

Math 115
Spring 2018
Lecture 14

$$\begin{array}{c} ? a^2 + b^2 = c^2 ? \\ y = mx + b \quad ? \quad d = rt \end{array}$$

Some Review:

① Is $(-4, 1)$ a solution of $\begin{cases} x - 3y = -7 \\ 2x + 9y = 1 \end{cases}$ ✓ ?

$$-4 - 3(1) = -7$$

$$-4 - 3 = -7$$

$$-7 = -7 \checkmark$$

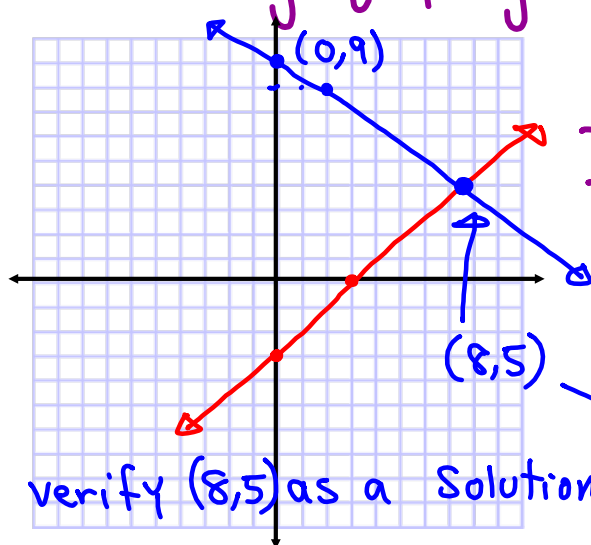
$$2(-4) + 9(1) = 1$$

$$-8 + 9 = 1$$

$$1 = 1 \checkmark$$

Yes, $(-4, 1)$
is a Soln.

② Solve by graphing method: $\begin{cases} x-y=3 \\ x+2y=18 \end{cases}$



x	y
0	-3
3	0

$$2y = -x + 18$$

$$y = -\frac{1}{2}x + 9$$

$$m = -\frac{1}{2}$$

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

verify (8,5) as a solution.

Soln is $\{(8,5)\}$

$$x-y=3 \checkmark$$

$$x+2y=18 \checkmark$$

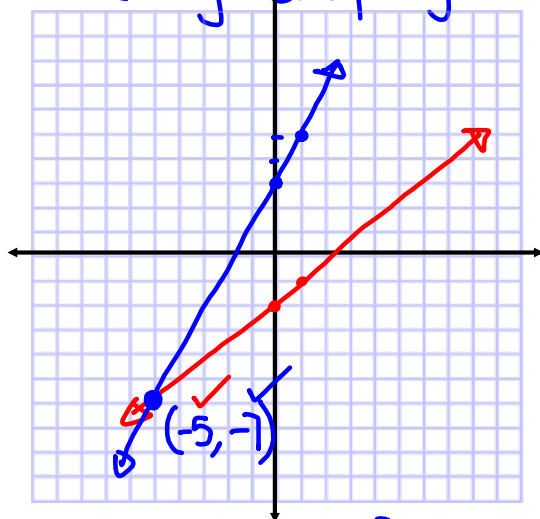
$$\begin{aligned} 8-5 &= 3 \\ 3 &= 3 \checkmark \end{aligned}$$

$$8+2(5)=18$$

$$8+10=18$$

$$18=18 \checkmark$$

③ Solve by Graphing: $\begin{cases} y=x-2 \\ y=2x+3 \end{cases}$



$$y = x - 2$$

$$m=1, Y\text{-Int } (0,-2)$$

$$y = 2x + 3$$

$$m=2, Y\text{-Int } (0,3)$$

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

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

$$2x + 3 = x - 2$$

$$2x - x = -2 - 3$$

$$\boxed{x = -5}$$

$$\begin{aligned} \text{Soln} \\ (-5,-7) \end{aligned}$$

$$\text{or } \{(-5,-7)\}$$

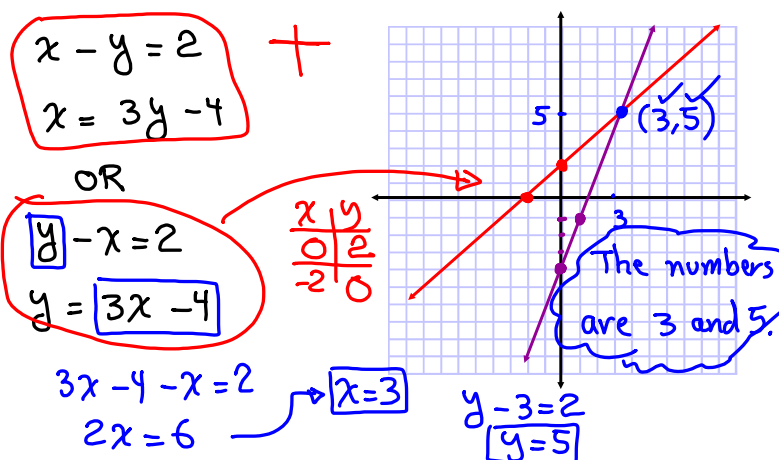
$$y = -5 - 2$$

$$\boxed{y = -7}$$

The difference of two numbers is 2.

The larger one is equal to 4 less than 3 times the smaller one.

Use system of linear equations to find both numbers. Use graphing method.



Solve by Subs. Method: $\begin{cases} 2x - y = 9 \\ x = y + 1 \end{cases}$

$$2(y + 1) - y = 9$$

$$2y + 2 - y = 9$$

$$y = 7$$

$$x = 7 + 1$$

$$x = 8$$

Final Ans
(8, 7)

Solve by Subs.:

Hint: Isolate one of the variables.

$$\begin{cases} 5x + 3y = -9 \\ -2x + y = 8 \end{cases}$$

$$\Rightarrow y = 2x + 8$$

$$5x + 3(2x + 8) = -9$$

$$5x + 6x + 24 = -9$$

$$11x = -33$$

$$x = -3$$

$$y = 2(-3) + 8$$

$$y = 2$$

$$(-3, 2)$$

Solve by Subs. method:

$$\begin{cases} 7x - 3y = -14 \\ -3x + y = 6 \end{cases}$$

$$\Rightarrow y = 6 + 3x$$

$$7x - 3(6 + 3x) = -14$$

$$y = 6 + 3(-2)$$

$$7x - 18 - 9x = -14$$

$$y = 0$$

$$-2x = 4$$

$$x = -2$$

$$(-2, 0)$$

The perimeter of a rectangular shape is 44 ft.

The length is 1 ft longer than twice its width.

① Draw & label clearly such rectangle using two variables.

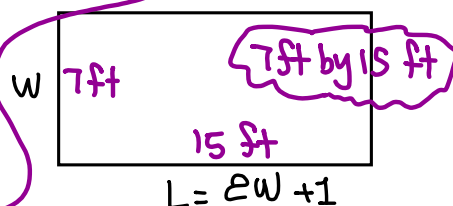
② Use the system of linear equation to find its dimensions.

$$\begin{cases} 2L + 2W = 44 \\ L = 2W + 1 \end{cases}$$

$$L = 2W + 1$$

$$2(2W + 1) + 2W = 44$$

$$4W + 2 + 2W = 44$$



The sum of two angles is 80° .

twice one of them increased by 3 times the other one is 215° .

use Subs. method to solve system of linear equations in two variable in order to find these two angles.

$$\begin{cases} x + y = 80 \\ 2x + 3y = 215 \end{cases}$$

$$y = 80 - x$$

$$2x + 3(80 - x) = 215$$

$$2x + 240 - 3x = 215$$

$$-x = 215 - 240$$

$$-x = -25$$

$$x = 25$$

$$y = 80 - 25$$

$$y = 55$$

25° & 55°

use addition/elimination method to Solve

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

$$\begin{cases} x + y = 8 \end{cases}$$

$$\hline 2x = 10$$

$$\boxed{x=5}$$

$$5 + y = 8$$

$$\boxed{y=3}$$

$$(5, 3)$$

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

Eliminate x

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

$$\begin{cases} -2x + 6y = -10 \end{cases}$$

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

$$0 = -13$$

false

$\Rightarrow$



Solve by Addition/Elimination method:

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

$$\begin{cases} -9x + 6y = -6 \end{cases}$$

$$\Rightarrow \begin{cases} 9x - 6y = 6 \\ -9x + 6y = -6 \end{cases}$$

$$0 = 0$$

True

Infinite number of Solutions

Do not say
 $\mathbb{R}$ or
all reals.

Solve by addition/elimination method:

$$\begin{array}{l}
 9 \left\{ \begin{array}{l} 3x + 4y = 13 \\ 5x - 9y = 6 \end{array} \right. \Rightarrow \left\{ \begin{array}{l} 27x + 36y = 117 \\ 20x - 36y = 24 \end{array} \right. \\
 \hline
 47x = 141 \\
 x = \frac{141}{47} \quad \boxed{x=3} \\
 \text{Final Ans} \\
 (3, 1)
 \end{array}$$

$3(3) + 4y = 13$
 $9 + 4y = 13$
 $4y = 4$ $\boxed{y=1}$

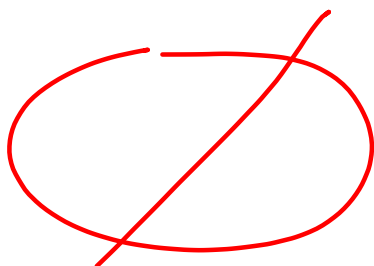
$$\begin{cases} \frac{3}{2}x + 4y = 1 \\ 9x + 24y = 5 \end{cases}$$

Hint: use LCD to clear fraction and then use elimination method to solve.

$$\begin{cases} 3x + 8y = 2 \\ 9x + 24y = 5 \end{cases}$$

$$\Rightarrow \left\{ \begin{array}{l} -9x - 24y = -6 \\ 9x + 24y = 5 \end{array} \right.$$

$$0 = -1 \\
 \text{false}$$



Solve by addition/elimination method:

$$10 \begin{cases} -2.5x - 6.5y = 47 \\ \end{cases}$$

$$10 \begin{cases} .5x - 4.5y = 37 \\ \end{cases}$$

Hint: Multiply
by Powers of 10
to remove
decimal point.

$$\begin{cases} -25x - 65y = 470 \\ \end{cases}$$

$$5 \begin{cases} 5x - 45y = 370 \\ \end{cases}$$

$$\begin{cases} \cancel{-25x} - 65y = 470 \\ \end{cases}$$

$$\begin{cases} \cancel{25x} - 225y = 1850 \\ \end{cases}$$

$$\rightarrow -290y = 2320$$

$$y = \frac{2320}{-290} = -8$$

$$\boxed{y = -8}$$

Final Ans

$$(2, -8)$$

$$5x - 45(-8) = 370$$

$$5x + 360 = 370$$

$$5x = 10 \quad \boxed{x = 2}$$

17 tkts was purchased.

Kids $\rightarrow$ \$5

Adults $\rightarrow$ \$10

Total cost $\rightarrow$ \$110

use system of linear eqns in two variables
to find # of kid's tkt.

12 Kid's ticket

$$\begin{cases} K + A = 17 \\ 5K + 10A = 110 \end{cases}$$

$$\begin{cases} \cancel{-10K} - \cancel{10A} = -170 \\ \end{cases}$$

$$\begin{cases} \cancel{5K} + \cancel{10A} = 110 \\ \end{cases}$$

$$-5K = -60$$

$$\boxed{K = 12}$$

Find the equation of a line with slope $\frac{2}{3}$ that contains $(0, -2)$.

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

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

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

Slope-Int form.

Find equation of a line that contains $(5, -3)$ and $(-1, -3)$.

$$m = \frac{-3 - (-3)}{5 - (-1)} = \frac{-3 + 3}{5 + 1} = \frac{0}{6} = 0$$

$$\text{Zero slope} \Rightarrow \text{H.L.} \Rightarrow y = b \Rightarrow \boxed{y = -3}$$

Find eqn of a line that contains $(-2, 7)$ and $(-2, -3)$.

$$m = \frac{7 - (-3)}{-2 - (-2)} = \frac{7 + 3}{-2 + 2} = \frac{10}{0} \text{ undefined}$$

$$\text{NO slope} \Rightarrow \text{V.L.} \Rightarrow x = a \Rightarrow \boxed{x = -2}$$

find equation of a line that contains
 $(6, 0)$ and $(0, -4)$.

$$m = \frac{0 - (-4)}{6 - 0} = \frac{4}{6} = \frac{2}{3}$$

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

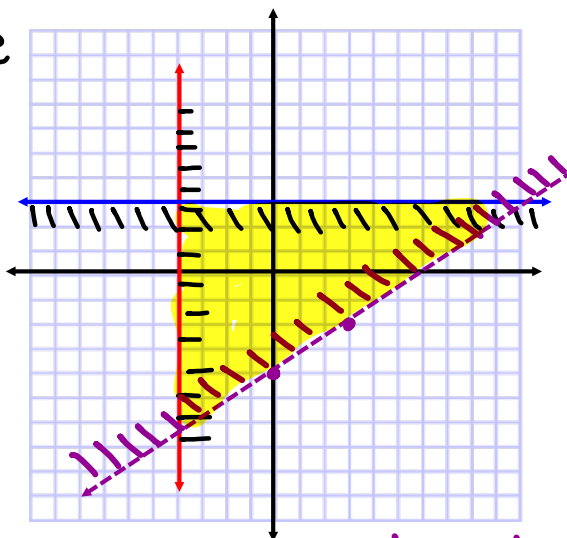
$$y - 0 = \frac{2}{3}(x - 6)$$

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

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

Graph & Shade

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



SG 10 & 11 due Wednesday.

Find 3 Consecutive integers such that the Sum of the first one, twice the second one and 3 times the third one is 134

$$x, x+1, x+2$$

first $\rightarrow x$

Second $\rightarrow x+1$

Third $\rightarrow x+2$

first + 2 · Second + 3 · Third = 134

$$x + 2(x+1) + 3(x+2) = 134$$

$$x + 2x + 2 + 3x + 6 = 134$$

$$6x + 8 = 134$$

$$6x = 126$$

$$x = 21$$

21, 22,
and 23

Three angles in triangle ABC are
3 Consecutive even integers.

find the largest angle.

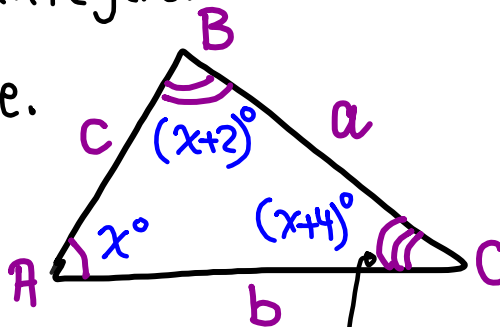
$$\boxed{A} + \boxed{B} + \boxed{C} = 180^\circ$$

$$\boxed{x} + \boxed{x+2} + \boxed{x+4} = 180$$

$$3x + 6 = 180$$

$$3x = 174$$

$$x = 58$$



Largest
Angle
 62°

Find two consecutive odd integers

Such that the difference of
3 times the first one and twice the
second one is equal to 35.

→ x & $x+2$

39 & 41

$$3 \cdot \text{first} - 2 \cdot \text{second} = 35$$

$$3x - 2(x+2) = 35$$

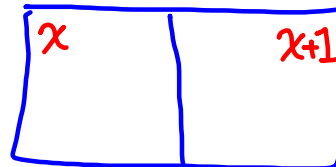
$$3x - 2x - 4 = 35$$

$$x = 39$$

The sum of page numbers on facing
Pages of a book is 155.

Find both page numbers.

First Page + Next Page = 155



$$x + x+1 = 155$$

$$2x = 154$$

$$x = 77$$

Page numbers
are 77 and 78.

54 people in a meeting.

Males & Females only.

The number of males & Females were two consecutive even integers.

There were more females. Males $\rightarrow x$

How many of each? Females $\rightarrow x+2$

$$\text{Males} + \text{Females} = 54$$

$$x + x + 2 = 54$$

$$2x = 52$$

$$\rightarrow x = 26$$

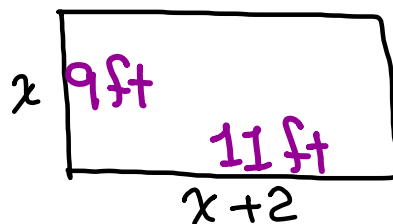
26 Males

28 Females

Dimensions of a rectangular room are two cons. odd integers.

Perimeter is 40 ft.

Find its area.



$$P = 40$$

$$2L + 2W = 40$$

$$2(x) + 2(x+2) = 40$$

$$2x + 2x + 4 = 40$$

$$4x = 36$$

$$\boxed{x = 9}$$

$$A = L W$$

$$= 11(9)$$

$$\boxed{A = 99 \text{ ft}^2}$$

Ch. 6
WP
due
Thursday