Linear Equations Test Review

Horizontal and Vertical Lines

1. For each of the following lines, determine the slope, and determine the equation. (Hint – you do not NEED to graph):

a. Passes through (–3.5, 4) and (–3.5, 0)

Slope: undefined

Equation: $x = -3.5$

b. Passes through (1, 2) and (2, 2)

Slope: 0

Equation: $y = 2$

c. Passes through (3, –4) and (–8, –4)

Slope: 0

Equation: $y = -4$

d. Passes through (5, –4.8) and (5, –3.9)

Slope: undefined

Equation: $x = 5$

e. Passes through (–4, –4) and (–4, 3)

Slope: undefined

Equation: $x = -4$

f. Passes through (–3, 0) and (2, 0)

Slope: 0

Equation: $y = 0$

g. Passes through (–7.3, 9) and (–3.5, 9)

Slope: 0

Equation: $y = 9$

h. Passes through (3, 5) and (3, –5)

Slope: undefined

Equation: $x = 3$

i. Passes through (–4, 1) and (–1, 1)

Slope: 0

Equation: $y = 1$

j. Passes through (3, –4) and (–8, –4)

Slope: 0

Equation: $y = -4$

k. Passes through (5, –4.8) and (5, –3.9)

Slope: undefined

Equation: $x = 5$

l. Passes through (3.5, –3.5) and (3.5, 3.5)

Slope: undefined

Equation: $x = 3.5$

2. Determine whether the following lines are vertical, horizontal or neither:

H **a. y = 5**

V **b. x = –3.4**

V **c. Passes through (7.8, 4) and (7.8 –4)**

N **d. Passes through (5.73, 4.02) and (6.73, –4.02)**

N **e. Passes through (6.5, 4.2) and (–6.5, –4.2)**

H **f. y = 45**

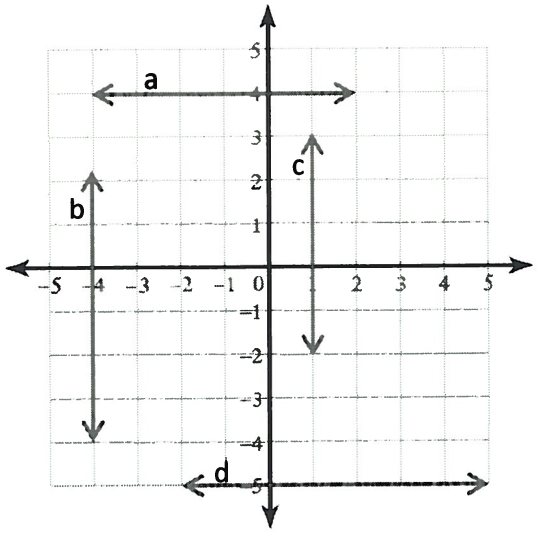
V **g. x = –9.3**

N **h. Passes through (8, 4) and (–8 –4)**

N **i. Passes through (23, 3) and (3, 23)**

H **j. Passes through (6, 3.4) and (–6, 3.4)**

3. Determine the equation for each of the following lines:



a) $y = 4$

b) $x = -4$

c) $x = 1$

d) $y = -5$

Parallel and Perpendicular Lines

4. For each of the following, find the equation of a line that is parallel, **and** a line that is perpendicular:

* answers will vary

		Parallel	Perpendicular
a.	**$y = -3x + 7$**	$y = -3x + 8$	$y = \frac{1}{3}x - 7$
b.	**$y = 8x - 6$**	$y = 8x$	$y = \frac{-1}{8}x + 100$
c.	**$y = 9$**	$y = 10$	$x = 43$
d.	**$y = 5$**	$y = -22$	$x = 5$
e.	**$y = \frac{2}{3}x - 5$**	$y = \frac{2}{3}x + 9$	$y = \frac{-3}{2}x - 10$
f.	**$y = \frac{-1}{4}x + 7$**	$y = \frac{-1}{4}x - 7$	$y = 4x + 42$
e.	**A line that passes through (0, 1) and (2, 4)**	$y = \frac{3}{2}x + 30$	$y = \frac{-2}{3}x - 89$
f.	**A line that passes through (–5, –1) and (–8, –6)**	$y = \frac{5}{3}x - 34$	$y = \frac{-3}{5}x$
g.	**$x = -4$**	$x = 5$	$y = 7$
h.	**$x = 3$**	$x = -4$	$y = -3$

5. Conclude whether the following pairs represent parallel lines, perpendicular lines, or neither, and state WHY:

a.	$y = \frac{1}{5}x - 7$ and $y = \frac{1}{7}x - 5$ Neither. $\frac{1}{5} \neq \frac{1}{7}$, so they are not parallel. The negative reciprocal of $\frac{1}{5}$ is -5, not $\frac{1}{7}$.	d.	$y = 9x$ and $y = \frac{1}{9}x + 3$ Neither. $9 \neq \frac{1}{9}$, so they are not parallel. The negative reciprocal of 9 is $-\frac{1}{9}$, not $\frac{1}{9}$
b.	$y = -2x + 1$ and $y = \frac{1}{2}x - 1$ Perpendicular, because $-2 \neq \frac{1}{2}$ are negative reciprocals.	e.	$y = 4x + 8$ and $y = -4x - 1$ Neither. $4 \neq -4$, so they are not parallel. The negative reciprocal of 4 is $\frac{-1}{4}$, not -4
c.	$y = 0.5x - 3$ and $y = \frac{1}{2}x + 7$ Parallel. $0.5 = \frac{1}{2}$	f.	$y = -5x + 12$ and $y = 13 - 5x$ Parallel. $-5 = -5$.

6. Find the equation of a line that is perpendicular to $y = \frac{3}{7}x - 9$ and passes through (3, –4)

$y = \frac{-7}{3}x + 3$

7. Find the equation of a line that has the same y-intercept as $3x - 5y + 2 = 0$ and is parallel to $y = 5x + 7y - 5 = 0$

$y = \frac{-5}{7}x + \frac{2}{5}$

8. Find the equation of a line that has the same x-intercept as $y = 6x - 4$ and passes through (3, 2)

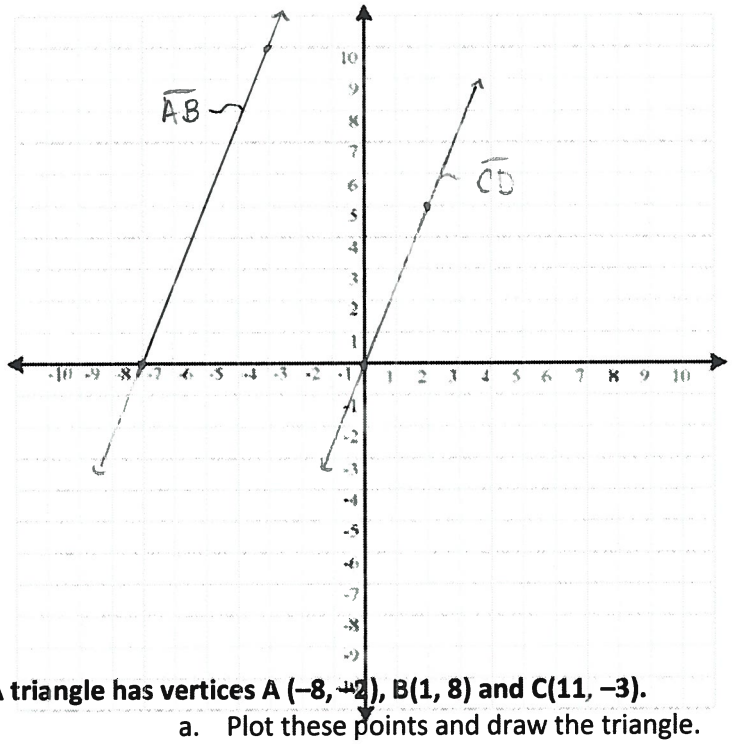
$y = 2x - 4$

9. Find the equation of a line that is perpendicular to $y = \frac{-1}{4}x + 8$ and has the same y-intercept at $y = 2x - 9$

$y = 4x - 9$

10. **Line AB passes through A(–7,0) and B(–3,10). Line CD passes through C(0,0) and D(2, 5).**

a. Plot these points and draw the lines.



b. Do these lines appear to be parallel, perpendicular, or neither? Explain.

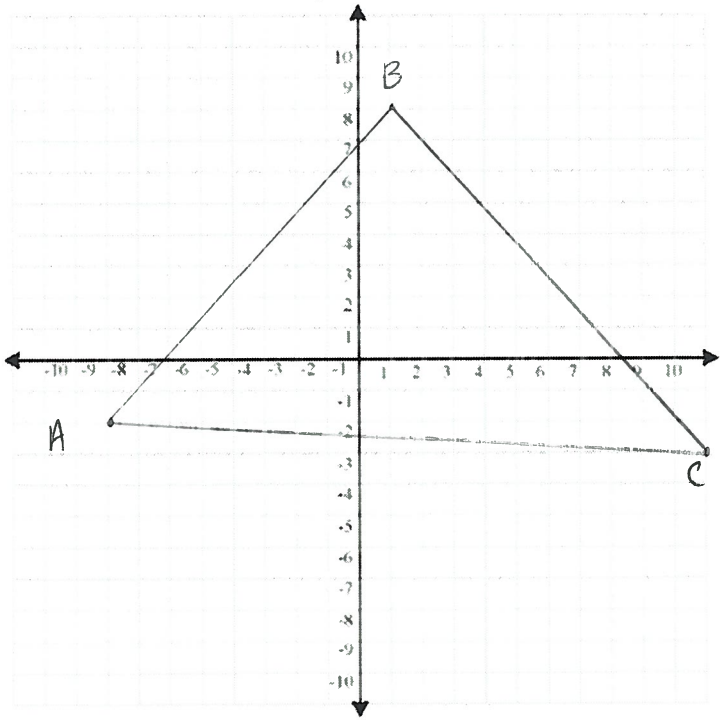
Parallel. It does not appear that they will ever meet

c. Conclude whether these lines are parallel, perpendicular, or neither by finding the slopes of the line segments.

Both slopes are $\frac{5}{2}$, so they are parallel.

11. **A triangle has vertices A (–8, –2), B(1, 8) and C(11, –3).**

a. Plot these points and draw the triangle.



b. Does this appear to be a right triangle? Explain.

$\angle ABC$ appears to be a right angle. It looks like it is 90°.

c. Using the slopes of the line segments, conclude whether or not this is a right triangle.

No it is not, because the slope of $\overline{AB}$ is $\frac{10}{9}$, which is not the negative reciprocal of the slope of $\overline{BC}$, which is $\frac{11}{-10}$.

Standard Form

12. The following equations are in Slope y-Intercept Form. Convert them to Standard Form.

a. $y = 2x - 33$

$2x - y - 33 = 0$

b. $y = -5x - 3.5$

$10x + 2y + 7 = 0$

c. $y = \frac{3}{5}x - 8$

$3x - 5y - 40 = 0$

d. $y = \frac{5}{8}x - \frac{1}{4}$

$5x - 8y - 2 = 0$

e. $y = -5x - 27$

$5x + y + 27 = 0$

f. $y = \frac{5}{9}x + \frac{1}{6}$

$10x + 18y + 5 = 0$

g. $y = 5x - \frac{1}{3}$

$15x - 3y - 1$

h. $y = -\frac{4}{5}x - \frac{9}{11}$

$44x + 55y + 45 = 0$

13. The following equations are in Standard Form. Convert them to Slope y-Intercept Form.

a. $4x + y + 2 = 0$

$y = -4x - 2$

b. $5x - 7y + 1 = 0$

$y = \frac{5}{7}x + \frac{1}{7}$

c. $x - 14y - 7 = 0$

$y = \frac{1}{14}x - \frac{1}{2}$

d. $5x + 12y - 4 = 0$

$y = \frac{-5}{12}x - \frac{1}{3}$

e. $9x + 24y + 35 = 0$

$y = \frac{-3}{8}x - \frac{35}{24}$

f. $5x - 7y = 0$

$y = \frac{5}{7}x$

Graphing from Standard Form

14. The following equations are in Standard Form. Graph each line on the grid at the right by finding the x and y intercepts. LABEL each line.

a. **5x – 6y + 30 = 0**

(0, 5) & (-6, 0)

b. **12x – 8y – 48 = 0**

(0, -6) & (4, 0)

c. **x + 5y – 10 = 0**

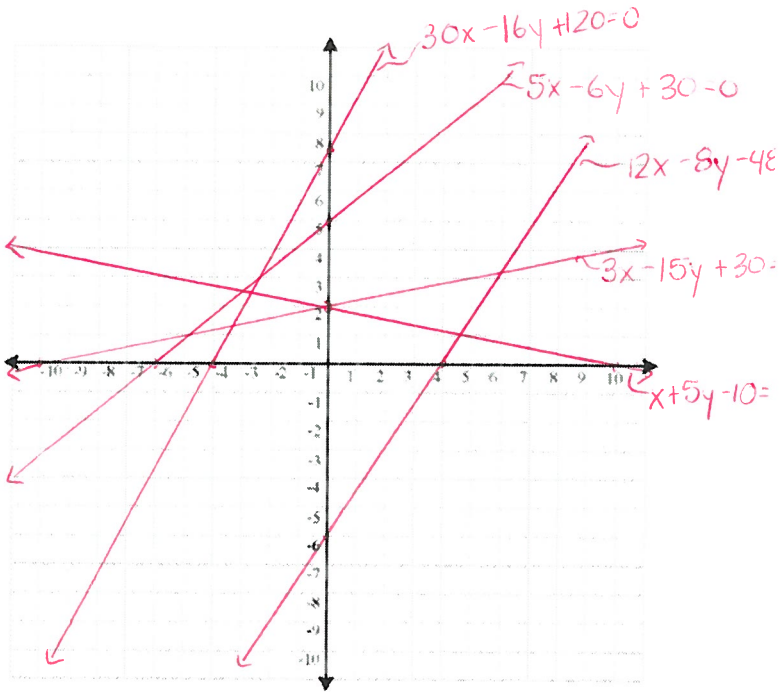
(0, 2) & (10, 0)

d. **30x – 16y + 120 = 0**

(0, 7.5) & (-4, 0)

e. **3x – 15y + 30 = 0**

(0, 2) & (-10, 0)



Word Problems in Standard Form

15. You have 300lbs of rice that needs to be packaged and stored. You have two types of containers: 3lb containers and 5lb containers.

a. Write an equation that represents the different number of 3lb and 5lb containers that will hold all of the rice. Define your variables.

let t be # of 3 lb containers

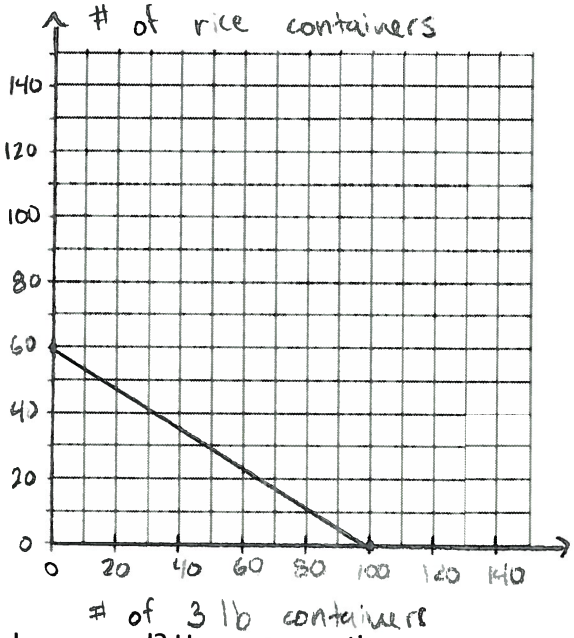
let f be # of 5 lb containers

3t + 5f = 300

b. Graph this relationship by finding and plotting the x- and y-intercepts.

0 3lb containers & 60 5lb

100 3lb containers & 0 5lb



c. If you use twenty 3lb containers, how many 5lb containers do you need? Use your equation.

You will need 48 5lb containers

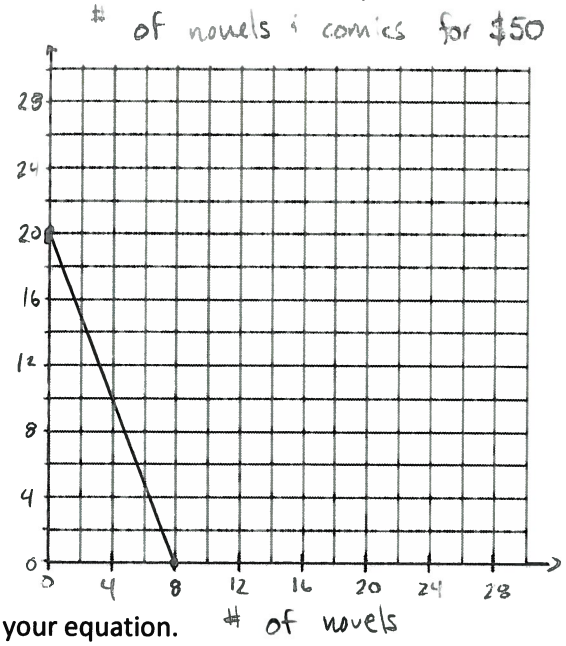
16. Julia loves to read. She has $50 to spend at her favourite used book store. Comic books cost $2.50 each, and novels cost $6.25 each.

a. Write an equation that represents the different number of comics and novels she can buy. Define your variables.

Let c be # of comics
Let n be # of novels

$2.5c + 6.25n = 50$

b. Graph this relationship by finding and plotting the x- and y-intercepts.



0 novels & 20 comics

8 novels & 0 comics

c. If Julia buys 10 comics, how many novels can she buy? Use your equation.

$2.5(10) + 6.25n = 50$

$n = 4$

∴ She can buy 4 novels.

Challenge Question

17. A line has the equation $12x - 6y + 3 = 0$. Point A (2,3) lies somewhere beside this line. If you were to draw a line perpendicular to the original line and passing through this point, it would be the shortest distance between the line and the point. What is the equation of this line that represents the shortest distance? Where does it intersect the original line?

$12x - 6y + 3 = 0$

$\frac{12x + 3}{6} = \frac{6y}{6}$

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

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

new line:

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

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

$3 = -1 + b$

$4 = b$

$y = -\frac{1}{2}x + 4$

∴ The equation of the line that represents the shortest distance is $y = -\frac{1}{2}x + 4$

point of intersection

$y = -\frac{1}{2}x + 4$ & $y = 2x + \frac{1}{2}$

$2\left(-\frac{1}{2}x + 4\right) = \left(2x + \frac{1}{2}\right)2$

$-1x + 8 = 4x + 1$

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

$1.4 = x$

$y = 2(1.4) + 0.5$

$y = 3.3$

∴ The point of intersection is (1.4, 3.3)