

As seen on last week's assignment...

- Determine the type of relation when given data, equation or graph.
- Determine the linear equation when given either data or graph.
- Generate data and graph for any equation.

New items...(these will be seen on an assignment later this week (likely Friday):

- Recognize relations which have the same slope (parallel) or the same y-intercept by their equations or by graphs.
- Determine the slope, y-intercept, x-intercept and equations when given data (linear only).
- Find the intersection of two lines (the coordinates which are shared by two or more relations).
- Rearrange linear equations to the slope/y-intercept form ($y=mx+b$).
- You WILL NOT be asked to find the equations for non-linear relations...yet.
- You MAY be asked to generate data and graph non-linear relations.

Rearrange the following into slope/y-intercept form:

1. $4y + 10 = 8x$

$$4y + 10 - 10 = 8x - 10$$

$$4y = 8x - 10$$

$$\frac{4y}{4} = \frac{8x}{4} - \frac{10}{4}$$

$$y = 2x - 2.5$$

2. $12x + 9 = 3y$

$$3y = 12x + 9$$

$$\frac{3y}{3} = \frac{12x}{3} + \frac{9}{3}$$

$$y = 4x + 3$$

3. $10x - 7 = 11y$

$$11y = 10x - 7$$

$$\frac{11y}{11} = \frac{10x}{11} - \frac{7}{11}$$

$$y = \frac{10}{11}x - \frac{7}{11}$$

4. What do the following have in common:

a) $y = 12x - 5$ b) $y = 12x + 7$ c) $y = -3x + 7$

a) and b) have the same slope (parallel, both slopes are 12)

b) and c) have the same y-intercept (both are 7)

5. Determine the slope, y-intercept (b), x-intercept and equation for each linear relation:

a)

x	y
-1	4
0	7
1	10
2	13

$$\text{slope} = (10-7)/(1-0) = 3$$

$$\begin{aligned} y &= 3x + b \\ 7 &= 3(0) + b \\ 7 &= b \end{aligned}$$

$$\begin{aligned} \text{x-intercept (let } y &= 0) \\ 0 &= 3(x) + 7 \\ 0 - 7 &= 3(x) + 7 - 7 \\ -7 &= 3x \\ -7/3 &= 3x/3 \\ -7/3 &= x \end{aligned}$$

$$\begin{aligned} \text{equation: } y &= mx + b, \text{ so} \\ y &= 3x + 7 \end{aligned}$$

b)

x	y
-1	-2
0	2
1	6
2	10

$$\text{slope} = (10-6)/(2-1) = 4$$

$$\begin{aligned} y &= 4x + b \\ 2 &= 4(0) + b \\ 2 &= b \end{aligned}$$

$$\begin{aligned} \text{x-intercept (let } y &= 0) \\ 0 &= 4(x) + 2 \\ 0 - 2 &= 4(x) + 2 - 2 \\ -2 &= 4(x) \\ -2/4 &= x = -0.5 \end{aligned}$$

$$\begin{aligned} \text{equation: } y &= mx + b, \text{ so} \\ y &= 4x + 2 \end{aligned}$$

c)

x	y
-6	12
-5	7
-4	2
-3	-3

$$\text{slope} = (7-12)/(-5-(-6)) = -5$$

$$\begin{aligned} y &= -5x + b \\ 2 &= -5(-4) + b \\ 2 &= 20 + b \\ 2 - 20 &= 20 + b - 20 \\ -18 &= b \end{aligned}$$

$$\begin{aligned} \text{x-intercept (let } y &= 0) \\ 0 &= -5(x) - 18 \\ 0 + 18 &= -5(x) - 18 + 18 \\ 18 &= -5(x) \\ 18/-5 &= -5x/-5 \\ x &= -3.6 \end{aligned}$$

$$\begin{aligned} \text{equation: } y &= mx + b, \text{ so} \\ y &= -5x - 18 \end{aligned}$$

6. At what coordinates do each pair of lines cross?

(Make a new equation from the two $mx+b$, then solve for x by balancing. Take the value of x and insert it into either equation to solve for y .)

$$\begin{aligned} \text{a) } y &= 2x - 5 \\ y &= -0.5x + 1 \end{aligned}$$

$$\begin{aligned} 2x - 5 &= -0.5x + 1 \\ 2x - 5 + 0.5x &= -0.5x + 1 + 0.5x \\ 2.5x - 5 &= 1 \\ 2.5x - 5 + 5 &= 1 + 5 \\ 2.5x &= 6 \\ 2.5x / 2.5 &= 6/2.5 \\ x &= 2.4 \end{aligned}$$

$$\begin{aligned} y &= 2(2.4) - 5 \\ y &= 4.8 - 5 = -0.2 \\ \text{lines intersect at } &(2.4, -0.2) \end{aligned}$$

$$\begin{aligned} \text{b) } y &= 4x - 1 \\ y &= -2x + 9 \end{aligned}$$

$$\begin{aligned} 4x - 1 &= -2x + 9 \\ 4x - 1 + 2x &= -2x + 9 + 2x \\ 6x - 1 &= 9 \\ 6x - 1 + 1 &= 9 + 1 \\ 6x &= 10 \\ 6x / 6 &= 10/6 \\ x &= 10/6 \end{aligned}$$

$$\begin{aligned} y &= -2(10/6) + 9 \\ y &= -20/6 + 9 \\ y &= -20/6 + 54/6 \\ y &= 34/6 \\ \text{lines intersect at } &(10/6, 34/6) \end{aligned}$$

7. At what coordinates do each pair of lines cross?

a) $y = 5x - 8$
 $y = -3x + 4$

$$\begin{aligned} 5x - 8 &= -3x + 4 \\ 5x - 8 + 3x &= -3x + 4 + 3x \\ 8x - 8 &= 4 \\ 8x - 8 + 8 &= 4 + 8 \\ 8x &= 12 \\ 8x / 8 &= 12 / 8 \\ x &= 1.5 \end{aligned}$$

$$\begin{aligned} y &= 5(1.5) - 8 \\ y &= 7.5 - 8 = -0.5 \\ \text{lines intersect at } &(1.5, -0.5) \end{aligned}$$

b) $y = x - 4$
 $y = -4x + 16$

$$\begin{aligned} x - 4 &= -4x + 16 \\ x - 4 + 4x &= -4x + 16 + 4x \\ 5x - 4 &= 16 \\ 5x - 4 + 4 &= 16 + 4 \\ 5x &= 20 \\ 5x / 5 &= 20 / 5 \\ x &= 4 \end{aligned}$$

$$\begin{aligned} y &= (4) - 4 \\ y &= 0 \quad \text{lines intersect at } (4, 0) \end{aligned}$$

Please find the following assigned work...I will be collecting them momentarily:

- Oct.19th, pg. 76, #5
- Oct. 23rd, pg. 101, #16

[As before, these are being marked as an assignment and, as you have now been given a full week extension beyond the original due date, if you submit nothing it will be marked as zero.]