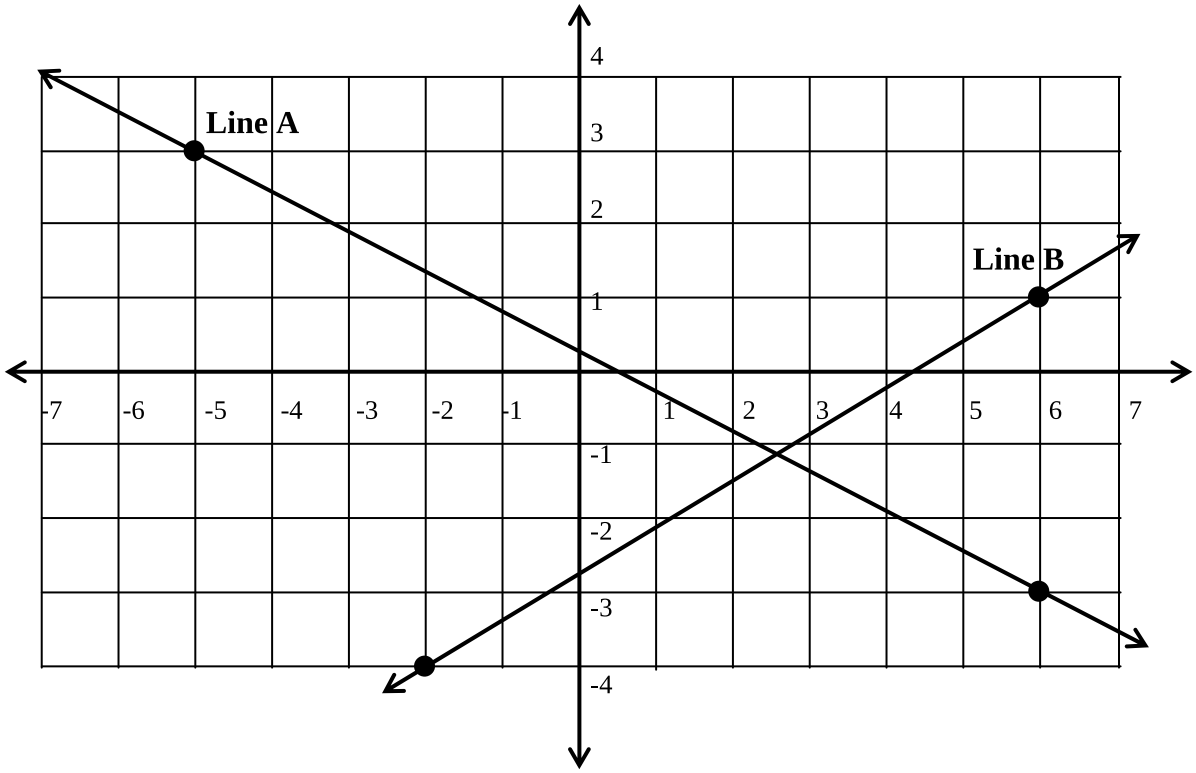
Math251

Practice Exam #02

1. Write the equation of the lines in slope-intercept form.



2. The plane travels 408 miles in 3 hours with the wind and 128 miles in 2 hours against the wind. Find the speed of the wind and the speed of the plane in still air. **<u>Complete the table, set up an equation, then solve the problem.</u>**

	Rate	Time	Distance
With			
Against			

$x = R_{Plane}$

$y = R_{Wind}$

3. Write the equation of the line in slope intercept form using the given information.

a) $m = -\frac{3}{2}, \left(-\frac{5}{2}, 2\right)$

b) $(3, -2), (-5, -3)$

4. A pharmacist has in stock a 30% alcohol solution and a 80% alcohol solution. How many liters of each are required to be mixed together to get 100 liters of a 50% alcohol solution? Fill in the table, get the two equations and solve. **Complete the table and set up an equation to solve this problem.**

	Amount of Solution	% Alcohol	Amount of Alcohol
Sol 1			
Sol 2			
Final			

5. Solve each system by elimination.

a) $\begin{aligned} x + y &= 2 \\ x - 2y &= 4 \end{aligned}$

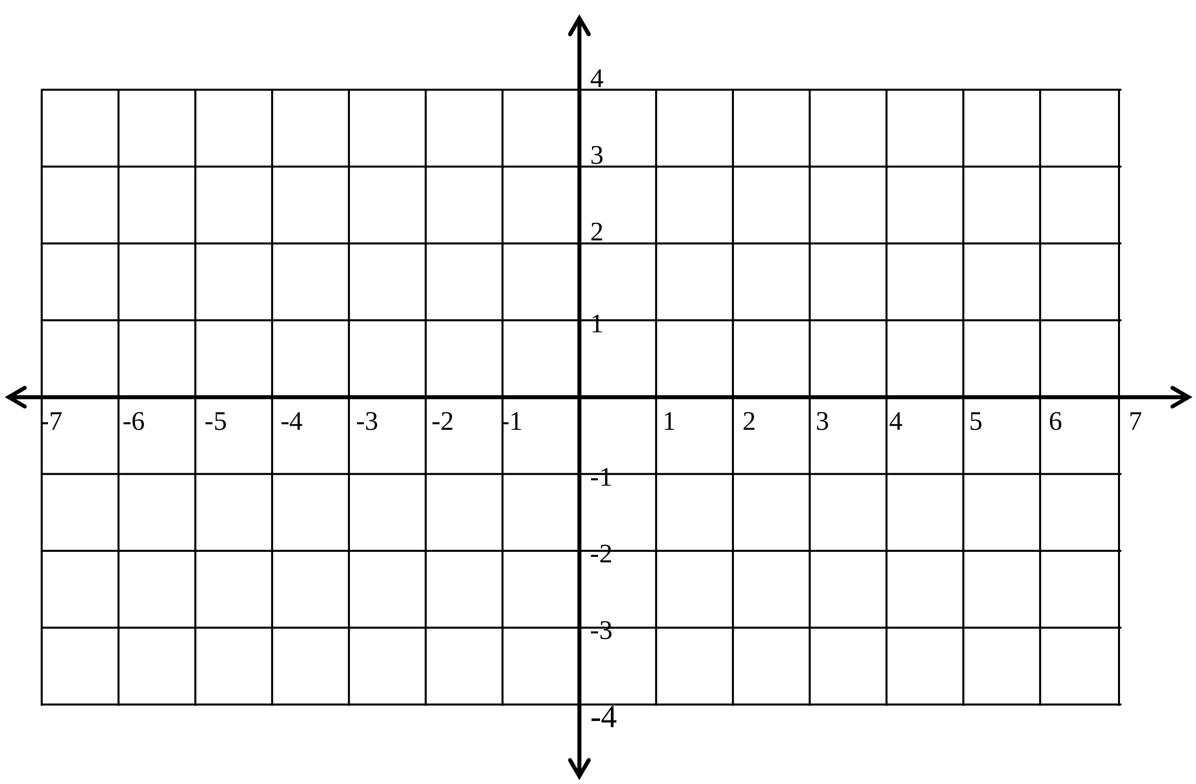
b) $\begin{aligned} 2x - 3y &= 3 \\ 3x + 4y &= -1 \end{aligned}$

6. At the end of the day a cashier has 103 \$1 and \$5 bills. The total value of the money is \$415. How many bills of each denomination does the cashier have? **Complete the table, set up an equation, then solve the problem.**

	Number of bills	Bill value	Total value
\$1's			
\$5's			
Total			

7. Graph the solution set of each system of linear inequalities. (This means, fine the shaded region.)

$$x + 2y \geq 5$$
$$x - y > 3$$



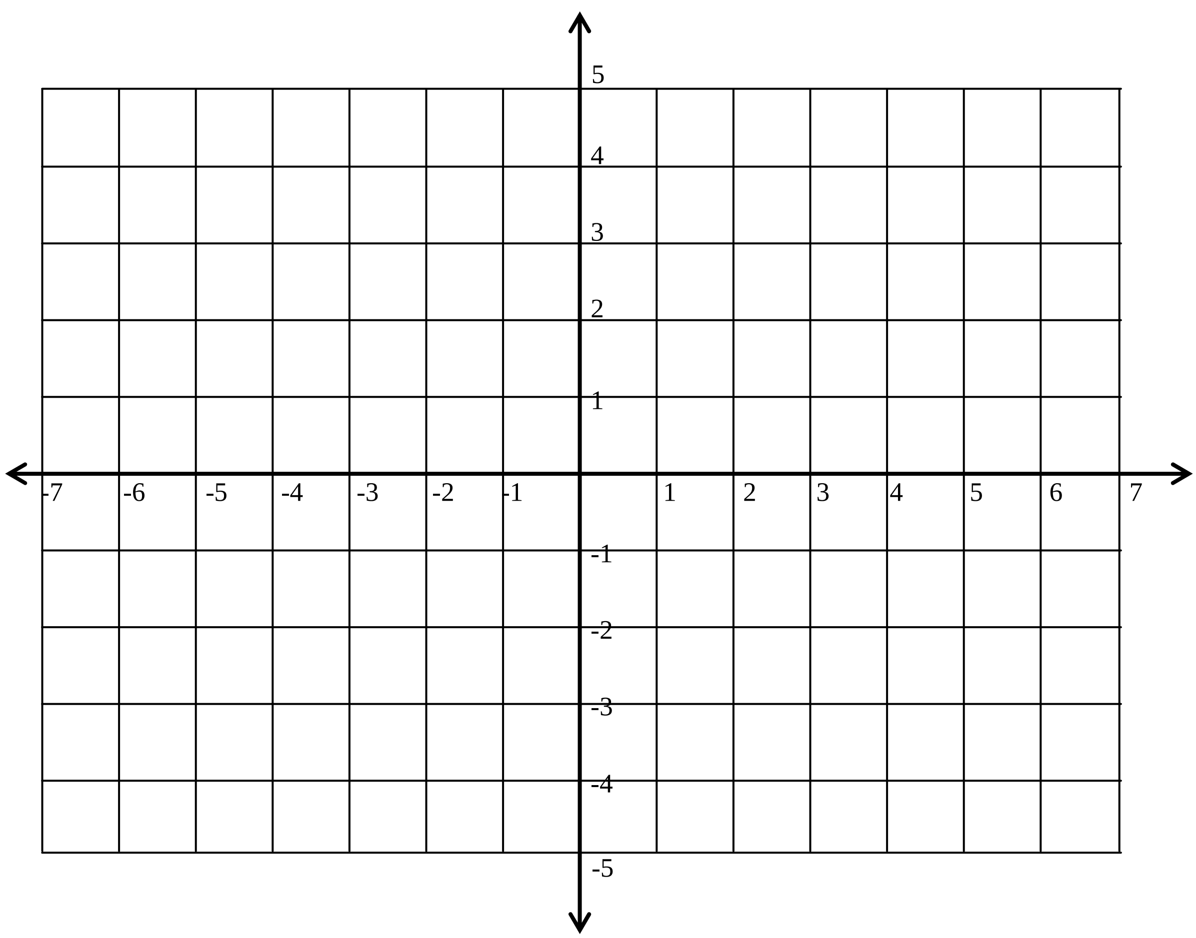
8. Line A and Line B are two perpendicular lines. Line B passes through the point (3,6). Line A has equation $-2x+3y=12$. Find the coordinates of the y-intercept for Line B.

9. A mini-mart store manager wishes to blend candy selling at $1.20 per lb with candy that sells at $1.50 per lb. How many pounds of each should be mixed to get 10 lbs of the blended candy mixture that costs $1.35 per lb? **Complete the table, set up an equation, then solve the problem.**

	Amount of candy	Cost per Pound	Total Cost

10. Solve the system of equations by **graphing**. **<u>You must find at least three points for each line!</u>** Once you have drawn each line find the intersection of your two lines.

$$x - y = -2$$
$$x + y = -6$$



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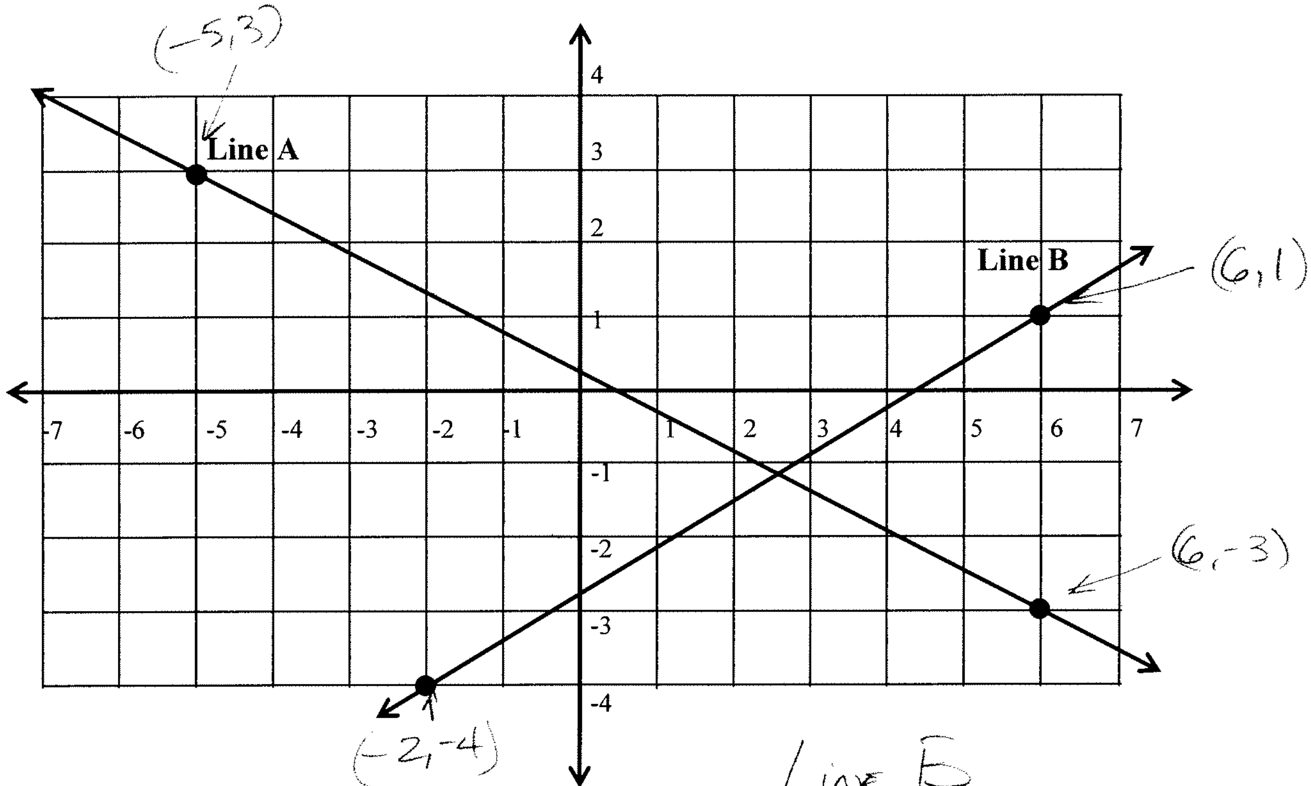
Practice Exam #02

1. Write the equation of the line in slope-intercept form.



Line A

$$m_A = \frac{y_2 - y_1}{x_2 - x_1} = \frac{3-(-3)}{-5 \quad -6} = -\frac{6}{11}$$

Using the slope & $(-5,3)$;

$$y = mx + b$$
$$3 = -\frac{6}{11}(-5) + b$$
$$3 = \frac{30}{11} + b$$
$$11[3] = 11\left[\frac{30}{11} + b\right]$$
$$33 = 30 + 11b$$
$$-30 \quad -30$$
$$\frac{3}{11} = \frac{11b}{11}$$
$$\frac{3}{11} = b$$

Solution
$$\boxed{y = -\frac{6}{11}x + \frac{3}{11}}$$

Line B

$$m_B = \frac{y_2 - y_1}{x_2 - x_1} = \frac{1-(-4)}{6-(-2)} = \frac{1+4}{6+2} = \frac{5}{8}$$

Using the slope & $(6,1)$;

$$y = mx + b$$
$$1 = \frac{5}{8}(6) + b$$
$$1 = \frac{30}{8} + b$$
$$8[1] = 8\left[\frac{30}{8} + b\right]$$
$$8 = 30 + 8b$$
$$-30 \quad -30$$
$$-22 = 8b$$
$$-\frac{22}{8} = \frac{8b}{8}$$
$$-\frac{22}{8} = b$$
$$-\frac{11}{4} = b$$

Solution
$$\boxed{y = \frac{5}{8}x - \frac{11}{4}}$$

2. The plane travels 408 miles in 3 hours with the wind and 128 miles in 2 hours against the wind. Find the speed of the wind and the speed of the plane in still air. **Complete the table and set up an equation to solve this problem.**

	Rate	Time	Distance
With the Wind	$x+y$	3	408
Against the Wind	$x-y$	2	128

$x = R_{Plane}$

$y = R_{Wind}$

$(x+y)\cdot 3 = 408$

$\frac{(x+y)\cdot 3}{3} = \frac{408}{3}$

$x+y = 136$

$(x-y)\cdot 2 = 128$

$\frac{(x-y)\cdot 2}{2} = \frac{128}{2}$

$x-y = 64$

$x+y=136$
$(+)\ x-y=64$

$\frac{2x}{2} = \frac{200}{2}$

$\boxed{x = 100\ mi/hr}$

$x+y=136$
$(-)\ x-y=64$

$\frac{2y}{2} = \frac{72}{2}$

$\boxed{y = 36\ mi/hr}$

3. Write the equation of the line in slope intercept form using the given information.

a) $m = -\frac{3}{2}, \left(-\frac{5}{2}, 2\right)$

$y = mx+b$

$2 = \left(-\frac{3}{2}\right)\left(-\frac{5}{2}\right)+b$

$2 = \frac{15}{4}+b$

$4[2] = 4\left[\frac{15}{4}+b\right]$

$8 = 15+4b$
$-15 \quad -15$

$-7 = 4b$

$-\frac{7}{4} = b$

$\boxed{y = -\frac{3}{2}x - \frac{7}{4}}$

b) (3,-2), (-5, -3)

$m = \frac{y_2-y_1}{x_2-x_1} = \frac{-3-(-2)}{-5-3} = \frac{-3+2}{-8} = \frac{-1}{-8} = \frac{1}{8}$

Using $(3,-2)$ & $m=\frac{1}{8}$;

$y = mx+b$

$-2 = \frac{1}{8}(3)+b$

$8[-2] = 8\left[\frac{1}{8}(3)+b\right]$

$-16 = 1\cdot 3+8b$

$-16 = 3+8b$
$-3 \quad -3$

$\frac{-19}{8} = \frac{8b}{8}$

$-\frac{19}{8} = b$

$\boxed{y = \frac{1}{8}x - \frac{19}{8}}$

4. A pharmacist has in stock a 30% alcohol solution and a 80% alcohol solution. How many liters of each are required to be mixed together to get 100 liters of a 50% alcohol solution? Fill in the table, get the two equations and solve. **Complete the table and set up an equation to solve this problem.**

	Amount of solution	% alcohol	Amount of alcohol
Sol 1	x	0.3	0.3x
Sol 2	y	0.8	0.8y
Final	100	0.5	50

$x + y = 100$

$3[x+y] = 3[100]$

$3x + 3y = 300$

$0.3x + 0.8y = 50$

$10[0.3x + 0.8y] = 10[50]$

$3x + 8y = 500$

$3x + 8y = 500$
$(-)\ 3x + 3y = 300$

$5y = 200$

$\frac{5y}{5} = \frac{200}{5}$

$\boxed{y = 40L}$

By inspection

$\boxed{x = 60L}$

Note: $x + y = 100$

5. Solve each system by elimination.

a) $x + y = 2$
$x - 2y = 4$

$x + y = 2$
$(-)\ x - 2y = 4$

$3y = -2$

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

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

Multiply top Equation by 2

$2[x+y] = 2[2]$

$2x + 2y = 4$

Top Equation $\{2x + 2y = 4$

Bottom Equation $\{x - 2y = 4$

$(+)$

$\frac{3x}{3} = \frac{8}{3}$

$x = \frac{8}{3}$

Solution $\boxed{\left(\frac{8}{3}, -\frac{2}{3}\right)}$

b) $2x - 3y = 3$
$3x + 4y = -1$

To Eliminate x,
Multiply top Equation by 3.
Multiply bottom Equation by 2.

$3[2x - 3y] = [3]3$

$6x - 9y = 9$

$2[3x + 4y] = [-1]2$

$6x + 8y = -2$

$6x - 9y = 9$
$(-)\ 6x + 8y = -2$

$-17y = 11$

$\frac{-17y}{-17} = \frac{11}{-17}$

$y = -\frac{11}{17}$

To Eliminate y, Multiply top Equation by 4.
Multiply bottom Equation by 3.

$4[2x - 3y] = [3]4$

$8x - 12y = 12$

$3[3x + 4y] = [-1]3$

$9x + 12y = -3$

$8x - \cancel{12y} = 12$
$(+)\ 9x + \cancel{12y} = -3$

$\frac{17x}{17} = \frac{9}{17}$

$x = \frac{9}{17}$

Solution $\boxed{\left(\frac{9}{17}, -\frac{11}{17}\right)}$

6. At the end of the day a cashier has a total of 103 \$1 and \$5 bills. The total value of the money is \$415. How many bills of each denomination does the cashier have?
Complete the table and set up an equation to solve this problem.

	Number of bills	Bill value	Total value
\$1's	x	1	x
\$5's	y	5	5y
Total	103		415

$x+y=103$ $\qquad$ $x+5y=415$

$$\begin{array}{r} x+5y=415 \\ (-)\ x+y=103 \\ \hline 4y=312 \\ \frac{4y}{4}=\frac{312}{4} \end{array}$$

$\boxed{y=78\ \$5\text{'s}}$

$x+y=103$

$x+78=103$

$-78 \quad -78$

$\boxed{x=25\ \$1\text{'s}}$

7. Graph the inequality.

$x+2y\geq 5$

$x-y>3$

$x+2y=5$

x	y
5	0
3	1
1	2

Using (0,0)

$0\geq 5$

False

$x-y=3$

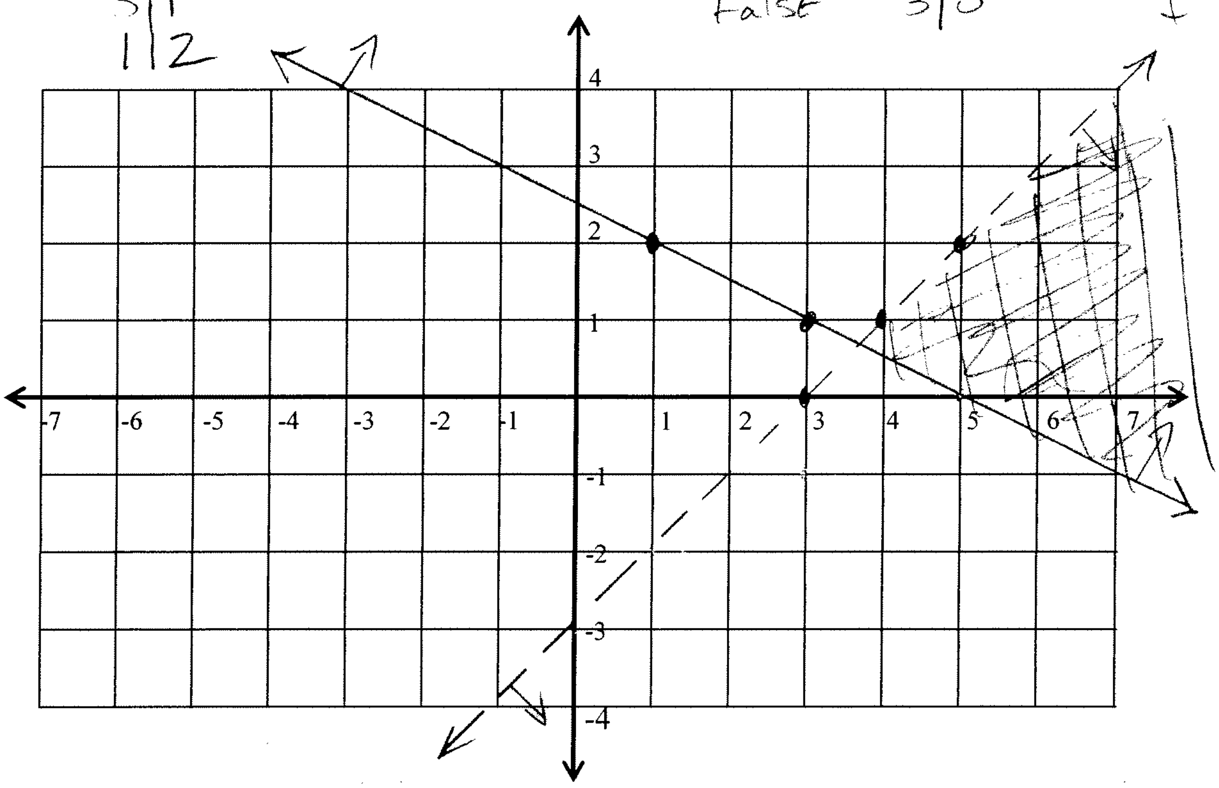
x	y
5	2
4	1
3	0

Using (0,0)

$0>3$

False

$x-y=3$



8. Line A and Line B are two perpendicular lines that intersect at the point $(3,6)$. Line A has equation $-2x+3y=12$. Find the coordinates of the y-intercept for Line B.

Line A; Solve for $y=mx+b$

$$-2x+3y=12$$
$$+2x \qquad +2x$$
$$\frac{3y}{3}=\frac{2x}{3}+\frac{12}{3}$$
$$y=\frac{2}{3}x+4$$

Slope of Line A is $m_A=\frac{2}{3}$

Since Line A & Line B are perpendicular, and $m_A=\frac{2}{3} \Longrightarrow m_B=-\frac{3}{2}$

To find the equation for Line B, use $(3,6)$ & $m_B=-\frac{3}{2}$: $y=mx+b$

$$6=-\frac{3}{2}(3)+b$$
$$2[6]=2[-\tfrac{3}{2}(3)+b]$$
$$12=-9+2b$$
$$+9 \qquad +9$$
$$\frac{21}{2}=\frac{2b}{2}$$
$$\frac{21}{2}=b$$

$\boxed{\text{Solution } (0,\tfrac{21}{2})}$ y-int.

9. A mini-mart store manager wishes to blend candy selling at \$1.20 per lb with candy that sells at \$1.50 per lb to get a mixture that will sell for \$1.35. How many pounds of the \$1.20 and the \$1.50 candies should be used to get 10 lbs of the blended candy mixture. **Complete the table and set up an equation to solve this problem.**

	Amount of candy	Cost per Pound	Total Cost
Candy 1	x	1.20	1.20x
Candy 2	y	1.50	1.50y
Blended Candy	10	1.35	13.5

$$x+y=10$$
$$12(x+y)=12(10)$$
$$12x+12y=120$$

$$1.20x+1.50y=13.5$$
$$10[1.20x+1.50y]=10[13.5]$$
$$12x+15y=135$$

$$12x+15y=135$$
$$(-)\,12x+12y=120$$
$$3y=15$$

$\boxed{y=5 \text{ lbs of Candy 2}}$

$\boxed{\therefore\ x=5 \text{ lbs of Candy 1}}$

Note: $x+y=10$

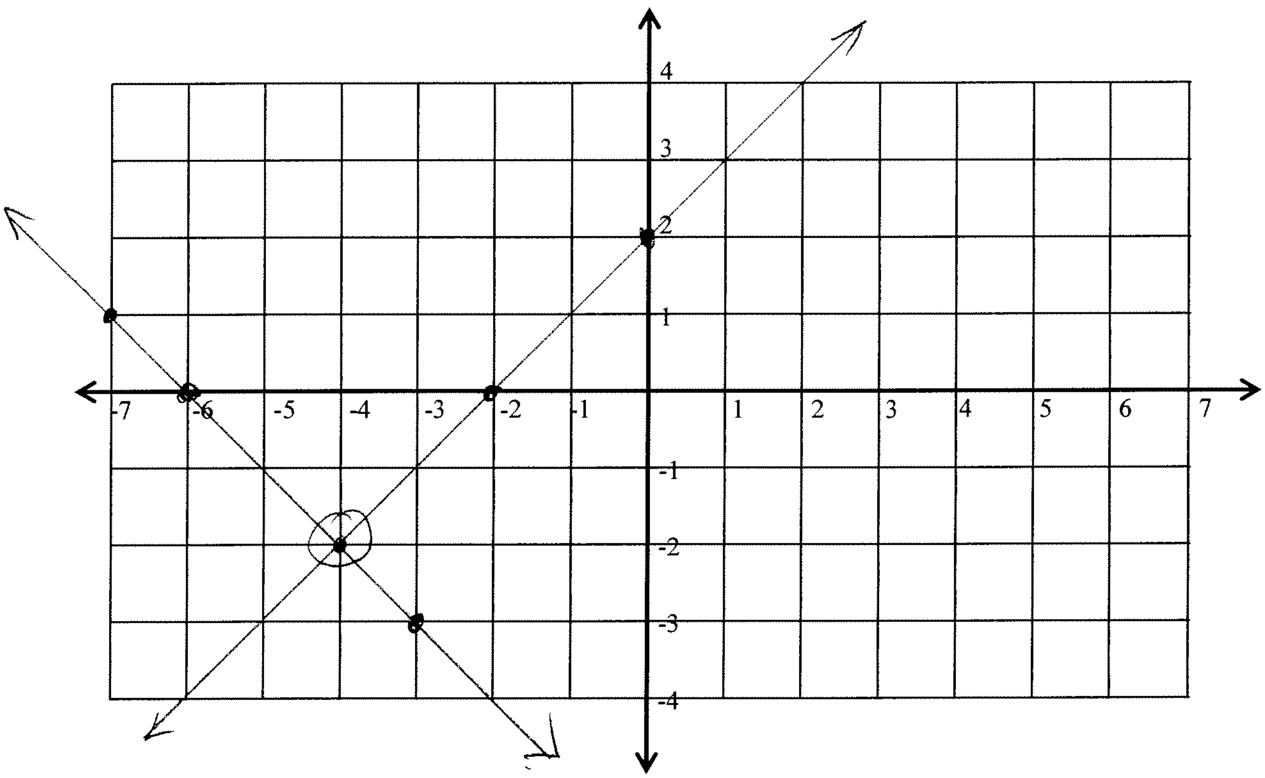
10. Solve the system of equations by graphing. Plot at least three points for each line.

$$x - y = -2$$
$$x + y = -6$$

x	y
0	2
-2	0
-4	-2

x	y
0	-6
-6	0
-3	-3
-7	1

This point is not on the given grid.



$\boxed{\text{Solution is } (-4, -2).}$

The intersection of the two lines.