2}{3} \cdot \frac{-3}{4} = \frac{-1}{2} \neq -1$

Find the equation of a line that contains $(-4, 1)$ with slope 2.

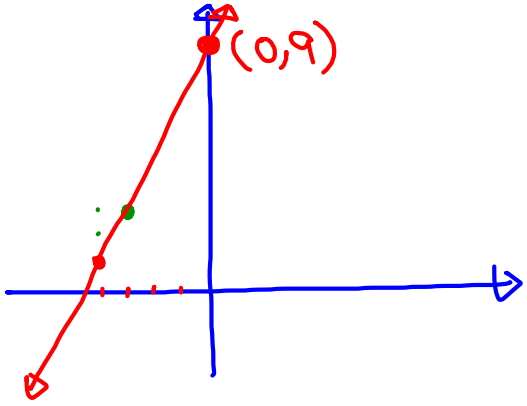
Graph, show rise & run.

mark important points on the graph.

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

$y - 1 = 2(x - -4)$

$\boxed{y = 2x + 9}$



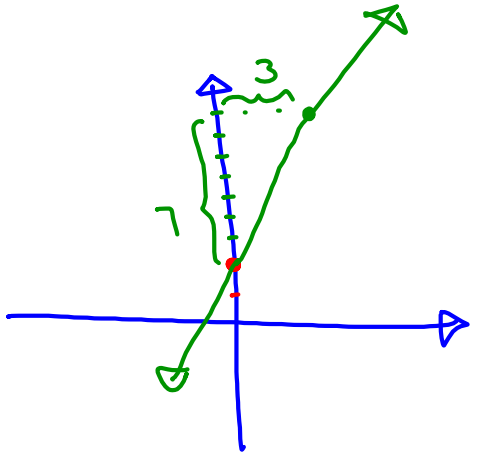
Find eqn of a line that contains $(-3,-5)$ and $(0,2)$. Ans in Slope-Int. form. Graph, show rise & run.

$$m = \frac{-5-2}{-3-0} = \frac{-7}{-3} = \boxed{\frac{7}{3}}$$

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

$$y - 2 = \frac{7}{3}(x - 0)$$

$$\rightarrow y = \frac{7}{3}x + 2$$



Find eqn of a line that contains $(2,-3)$ and is parallel to the line $2x - 3y = -6$. Ans in Slope-Int form. Graph both lines.

$(2,-3)$, $m = \frac{2}{3}$

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

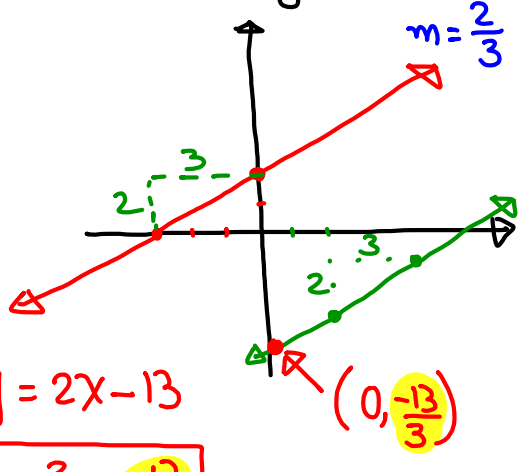
$$y + 3 = \frac{2}{3}(x - 2)$$

$$3y + 9 = 2(x - 2)$$

$$3y + 9 = 2x - 4$$

$$\rightarrow 3y = 2x - 13$$

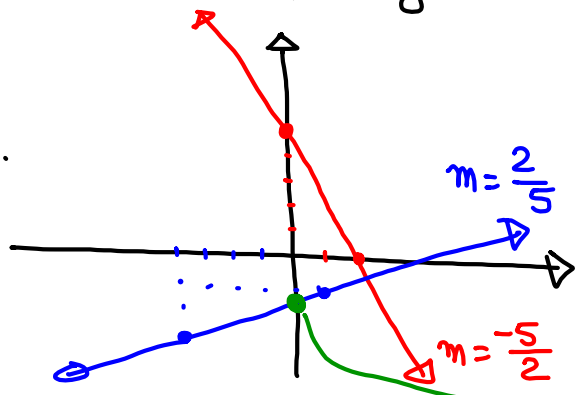
$$\boxed{y = \frac{2}{3}x - \frac{13}{3}}$$



Find eqn of a line that contains $(-4,-3)$ and is perpendicular to the line $5x+2y=10$.

Graph both lines.

Ans. in slope-Int form.



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

$y--3=\frac{2}{5}(x--4)$

$y+3=\frac{2}{5}(x+4)$

LCD = 5

$5y+15=2(x+4)$

$5y+15=2x+8$

$5y=2x-7$

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

$\frac{2}{5}\cdot\frac{-5}{2}=\frac{-10}{10}=-1$

$(0,\frac{-7}{5})$

Find eqn of a line that contains $(5,-2)$ and

1) Zero Slope

H.L. $y=-2$

2) No slope

V.L. $x=5$

3) undefined Slope

V.L. $x=5$

4) Slope $\frac{2}{5}$.

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

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

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

$y+2=\frac{2}{5}x-2$

$y=\frac{2}{5}x-4$

Find eqn of a line that contains $(-4,3)$ and

1) $(5,3)$ $\boxed{y=3}$

$m=\frac{3-3}{5-(-4)}=0$

2) $(-4,-7)$ $\boxed{x=-4}$

$m=\frac{-7-3}{-4-(-4)}=\phi$

3) $(0,0)$

$m=\frac{3-0}{-4-0}=\frac{-3}{4}$ ← b

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

4) Parallel to $y=2x-4$

$y-3=2(x-(-4))$

$\boxed{y=2x+11}$

5) Perpendicular to $y=-\frac{2}{3}x+1$

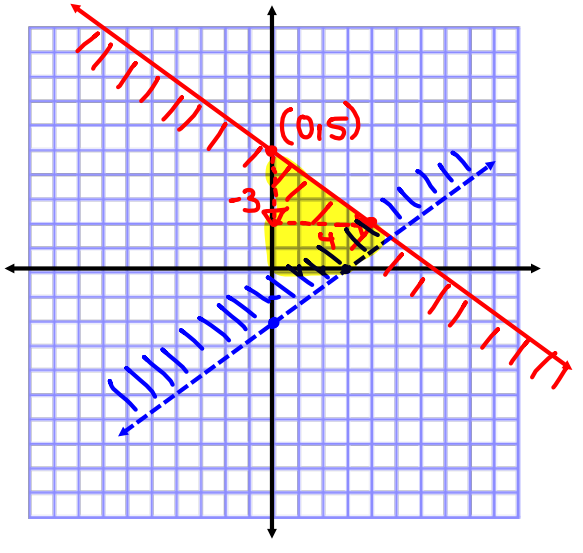
$y-3=\frac{3}{2}(x+4)$

$y-3=\frac{3}{2}x+6$

$\boxed{y=\frac{3}{2}x+9}$

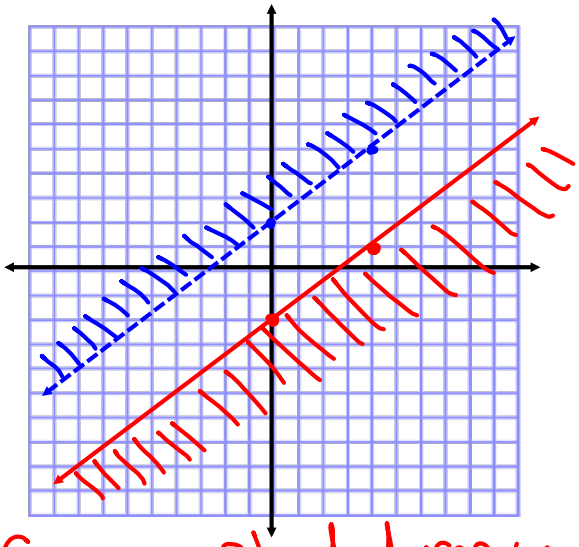
Graph & Shade

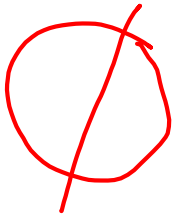
$$\begin{cases} y \le \frac{-3}{4}x+5 \\ y > \frac{2}{3}x-2 \\ x \ge 0 \\ y \ge 0 \end{cases} \text{QI}$$



Graph & Shade the Solution

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





No Common shaded region.

Ch. 8

Is $(-2,-4)$ a Solution of $\begin{cases} 2x-3y=8 \\ x-2y=6 \end{cases}$?

Checking $2x-3y=8$:

$2(-2)-3(-4)=8$

$-4+12=8$

$8=8$ ✓

Checking $x-2y=6$:

$-2-2(-4)=6$

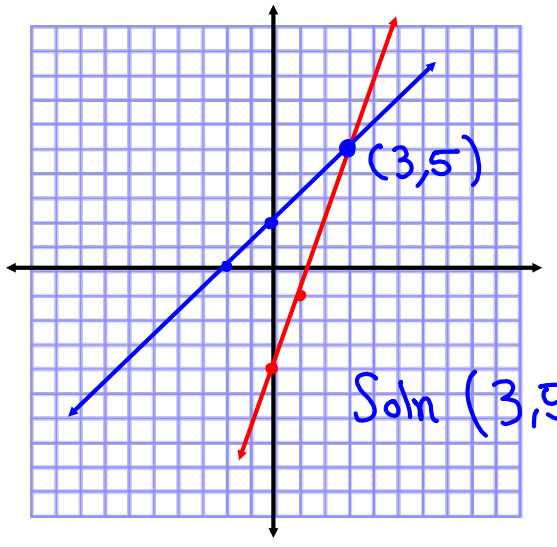
$-2+8=6$

$6=6$ ✓

Yes, $(-2,-4)$ is a Solution.

Solve by Graphing method

$\begin{cases} y = 3x - 4 \checkmark \\ x - y = -2 \checkmark \end{cases}$



Soln (3,5)

Check $5 = 3(3) - 4$

$5 = 9 - 4$

$5 = 5$

$3 - 5 = -2$

$-2 = -2$

Solve by Subs.

$\begin{cases} 5y - 7x = 18 \\ y = 2x + 3 \end{cases}$

$\Rightarrow 5(2x+3) - 7x = 18$

$10x + 15 - 7x = 18$

$3x = 18 - 15$

$3x = 3$ $\boxed{x = 1}$

$y = 2(1) + 3$

$\boxed{y = 5}$

$(1, 5)$

Solve by addition/elimination method:

$$-5\begin{cases} x + 4y = 14 \\ 5x + 3y = 2 \end{cases} \Rightarrow \begin{cases} -5x - 20y = -70 \\ 5x + 3y = 2 \end{cases}$$

$$-17y = -68$$

$$\boxed{y = 4}$$

$$x + 4(4) = 14$$

$$\boxed{x = -2}$$

$$(-2, 4)$$

The sum of two numbers is 7, their difference is 3. Use system of linear eqns in two variables to find them.

$$\begin{cases} x + y = 7 \\ x - y = 3 \end{cases}$$

$$2x = 10$$

$$\boxed{x = 5}$$

$$5 + y = 7$$

$$\boxed{y = 2}$$

the two numbers are 5 & 2.

Perimeter of a rectangular garden is 36 m. the length is 3 m longer than twice its width. Use system of linear eqns in two variables to find its dimensions.

$P = 36$

$$\begin{cases} 2L + 2W = 36 \\ L = 2W + 3 \end{cases}$$

use Subs. method

$2(2W+3) + 2W = 36$

$4W + 6 + 2W = 36$

$W = 5$

$L = 2(5) + 3$

$L = 13$

5m by 13m.

A first number plus twice a second number is 8.

Twice the first number plus the second number totals 25.

Find both numbers.

F → First #

S → Second #

$$\begin{cases} F + 2S = 8 \\ 2F + S = 25 \end{cases}$$

$$-2\begin{cases} F + 2S = 8 \\ 2F + S = 25 \end{cases} \Rightarrow \begin{cases} -2F - 4S = -16 \\ 2F + S = 25 \end{cases}$$

$-3S = 9 \Rightarrow S = -3$

$F + 2(-3) = 8$

$F = 14$

14 & -3

John purchased 40 Stamps. He paid $14.85. Stamps were of two kinds, 24¢ Stamps and 39¢ Stamps. use System of linear eqns in two variables to find # of each Stamps purchased.

$x \to$ # of 24¢ Stamps

$y \to$ # of 39¢ Stamps

$$\begin{cases} x + y = 40 \\ .24x + .39y = 14.85 \end{cases} \quad \begin{cases} x + y = 40 \\ 24x + 39y = 1485 \end{cases}$$

$$\begin{cases} x + y = 40 \\ 24x + 39y = 1485 \end{cases} \Rightarrow \begin{cases} -24x - 24y = -960 \\ 24x + 39y = 1485 \end{cases}$$

$$15y = 525$$

$$y = 35$$

35 Stamps @ 39¢ each

&

5 Stamps @ 24¢ each

In his first NBA game, Lonzo Ball had 20 pts, no free throws, he made 9 shots. How many 3-ptrs did he make?

$x \to$ # of 2-ptrs
$y \to$ # of 3-ptrs

$$\xrightarrow{-2} \begin{cases} x + y = 9 \\ 2x + 3y = 20 \end{cases}$$

$$\begin{cases} -2x - 2y = -18 \\ 2x + 3y = 20 \end{cases}$$

$$y = 2$$

He made 2 3-ptrs.

John served 40 drinks in his shift.
Small drink $\Rightarrow$ \$4, Large drink $\Rightarrow$ \$6
He collected \$206 in total.
How many small drinks did he serve?

$S \to$ Small, $L \to$ Large

$$\xrightarrow{-6} \begin{cases} S + L = 40 \\ 4S + 6L = 206 \end{cases}$$

$$\begin{cases} -6S - 6L = -240 \\ 4S + 6L = 206 \end{cases}$$

$$-2S = -34 \Rightarrow S = 17$$

17 Small drinks

Two angles are Complementary.

One of them is 10° more than three times the other one.

Find both angles using System of linear eqns in two Variables.

$$\begin{cases} x + y = 90 \\ x = 3y + 10 \end{cases}$$

$3y + 10 + y = 90$

$4y = 80$

$y = 20$

$x = 70$

{20° & 70°}

Two angles are Supplementary.

One of them is 20° less than 4 times the other one.

Find both angles.

You must use system of linear equations in two Variables to get any credit.

$$\begin{cases} x + y = 180 \\ y = 4x - 20 \end{cases}$$

$x + 4x - 20 = 180$

$5x = 200$

$x = 40$

{40° & 140°}

Class QZ

① Solve by graphing: $\begin{cases} x+y=3 \\ x-y=-1 \end{cases}$

② Solve by Sub.: $\begin{cases} x+y=6 \\ y=-x-4 \end{cases}$

③ Solve by addition/elimination: $\begin{cases} 6x-3y=-15 \\ 4x-2y=-10 \end{cases}$