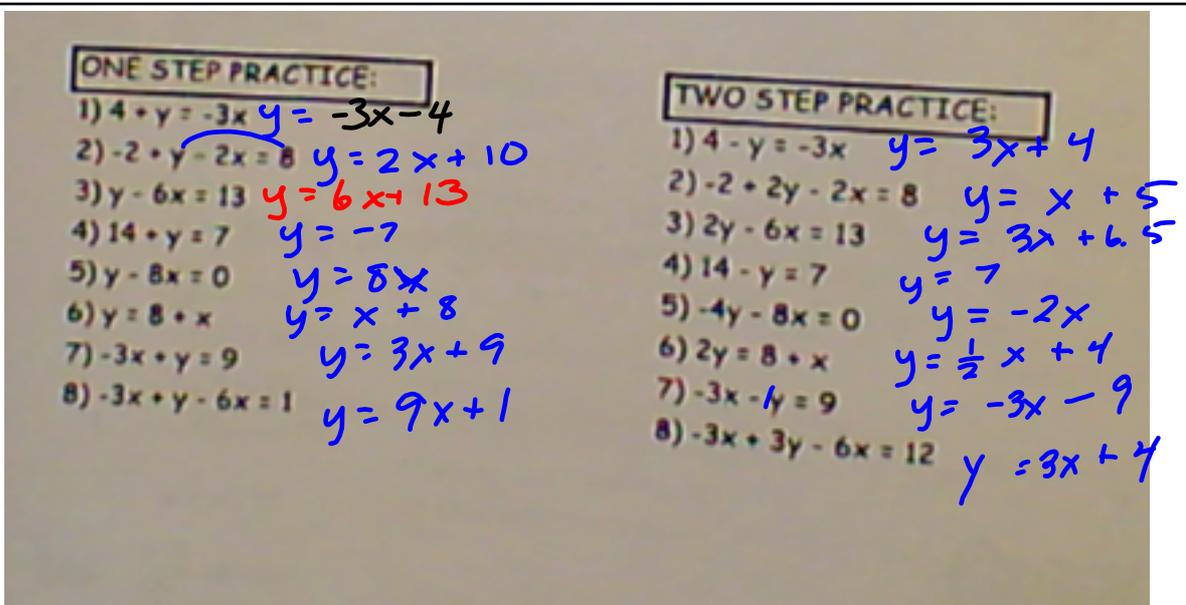


- 1) Bell Ringer: slope quiz
- 2) Go over page 48D, 56-62, turn in transformations wkst and PS 17
- 3) lesson: one line passing through 1 point with a given slope
- 4) Homework: all pages through 69F

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Rewriting Equations in Slope-Intercept Form

The equation of a line written in the form $y = mx + b$ is said to be in slope-intercept form. To write an equation in slope-intercept form, you need to isolate y by using the properties of equality.

Example:
 Rewrite the equation $4x - 2y = 12$ in slope-intercept form.

$4x - 2y = 12$ $\begin{array}{r} -4x \quad -4x \\ \hline -2y = -4x + 12 \\ \hline \frac{-2}{-2} \quad \frac{-4x}{-2} \quad \frac{12}{-2} \\ \hline y = 2x - 6 \end{array}$	<ol style="list-style-type: none"> 1. Subtract $4x$ from each side to isolate y. 2. Simplify. 3. Divide each term by -2 to get y by itself. 4. Simplify.
--	--

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Rewrite each of the following equations in $y = mx + b$ form. Show each step!

1) ~~$x + y = -15$~~

$$\begin{array}{r} \cancel{x} \quad \cancel{y} \\ \hline y = -x - 15 \\ m = -1 \quad b = -15 \end{array}$$

3) ~~$-2x + y = 1$~~

$$\begin{array}{r} \cancel{-2x} \quad \cancel{y} \\ \hline y = 2x + 1 \\ m = 2 \quad b = 1 \end{array}$$

5) $2y = -1x - 8$

$$\begin{array}{r} \frac{2y}{2} = \frac{-1x}{2} - \frac{8}{2} \\ \hline y = -\frac{1}{2}x - 4 \end{array}$$

2) ~~$2y + 8x = 1$~~

$$\begin{array}{r} \cancel{2y} \quad \cancel{8x} \\ \hline \frac{2y}{2} = \frac{-8x}{2} + \frac{1}{2} \\ \hline y = -4x + \frac{1}{2} \end{array}$$

4) ~~$3y - 2x = 9$~~

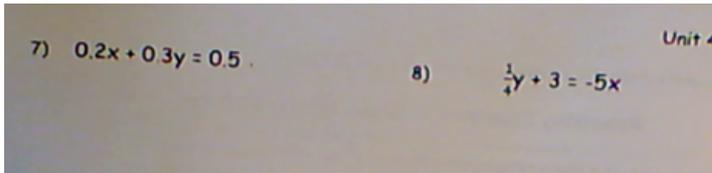
$$\begin{array}{r} \cancel{3y} \quad \cancel{-2x} \\ \hline \frac{3y}{3} = \frac{2x}{3} + \frac{9}{3} \\ \hline y = \frac{2}{3}x + 3 \end{array}$$

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

$$\begin{array}{r} y - 4 = -3x + 9 \\ \hline - 4 = + 9 \\ - 4 + 4 = + 9 + 4 \\ \hline y = -3x + 13 \end{array}$$

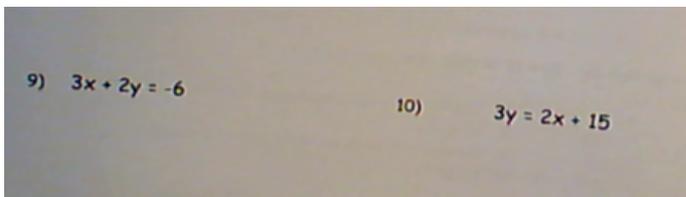
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7) $0.2x + 0.3y = 0.5$. 8) $\frac{1}{4}y + 3 = -5x$ Unit 4

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9) $3x + 2y = -6$ 10) $3y = 2x + 15$

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11) $y - 4x = 8$

12) $y - 8 = -\frac{1}{2}(x + 4)$

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13) $3x - 4y = 8$

14) $6x - 2y = 10$

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Solve for y.

1) $x + y = 3$ 2) $x + y = -4$ 3) $x - y = 5$

4) $y - 4x = -3$ 5) $y + 5x = 3$

6) $2y = 6x + 10$ 7) $-6 + 2y = 10x$

8) $2y - 6x = 2$ 9) $4y = 5x + 12$

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10) $-x + y = 4$ 11) $y + 3x = -7$

12) $2x - y = 7$ 13) $3y - 6x + 12 = 0$

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2. Solve the following equation for y: $9x + 3y = 21$.

a. Based on your transformed equation, what is the slope of the linear equation $9x + 3y = 21$?

b. Complete the table to find solutions to the linear equation.

x	Transformed linear equation:	y
-2	$y = -3x + 7$	13
-1	$-3(-1) + 7$	10
0	$-3(0) + 7$	7
1	$-3(1) + 7$	4

c. Graph the points on the coordinate plane.

d. Find the slope between any two points: $m = -\frac{3}{1}$

e. The slope you found in part (d) should be equal to the slope you noted in part (a). If so, connect the points to make the line that is the graph of an equation of the form $y = mx + b$ that has slope m.

f. Note the location (ordered pair) that describes where the line intersects the y-axis: $(0, 7)$

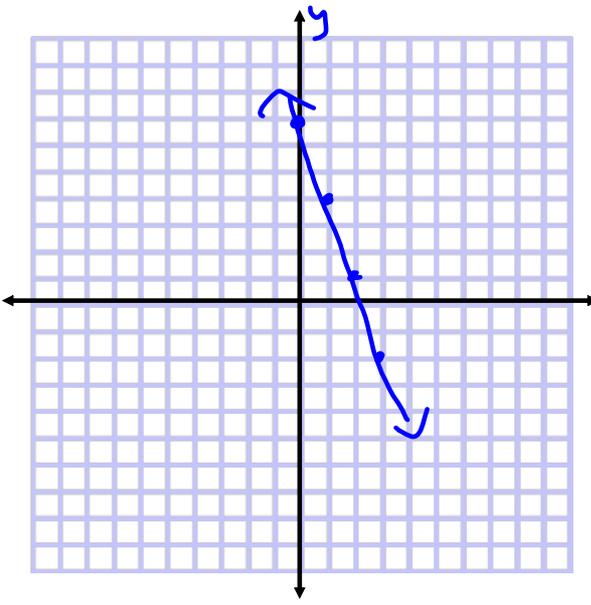
$y = -3x + 7$

$\frac{9x}{9x} + 3y = 21$
 $-9x$

$3y = -\frac{9x}{3} + \frac{21}{3}$

$y = -3x + 7$
 $m \quad b$

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$y = -3x + 7$
 $m = -\frac{3}{1} \quad b = 7$

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3. Solve the following equation for y: $2x + 3y = -6$

a. Based on your transformed equation, what is the slope of the linear equation $2x + 3y = -6$?

b. Complete the table to find solutions to the linear equation.

x	Transformed linear equation:	y
-3	$-\frac{2}{3}(0) - 2$	0
0	$-\frac{2}{3}(3) - 2$	-2
3	$-\frac{2}{3}(3) - 2$	-4
6		-6

c. Graph the points on the coordinate plane.

d. Find the slope between any two points. $m = -\frac{2}{3}$

e. The slope you found in part (d) should be equal to the slope you noted in part (a). If so, connect the points to make the line that is the graph of an equation of the form $y = mx + b$ that has slope m.

f. Note the location (ordered pair) that describes where the line intersects the y-axis.

Handwritten work:

$$2x + 3y = -6$$

$$-2x \quad -2y$$

$$3y = -2x - 6$$

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

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

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Handwritten equation:

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

Labels: m under $-\frac{2}{3}$, b under -2

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Lesson 18: There is Only One Line Passing Through a Given Point with a Given Slope

Classwork

Opening Exercise

Examine each of the graphs and their equations below. Identify the coordinates of the point where the line intersects the y-axis. Describe the relationship between the point and the equation $y = mx + b$.

a. $y = \frac{1}{2}x + 3$ $m = \frac{1}{2}$ $b = 3$ $(0, 3)$

rise = 1, run = 2

b. $y = -3x + 7$ $m = -\frac{3}{1}$ $b = 7$ $(0, 7)$

c. $y = -\frac{2}{5}x - 2$ $m = -\frac{2}{5}$ $b = -2$ $(0, -2)$

d. $y = 5x - 4$ $m = 5$ $b = -4$ $(0, -4)$

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4. Solve the following equation for y : $5x - y = 4$.

a. Based on your transformed equation, what is the slope of the linear equation $5x - y = 4$?

b. Complete the table to find solutions to the linear equation.

x	Transformed linear equation:	y
-1	$y = 5x - 4$	-9
0		-4
1	$5(1) - 4$	1
2		6

$5x - y = 4$

$-5x$ $-5x$

$-y = -5x + 4$

$\frac{-y}{-1} = \frac{-5x + 4}{-1}$

$y = 5x - 4$

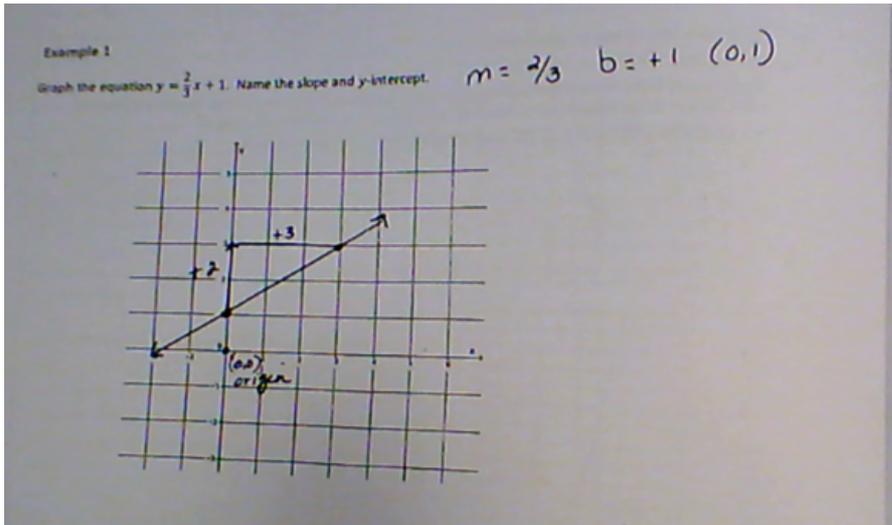
c. Graph the points on the coordinate plane. **3**

d. Find the slope between any two points.

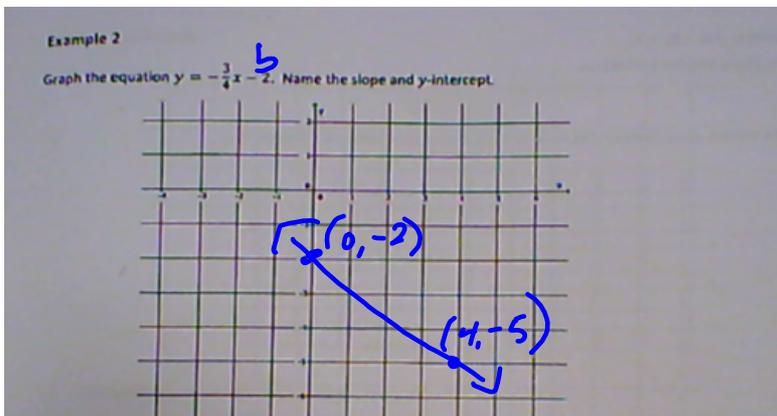
e. The slope you found in part (d) should be equal to the slope you noted in part (a). If so, connect the points to make the line that is the graph of an equation of the form $y = mx + b$ that has slope m .

f. Note the location (ordered pair) that describes where the line intersects the y-axis. $(0, -4)$

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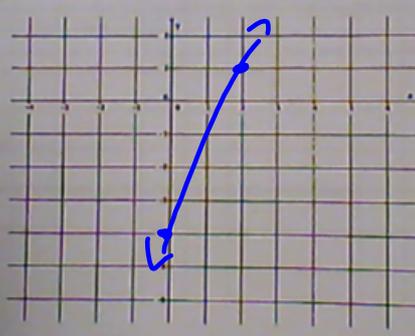
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Exercises

1. Graph the equation $y = \frac{5}{2}x - 4$.

a. Name the slope and the y-intercept. $m = \frac{5}{2}$ $b = -4$

b. Graph the known point, then use the slope to find a second point before drawing the line.



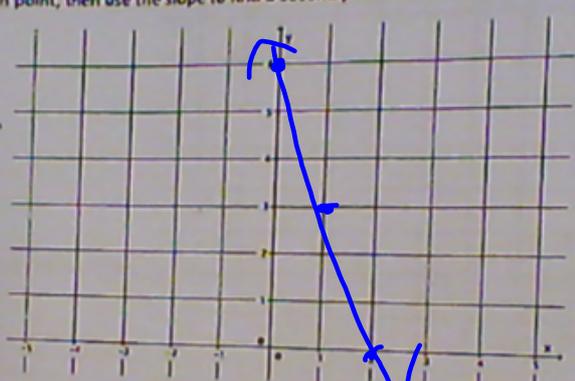
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2. Graph the equation $y = -3x + 6$.

a. Name the slope and the y-intercept. $m = -\frac{3}{1}$ $b = 6$

b. Graph the known point, then use the slope to find a second point before drawing the line.



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3. The equation $y = 1x + 0$ can be simplified to $y = x$.

a. Name the slope and the y-intercept.

b. Graph the known point, then use the slope to find a second point before drawing the line.

$y = 1x + 0$

$m = 1$
 $b = 0$

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Graph the point $(0, 2)$.

a. Find another point on the graph using the slope, $m = \frac{2}{7}$.

b. Connect the points to make the line.

c. Draw a different line that goes through the point $(0, 2)$ with slope $m = \frac{2}{7}$. What do you notice?

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

cannot be done

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A bank put \$10 into a savings account when you opened the account. Eight weeks later you have a total of \$24.
 Assume you saved the same amount every week.

a. If y is the total amount of money in the savings account and x represents the number of weeks, write an equation in the form $y = mx + b$ that describes the situation.

$(0, 10)$
 b

$y = 1.75x + 10$
 $y = \frac{7}{4}x + 10$

b. Identify the slope and the y-intercept. What do these numbers represent?

Slope = \$1.75
 You put in \$1.75 each week
 y-intercept = (0, 10)
 Started w/ \$10 in account

0	10
8	24

$\frac{14}{8} \div 2 = \frac{7}{4}$
 $\frac{14}{8} \div 2 = \frac{7}{4}$
 1.75

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c. Graph the equation on a coordinate plane.

d. Could any other line represent this situation? For example, could a line through point $(0, 10)$ with slope $\frac{7}{5}$ represent the amount of money you save each week? Explain.

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6. A group of friends are on a road trip. So far they have driven 120 miles. They continue their trip and drive at a constant rate of 50 miles per hour.
- a. Let y represent the total distance traveled in x hours. Write an equation to represent the total number of miles driven in x hours.

$$y = 50x + 120$$

- b. Identify the slope and the y -intercept. What do these numbers represent?

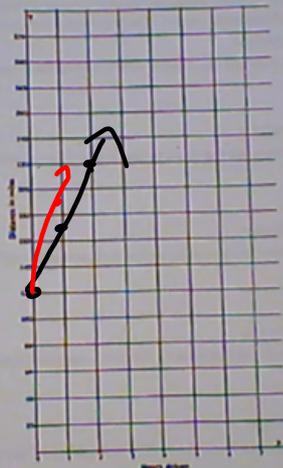
$$m = 50 \text{ mph}$$

$$b = (0, 120)$$

120 miles

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- c. Graph the equation on a coordinate plane.



- d. Could any other line represent this situation? For example, could a line through point $(0, 120)$ with slope 75 represent the total distance the friends drive? Explain.

no

c. 63

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Problem Set

Graph each equation on a separate pair of x and y axes.

- Graph the equation $y = \frac{4}{3}x - 5$.
 - Name the slope and the y -intercept.
 - Graph the known point, and then use the slope to find a second point before drawing the line.
- Graph the equation $y = x + 3$.
 - Name the slope and the y -intercept.
 - Graph the known point, and then use the slope to find a second point before drawing the line.
- Graph the equation $y = -\frac{4}{3}x + 4$.
 - Name the slope and the y -intercept.
 - Graph the known point, and then use the slope to find a second point before drawing the line.
- Graph the equation $y = \frac{5}{2}x$.
 - Name the slope and the y -intercept.
 - Graph the known point, and then use the slope to find a second point before drawing the line.
- Graph the equation $y = 2x - 6$.
 - Name the slope and the y -intercept.
 - Graph the known point, and then use the slope to find a second point before drawing the line.
- Graph the equation $y = -5x + 9$.
 - Name the slope and the y -intercept.
 - Graph the known point, and then use the slope to find a second point before drawing the line.

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- Graph the equation $y = \frac{1}{3}x + 1$.
 - Name the slope and the y -intercept.
 - Graph the known point, and then use the slope to find a second point before drawing the line.
- Graph the equation $5x + 4y = 8$. (Hint: transform the equation so that it is of the form $y = mx + b$.)
 - Name the slope and the y -intercept.
 - Graph the known point, and then use the slope to find a second point before drawing the line.
- Graph the equation $-2x + 5y = 30$.
 - Name the slope and the y -intercept.
 - Graph the known point, and then use the slope to find a second point before drawing the line.
- Let l and l' be two lines with the same slope m passing through the same point P . Show that there is only one line with a slope m , where $m < 0$, passing through the given point P . Draw a diagram if needed.

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Slope-Intercept Form

I. Solve for y .

$$4x + y = 3$$

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

$$y = 4x + 3$$

1. $x + y = 3$
2. $2x - y = 7$
3. $6 + 2y = 10x$
4. $3y - 6x + 12 = 0$

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II. Solve for y , state the m and y_0 .

$$9x - 3y = -6$$

$$y = 3x + 2$$

$$m = \frac{3}{1}$$

$$y_0 = 2$$

5. $2y - 6x = 2$
6. $y - 4x = -3$
7. $4y = 5x + 12$
8. $2x - 3y = 5$

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III. Graph the line by 1.) solving for y 2.) using m and y_0 3.) check one point

9. $4x + y = -8$
 $y = -4x - 8$
 $m = -\frac{4}{1}$
 $b = -8 (0, -8)$
 check: $y = -8 - (-8) \checkmark \therefore$
 $(2, 0) \quad y = 0$
 $10. \quad y - 3x = -9$

11. $2x - 4y = -16$

12. $3x + 3y + 4 = 0$

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1. $y = 2x - 4$ ✖ 2. $3x - y = 7$ ✖ 3. $2x + 3y = 6$

4. $y = -\frac{2}{3}x + 1$ ✖ 5. $x - 4y + 8 = 0$ ✖ 6. $6x - 5y = 15$

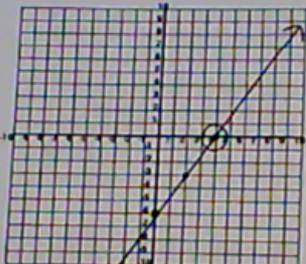
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Transform each equation to $y=mx+b$ and graph, find slope, find y-intercept, find coordinate on y-axis, check with one pt.

1.) $\frac{2y}{2} = \frac{3x-12}{2}$

M: $\frac{3}{2}$ b: -6 $(0, -6)$



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

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

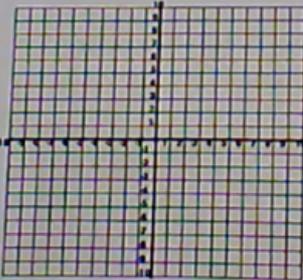
$y = 6 - 6$

$y = 0$ It checks!!
at $(4, 0)$

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2.) $x+y=3$ ↙

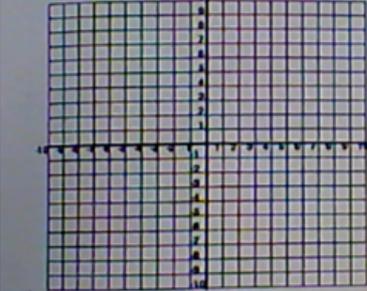
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3.) $2y - 6x = 2$

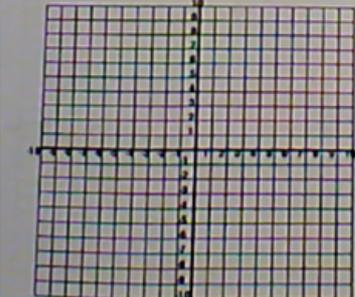
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4.) $y + 5x = 3$

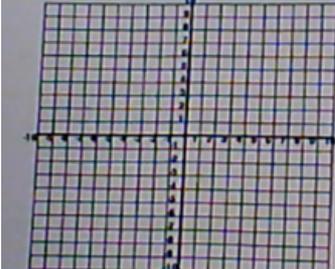
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5.) $2y = -6x + 10$

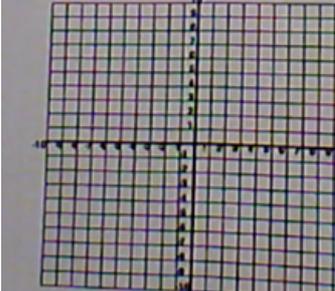
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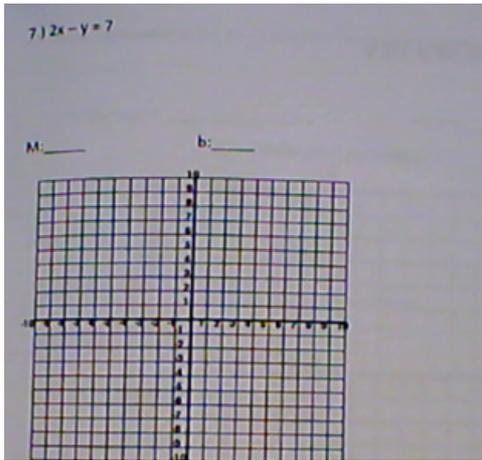
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6.) $4y = 5x - 12$

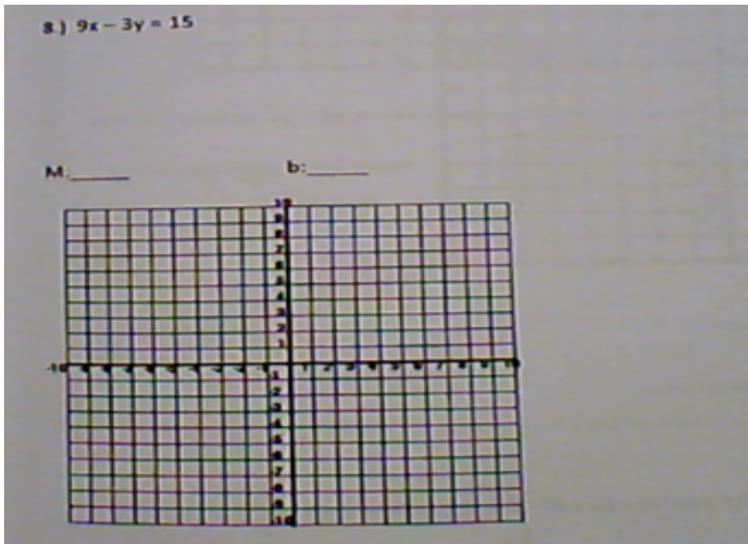
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$$\begin{array}{r} -6 + 2y = 10x \\ +6 \qquad \qquad +6 \end{array}$$

$$\frac{2}{2}y = \frac{10}{2}x + \frac{6}{2}$$

$$y = 5x + 3$$

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