Math 115

Spring 2019

Lecture 12

$? \; a^2 + b^2 = c^2 \; ?$

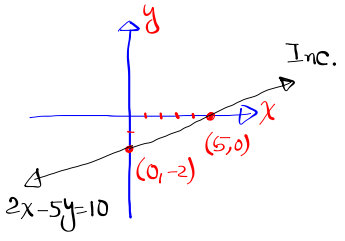
$y = mx + b \quad ? \quad d = rt$

Feb 19-8:47 AM

Class QZ

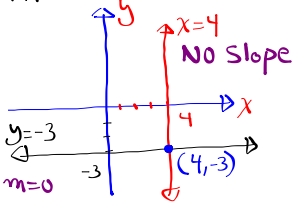
① Graph $2x - 5y = 10$

x	y
0	-2
5	0



② Graph $x=4$ and $y=-3$ in the Same Coordinate System.

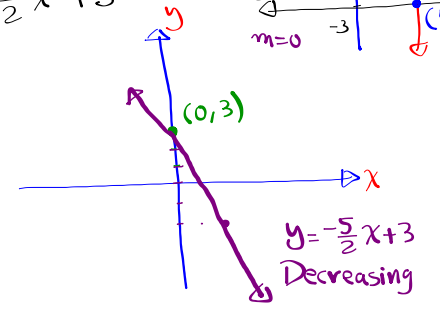
V.L. H.L.



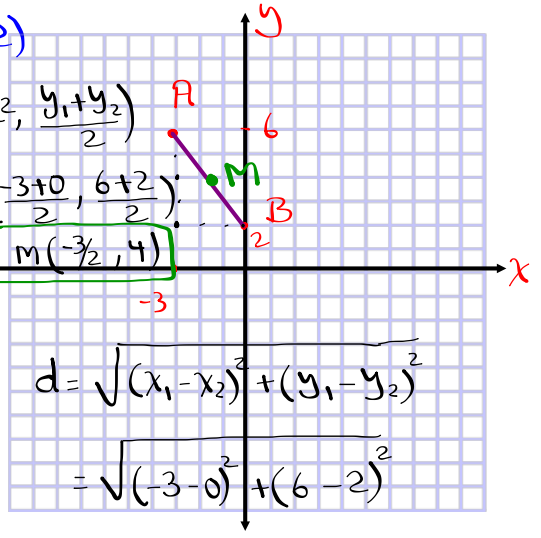
③ Graph $y = \frac{-5}{2}x + 3$

$m = \frac{-5}{2}$

Y-Int $(0,3)$



Given $A(-3,6)$, $B(0,2)$



① Draw $\overline{AB}$ ✓

② $d(A,B)$ ✓

③ Midpoint M of $\overline{AB}$ ✓

④ Slope m of $\overleftrightarrow{AB}$ ✓

⑤ Find eqn of $\overleftrightarrow{AB}$

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

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

$M\left(-\frac{3}{2}, 4\right)$

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

$= \sqrt{(-3-0)^2+(6-2)^2}$

$= \sqrt{(-3)^2+4^2} = \sqrt{9+16} = \sqrt{25} = \boxed{5}$

$m = \frac{y_1-y_2}{x_1-x_2} = \frac{6-2}{-3-0} = \frac{4}{-3} = \boxed{-\frac{4}{3}}$

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

$y - 2 = -\frac{4}{3}(x-0)$

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

Find the slope of the line that contain $A(-5,7)$ and

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

1) $B(3,7)$

$m = \frac{7-7}{-5-3} = \frac{0}{-8} = \boxed{0}$

2) $B(-5,-2)$

$m = \frac{7-(-2)}{-5-(-5)}$

$= \frac{7+2}{-5+5} = \frac{9}{0}$

No slope

undefined slope

3) $B(0,0)$

$m = \frac{7-0}{-5-0}$

$= \frac{7}{-5}$

$= \boxed{-\frac{7}{5}}$

4) $B(1,3)$

$m = \frac{7-3}{-5-1} = \frac{4}{-6}$

$= \boxed{-\frac{2}{3}}$

Write in Slope-Int. Form, then graph

① $2x - 7y = 14$

$-7y = -2x + 14$

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

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

$m = \frac{2}{7}$

Y-Int $(0,-2)$

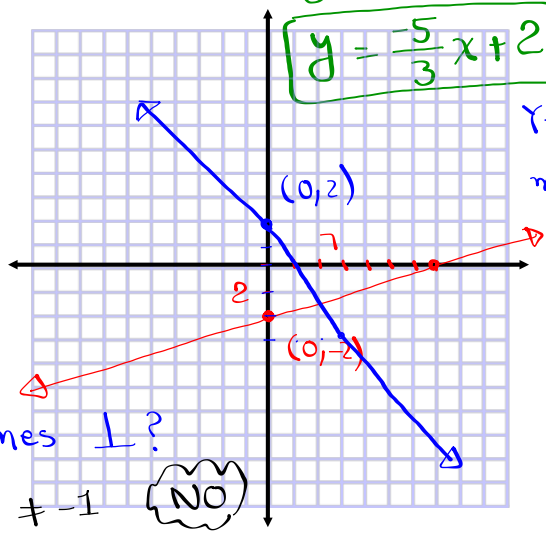
② $5x + 3y = 6$

$3y = -5x + 6$

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

Y-Int $(0,2)$

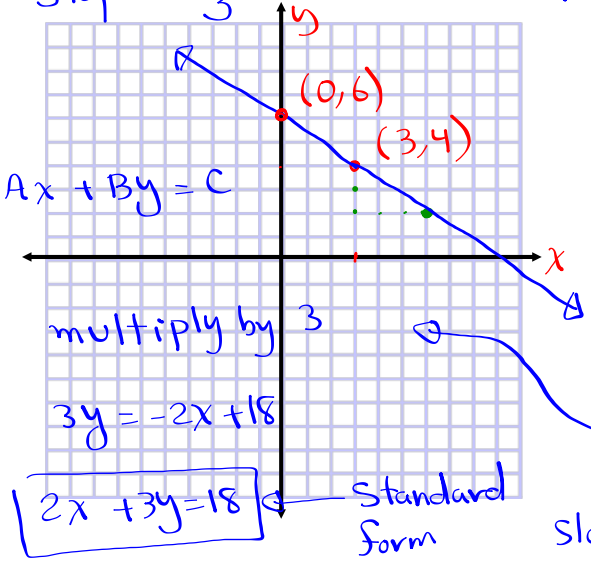
$m = \frac{-5}{3}$



Are these two lines ⊥?

$\frac{2}{7} \cdot \frac{-5}{3} = \frac{-10}{21} \neq -1$ (NO)

Graph a line that contains $(3,4)$ with slope $\frac{-2}{3}$. Find its equation.



$Ax + By = C$

multiply by 3

$3y = -2x + 18$

$2x + 3y = 18$ — Standard Form

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

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

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

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

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

Slope-Int Form.

$m = \frac{-2}{3}$, Y-Int $(0,6)$

Find equation of a line that contains $(3,-5)$ with slope $\frac{3}{2}$. Graph the line and clearly mark important information.

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

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

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

LCD = 2

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

$2y + 10 = 3x - 9$

$-3x + 2y = -9 - 10$

$-3x + 2y = -19$

Multiply by -1

$3x - 2y = 19$ Standard form

$-2y = -3x + 19$

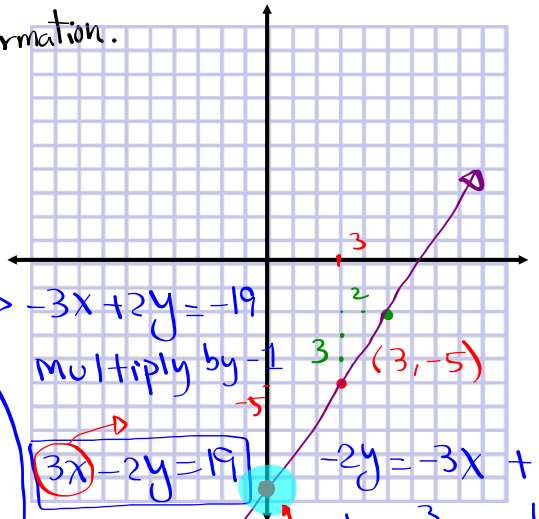
$y = \frac{-3}{-2}x + \frac{19}{-2}$

Slope-Int form

$y = \frac{3}{2}x - \frac{19}{2}$

$(0, -\frac{19}{2})$

$(3,-5)$



Graphing inequalities:

$x < a$	$x \leq a$	Shade left
$x > a$	$x \geq a$	Shade right
Dashed line	Solid line	

Vertical line

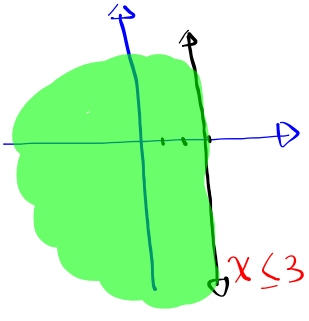
Graph & Shade

$x \leq 3$

V.L.

Solid

Shade left



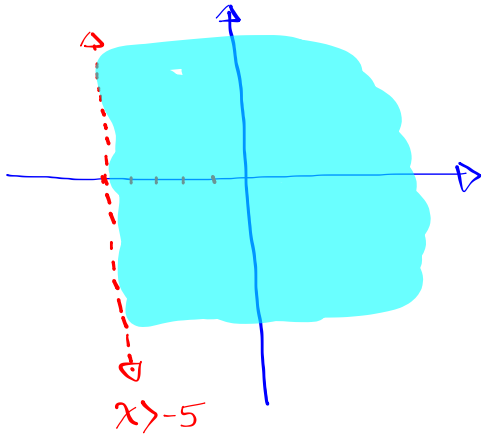
Graph & Shade

$x > -5$

V.L.

Dashed line

Shade right



$y < b$	$y \leq b$	Shade below
$y > b$	$y \geq b$	Shade above
Dashed line	Solid line	

Horizontal line

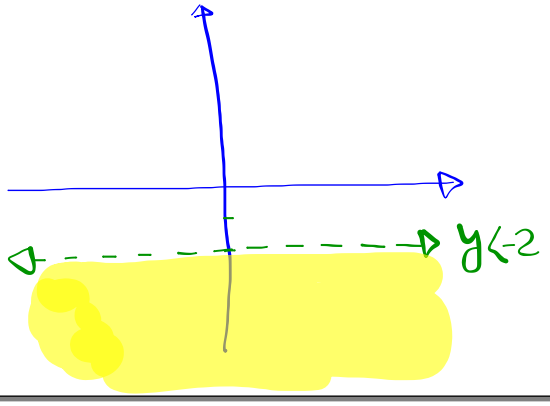
Graph & shade

$y < -2$

H.L.

Dashed line

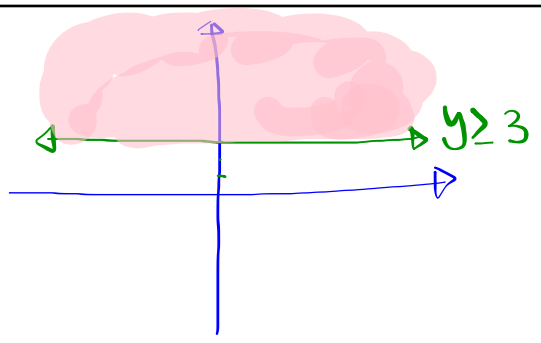
Shade below



Graph & shade

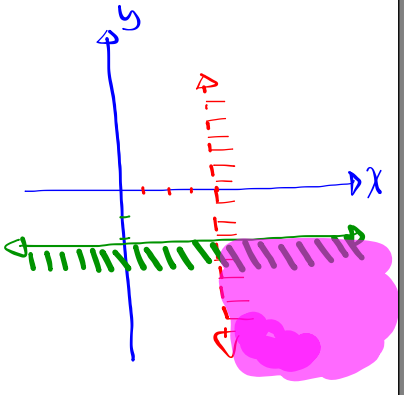
$y \geq 3$

H.L.
Solid
Shade above



Graph & shade

$\begin{cases} x > 4 & \text{V.L., dashed, Shade Right} \\ y \leq -2 & \text{H.L., Solid, Shade below} \end{cases}$



Slant lines

$y < mx + b$	$y \leq mx + b$	Shade below
$y > mx + b$	$y \geq mx + b$	Shade above
Dashed lines	Solid lines	

If we have $Ax + By < C$, $Ax + By \leq C$, $Ax + By > C$, or $Ax + By \geq C$ ⇒ we should convert to Slope-Int. form.

Graph & Shade

$5x + 2y \leq 10$

Convert to Slope-Int form

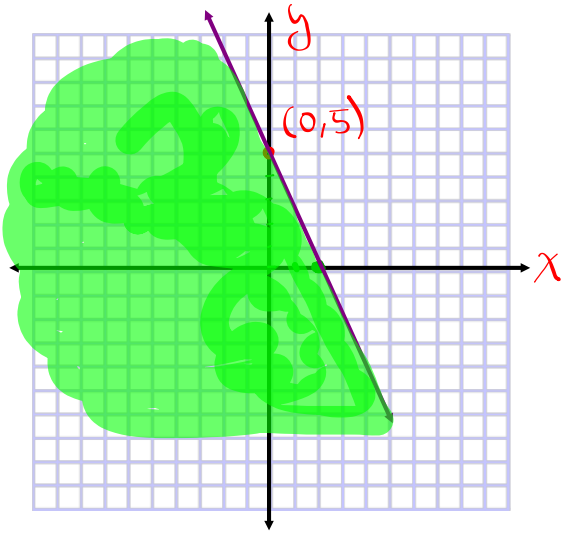
$2y \leq -5x + 10$

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

Slant line

Solid line

Shade below



Graph & Shade

$3x - 2y < 8$

Convert to Slope-Int form

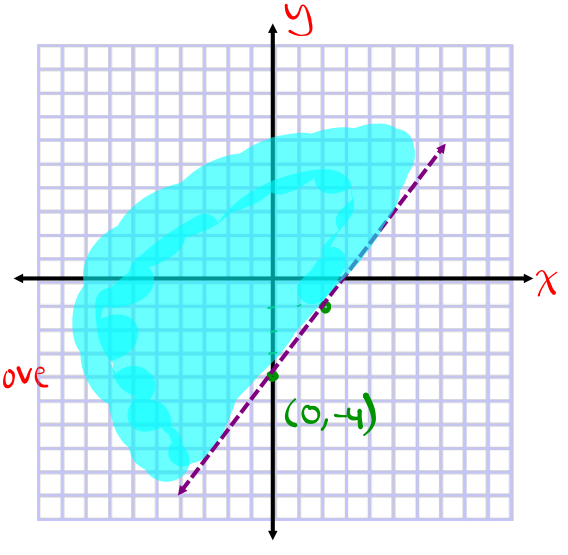
$-2y < -3x + 8$

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

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

Slant, Dashed, Shade above

Y-Int $(0,-4)$, $m = \frac{3}{2}$



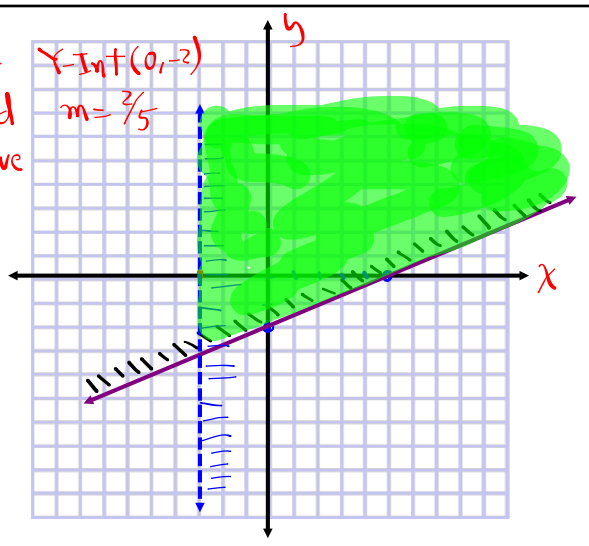
Graph & Shade

$$\begin{cases} y \geq \frac{2}{5}x - 2 \\ x > -3 \end{cases}$$

V.L.
Dashed
Shade Right

Slant
Solid
above

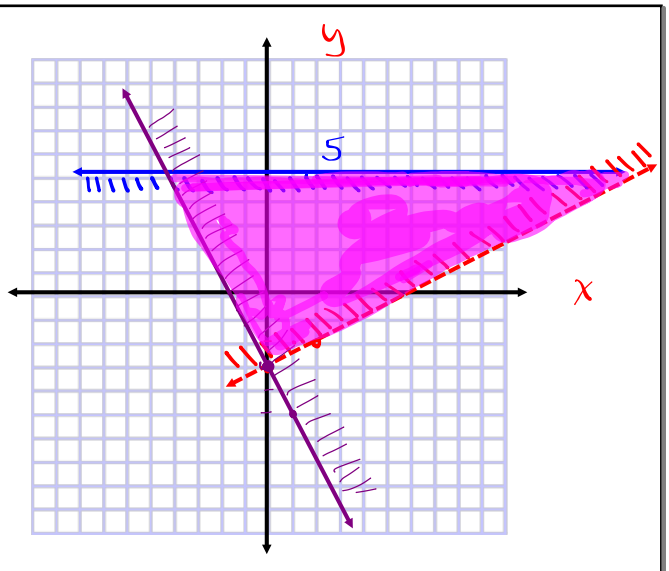
y-Int $(0, -2)$
$m = \frac{2}{5}$



Graph & Shade

$$\begin{cases} y \leq 5 \\ y > \frac{1}{2}x - 3 \\ y \geq -2x - 3 \end{cases}$$

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

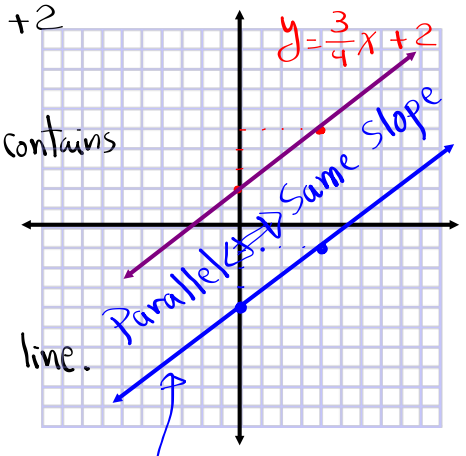


a) Graph the line $y = \frac{3}{4}x + 2$

b) Graph another line that contains $(0, -4)$ and parallel to it.

Same slope

c) Find eqn of the Second line.



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

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

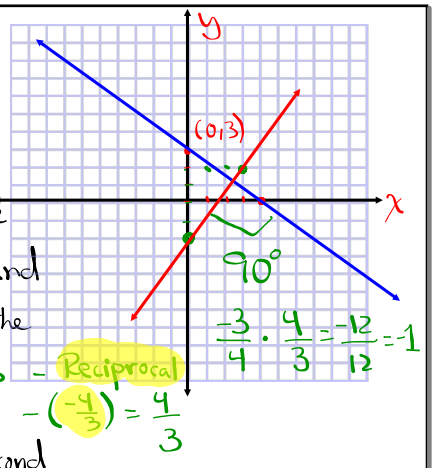
$y + 4 = \frac{3}{4}x \Rightarrow$ $y = \frac{3}{4}x - 4$

a) Graph the line

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

b) Graph a Second line that contains $(0, -2)$ and is perpendicular to the first line.

↳ Slope is $-\left(\frac{-4}{3}\right) = \frac{4}{3}$ — Reciprocal



$\frac{-3}{4} \cdot \frac{4}{3} = \frac{-12}{12} = -1$

c) Find eqn of the Second line.

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

$y - -2 = \frac{4}{3}(x - 0)$

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

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

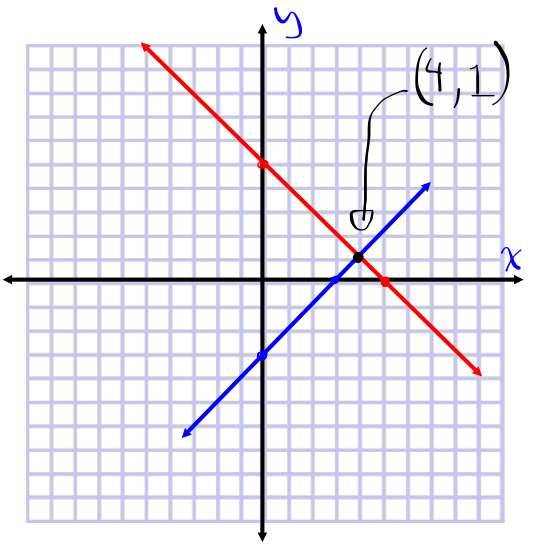
Graph

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

x	y
0	5
5	0

x	y
0	-3
3	0

Guess their intersection Point



Graph

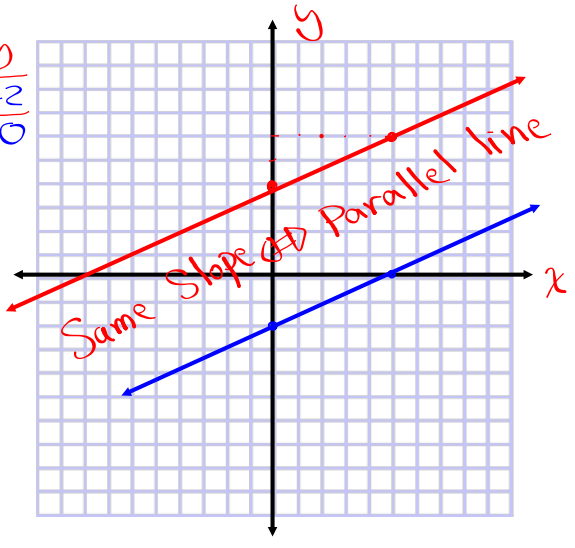
$$\begin{cases} 2x - 5y = 10 \\ y = \frac{2}{5}x + 4 \end{cases}$$

x	y
0	-2
5	0

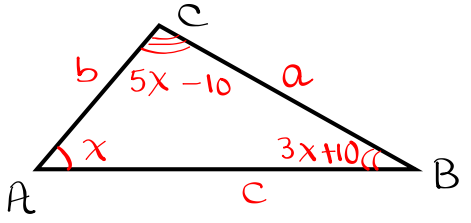
$m = \frac{2}{5}$

Y-Int (0,4)

No intersection



In triangle ABC,
angle B is 10° more than 3 times angle A.
angle C is 10° less than 5 times angle A.
Find all three angles.



Angle A → x

Angle B → $3x + 10$

Angle C → $5x - 10$

$A + B + C = 180°$

$x + (3x+10) + (5x-10) = 180$

$9x = 180$

$x = 20$

20°, 70°, and 90°

Find two complementary angles such that one of them plus 3 times the other one is 240°.

x & $90 - x$

15° & 75°

$x + 3(90 - x) = 240$

$x + 270 - 3x = 240$

$-2x = 240 - 270$

$-2x = -30$

$x = 15$

Same

$90 - x + 3x = 240$

$2x = 240 - 90$

$2x = 150$

$x = 75$

75° & 15°

Find two supplementary angles such that one of them is twice another one.

x & $180-x$

$x = 2(180-x)$

$x = 360 - 2x$

$x + 2x = 360$

$3x = 360$

$x = 120$

120° & 60°

$180 - x = 2x$

$180 = 2x + x$

$180 = 3x$

$x = 60$

60° & 120°

Find an angle such that the sum of 3 times its Complement and twice its Supplement is 540°.

Angle	Complement	Supplement
x	$90 - x$	$180 - x$

3·Complement + 2·Supplement = 540

$3(90 - x) + 2(180 - x) = 540$

$270 - 3x + 360 - 2x = 540$

$-5x + 630 = 540$

$-5x = 540 - 630$

$-5x = -90$

$x = \frac{-90}{-5}$

$x = 18$

18°

Work on SG 9
Work on graphing Project

Work on Word problems angles & triangles.