

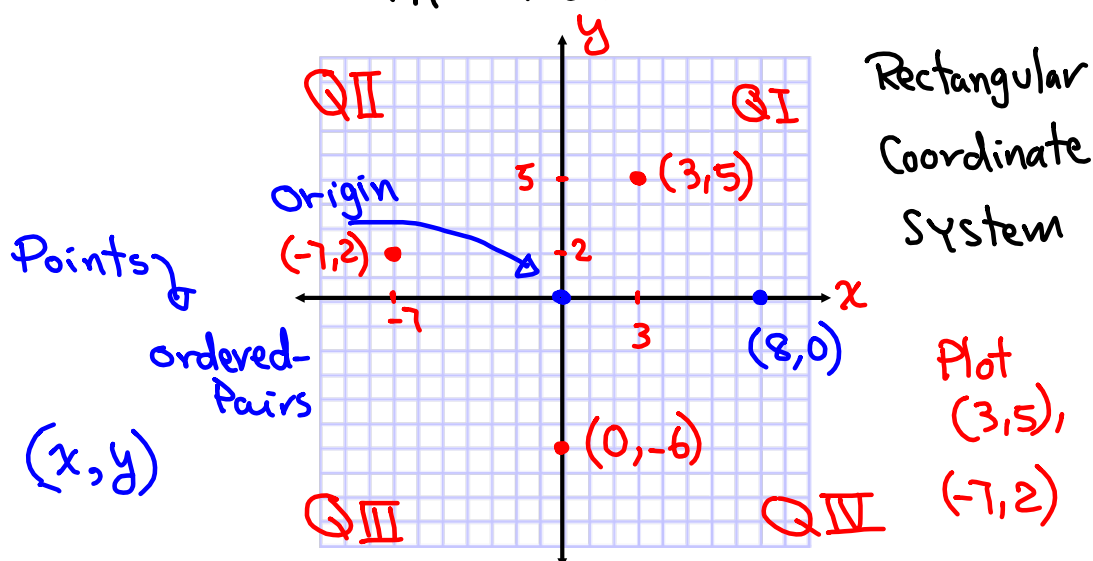
Math 115

Fall 2017

Lecture 9

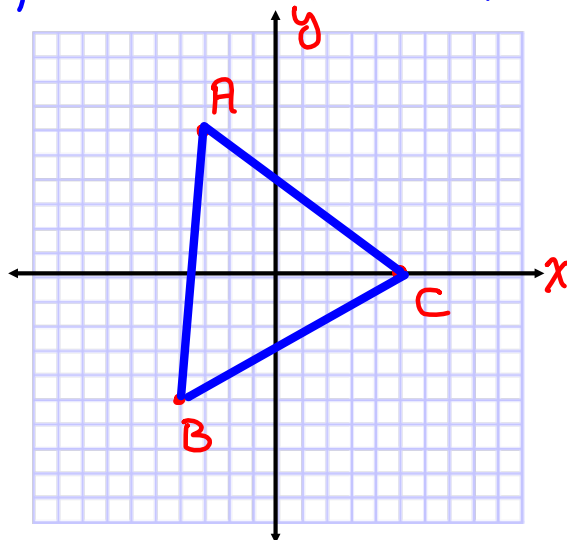


# Ch. 3 Graphing Linear Equations in two Variables



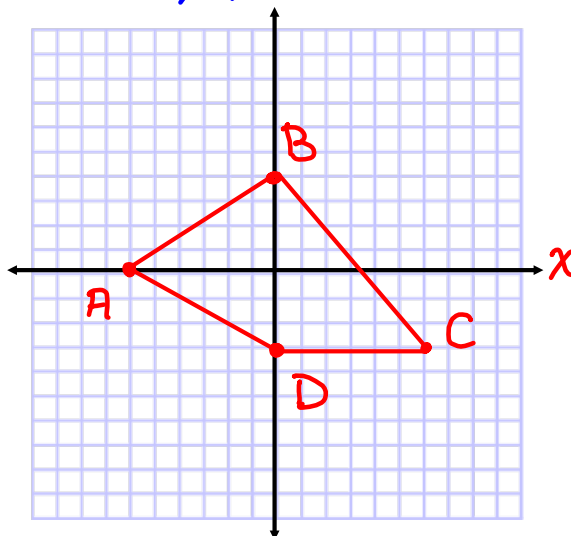
Draw triangle ABC where

$A(-3,6)$  ,  $B(-4,-5)$  ,  $C(5,0)$



Draw the polygon ABCD with  
 $A(-6,0)$  ,  $B(0,4)$  ,  $C(6,-3)$  , and  
 $D(0,-3)$ .

Ordered-Pair  
( $x, y$ )



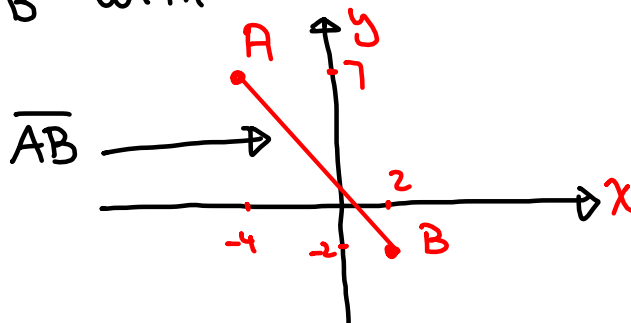
Line Segment  $\overline{AB}$

Straight line that connects A and B.

Line  $\overleftrightarrow{AB}$

Straight line that contains A and B.

Draw  $\overline{AB}$  with  $A(-4,7)$  &  $B(2,-2)$



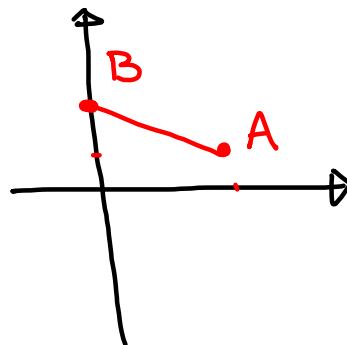
Distance between A and B.

$$d = \sqrt{(x_1 - x_2)^2 + (y_1 - y_2)^2}$$

$$A(5, 2), B(0, 4)$$

$$d = \sqrt{(5-0)^2 + (2-4)^2}$$

$$= \sqrt{5^2 + (-2)^2} = \sqrt{25 + 4} = \sqrt{29} \approx 5.4$$



A (-6, -2)    B (0, 6)

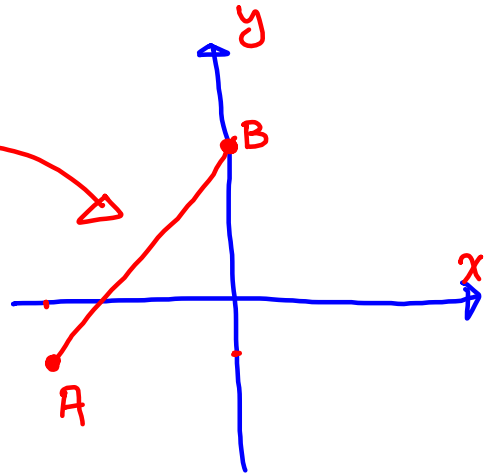
1) Draw  $\overline{AB}$

2) Find distance

$$d = \sqrt{(-6 - 0)^2 + (-2 - 6)^2}$$

$$= \sqrt{(-6)^2 + (-8)^2} = \sqrt{36 + 64} = \sqrt{100}$$

$$= \boxed{10}$$

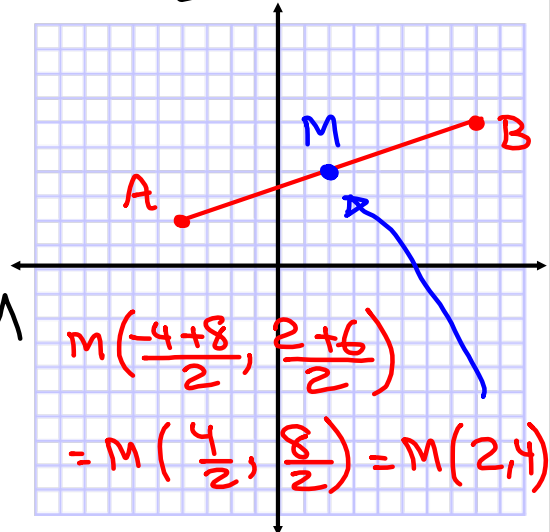


Midpoint  $M\left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$

A (-4, 2)    B (8, 6)

① Draw  $\overline{AB}$

② Find its midpoint M



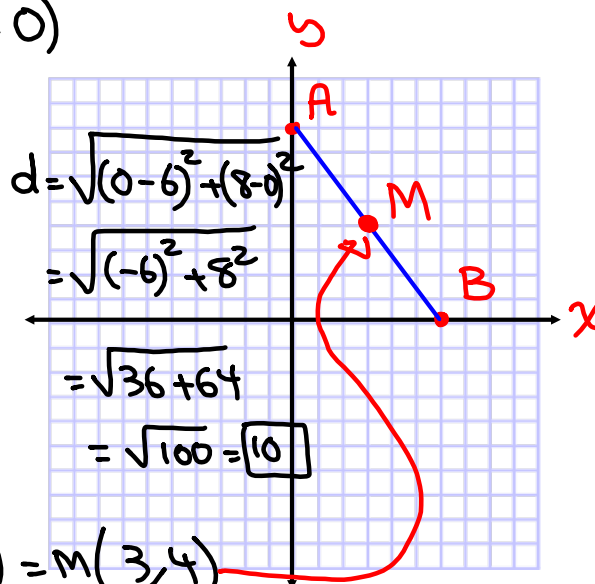
$A(0,8)$  ,  $B(6,0)$

1) Draw  $\overline{AB}$

2) Find distance

3) Find midpoint

$$M\left(\frac{0+6}{2}, \frac{8+0}{2}\right) = M(3,4)$$



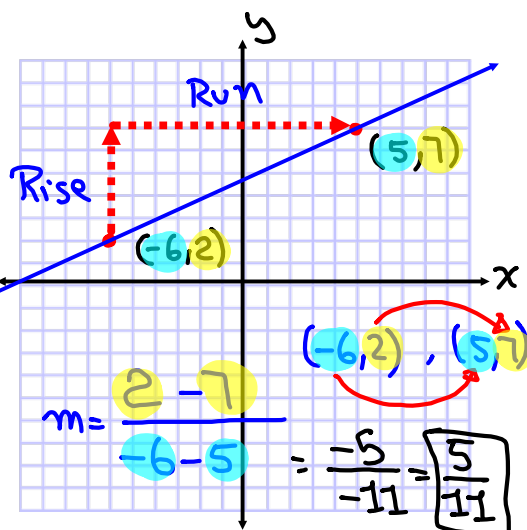
Slope of a line that contains A & B:

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

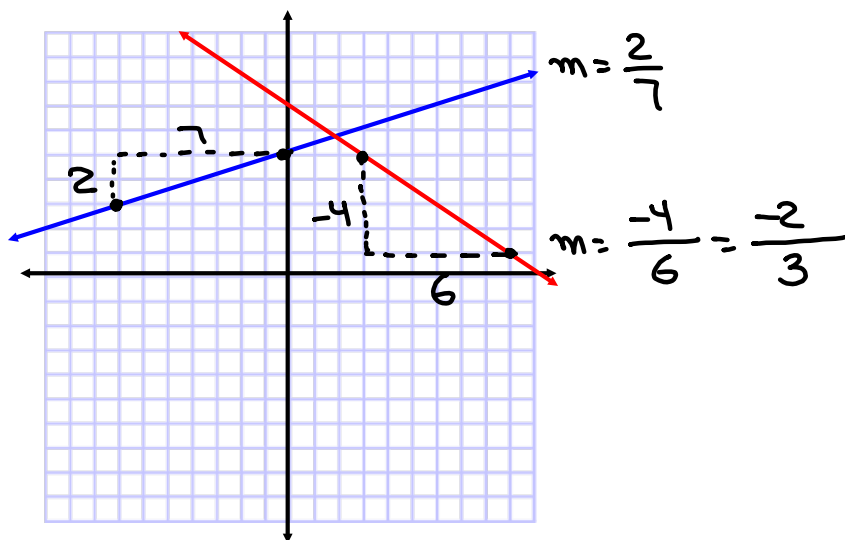
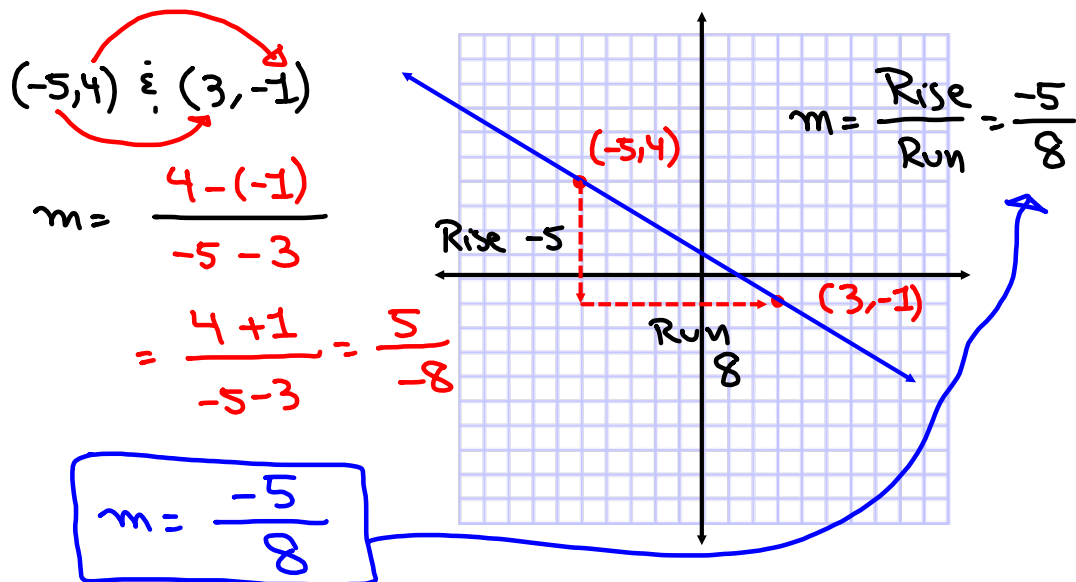
$$m = \frac{y_2 - y_1}{x_2 - x_1}$$

$$m = \frac{\text{Rise}}{\text{Run}}$$

$$m = \frac{5}{11}$$



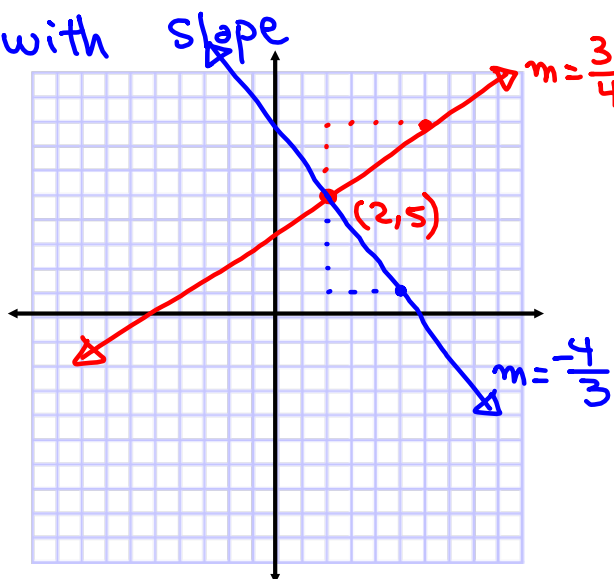
Draw a line that contains  $(-5, 4)$  and  $(3, -1)$   
 Show rise & run of its slope. Find its slope.



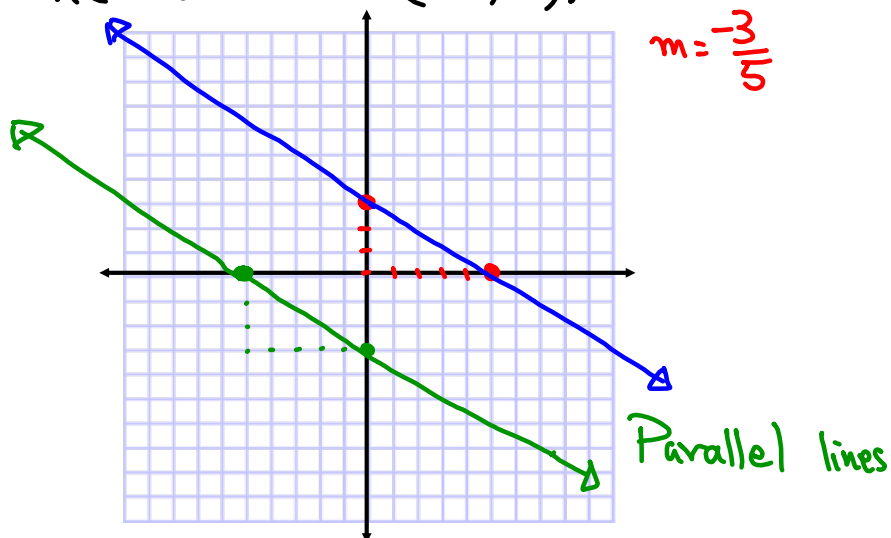
Plot the point  $(2,5)$ , and then draw a line from there with slope

a)  $\frac{3}{4} = \frac{\text{Rise}}{\text{Run}}$

b)  $-\frac{4}{3} = \frac{\text{Rise}}{\text{Run}}$



Draw two lines with same slope  $-\frac{3}{5}$   
Such that one contains  $(0,3)$ , and the other one contains  $(-5,0)$ .



Types of line :

1) Vertical

$$x=a$$



2) Horizontal

$$y=b$$

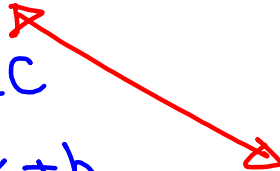


3) Slant

$$Ax + By = C$$

$$y = mx + b$$

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



Draw

$$x=4 \quad \text{;} \quad y=-3$$

Vertical

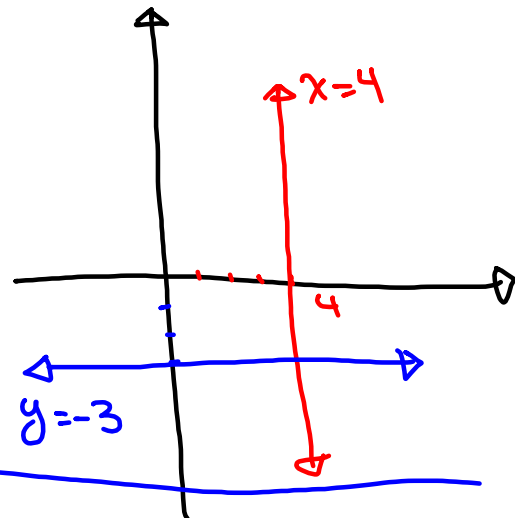
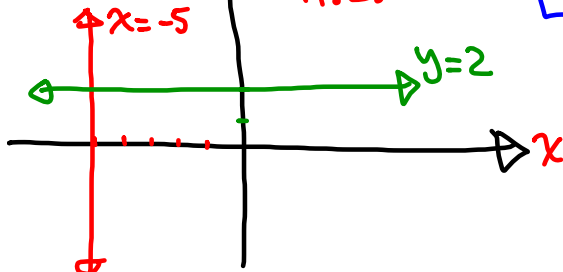
Horizontal

Draw

$$x=-5 \quad \text{;} \quad y=2$$

V.L.

H.L.





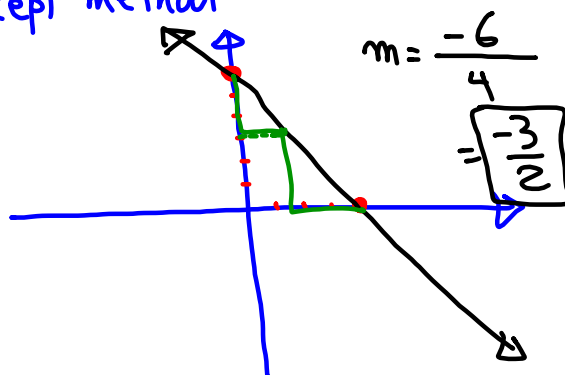
Slant line

1) Standard form  $Ax + By = C$

$$3x + 2y = 12$$

Graph by intercept method

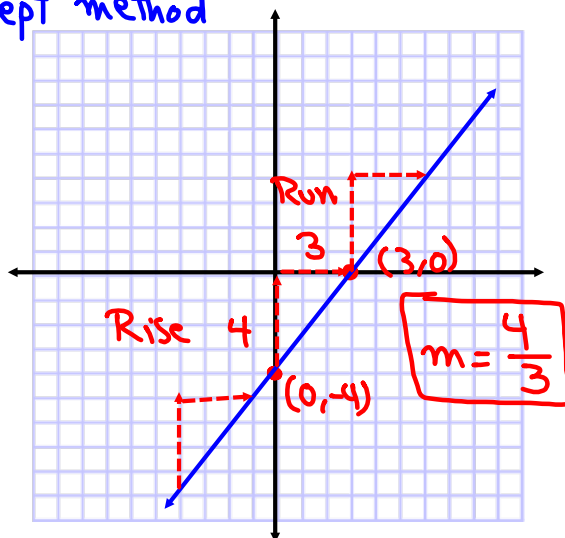
x	y
0	6
4	0



Graph by intercept method

$$4x - 3y = 12$$

x	y
0	-4
3	0

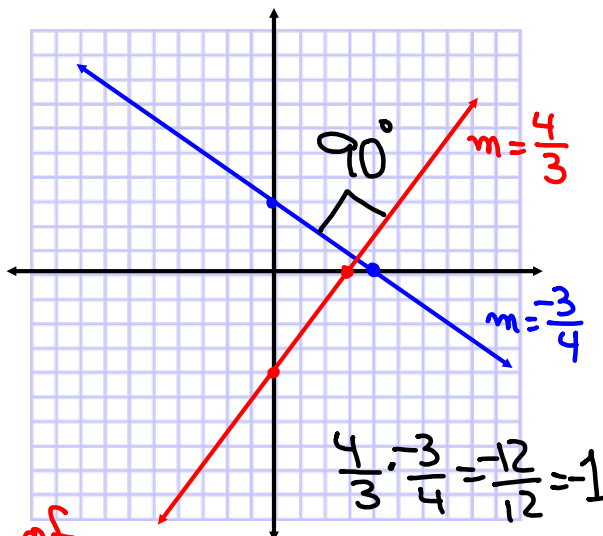


Draw these two lines in the same  
Coordinate System

$$\begin{cases} 3x + 4y = 12 \\ 4x - 3y = 12 \end{cases}$$

$$\begin{array}{c|c} x & y \\ \hline 0 & 3 \\ \hline 4 & 0 \end{array}$$

$$\begin{array}{c|c} x & y \\ \hline 0 & -4 \\ \hline 3 & 0 \end{array}$$



when the product of  
two slopes is  $-1$ , the slant lines are  
Perpendicular to each  
other.

A piece of wood is 71 inches long.

It is cut into 3 pieces.

Longest piece is 1 inch shorter than

3 times the shortest piece.

The other piece is twice the shortest piece.

Find all three pieces.

Shortest	Other Piece	Longest
$x$	$2x$	$3x - 1$

71 inches.

$$x + 2x + 3x - 1 = 71$$

$$6x = 72$$

$$x = 12$$

12 in, 24 in. and  
35 in.

Two sides of a triangle are equal  
 The third side is 7cm shorter than  
 the (Sum of equal sides) The perimeter is  
 33cm. Find all three sides.

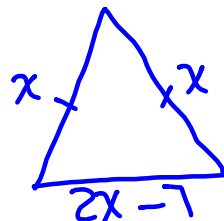
$$P = 33$$

$$x + x + 2x - 7 = 33$$

$$4x - 7 = 33$$

$$4x = 40$$

$$x = 10$$



10cm, 10cm, and 13cm.

Find three cons. integers such that  
 the Sum of twice the smallest and 3 times  
 the largest is equal to 86 more than  
 the middle integer.

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

$$2 \cdot \text{Smallest} + 3 \cdot \text{largest}$$

$$= x + 1 + 86$$

$$2x + 3(x+2) = x + 1 + 86$$

$$5x - x = 87$$

$$4x = 87$$

$$x = 20.25$$

$$2x + 3x + 6 = x + 87$$

$$5x + 6 = x + 87$$

No Solution

Not  
an integer

Find three cons. even integers such that the difference of 5 times the third one and 3 times the second one is equal to 86 reduced by the first one.

$x$  ,  $x+2$  ,  $x+4$       5 · Third - 3 · Second  
 First      Second      Third      = 86 - First

$$5(x+4) - 3(x+2) = 86 - x$$

$$5x + 20 - 3x - 6 = 86 - x$$

$$2x + 14 = 86 - x$$

$$2x + x = 86 - 14$$

$$3x = 72$$

$$x = 24$$

24, 26, 28

Find two cons. odd integers such that 3 times the smallest less largest is equal to 100.

$$x \text{ \& } x+2$$

$$3 \cdot \text{Smallest} - \text{largest} = 100$$

$$3 \cdot x - (x+2) = 100$$

$$3x - x - 2 = 100$$

$$2x = 102$$

$$x = 51$$

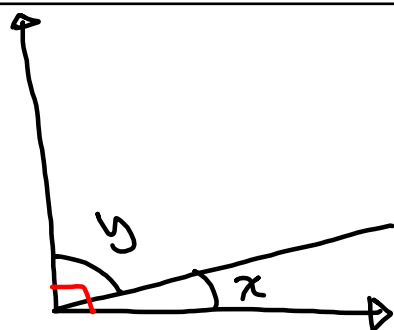
$$51 \text{ \& } 53$$

Nothing due tomorrow,  
work on SG7, SG8  
wp5, wp6

Complementary angles  $\Rightarrow$  Their sum  $= 90^\circ$   
 $x + y = 90^\circ$

Supplementary angles  $\Rightarrow$  Their sum  $= 180^\circ$   
 $x + y = 180^\circ$

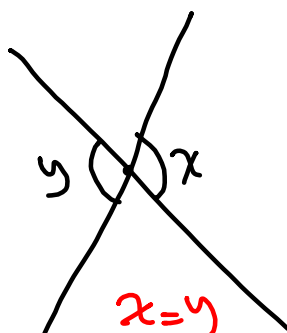
Vertical Angles  $\Rightarrow$  they are equal  $x = y$



$x + y = 90^\circ$   
Comp. angles.

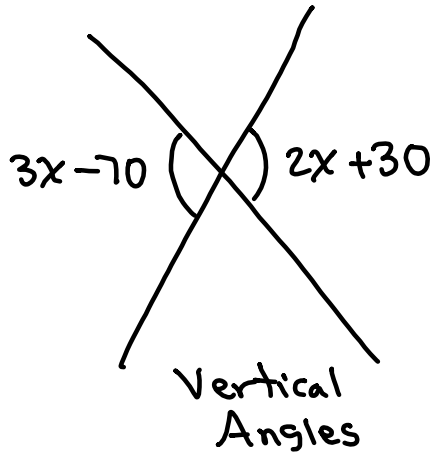


$x + y = 180^\circ$   
Suppl. angles



$x = y$

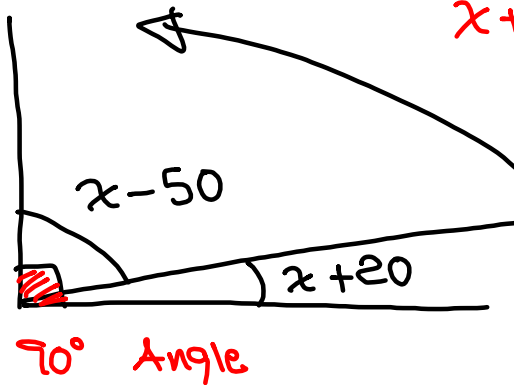
Vertical angles.

Find  $x$ 

$$3x - 70 = 2x + 30$$

$$3x - 2x = 30 + 70$$

$$x = 100$$

Find  $x$ :

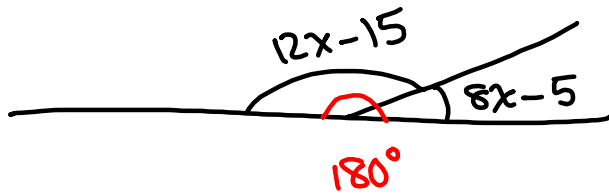
$$x + 20 + x - 50 = 90$$

$$2x - 30 = 90$$

$$2x = 120$$

$$x = 60$$

Find  $x$



$$12x - 15 + 8x - 5 = 180$$

$$20x - 20 = 180$$

$$20x = 200$$

$$x = 10$$