Name: Key Date: Math7

# Review Sheet Unit 9

1. Determine whether the relation {(5,3) (-5,4) (4,2) (4,1)} is a function. Explain your reasoning.

The relation is NOT a function because the x value of 4 repeats.

**Example 1**

**Determine whether the relation shown in the table below is a function. Explain.**

| x | 9 | 11 | 13 | 17 | 21 |
|---|---|---|---|---|---|
| y | 7 | 3 | −1 | −5 | −7 |

Yes; it is a function since each domain value is paired with only one range value.

2. **Use the table below that shows the cost of gas in different years. Is the relation a function? Explain.**

x

| Year | 2002 | 2004 | 2006 |
|---|---|---|---|
| Cost ($) | 1.36 | 1.82 | 2.26 |

y

Yes, because the input value, years, does not repeat.

Find four **solutions** of each equation. Write the solution as an ordered pair.
*(Hint: make a table of values)*

3. a) y= -5x

pick any x values

| x | y= -5x | y | (x,y) |
|---|---|---|---|
| -1 | -5(-1) | 5 | (-1,5) |
| 0 | -5(0) | 0 | (0,0) |
| 1 | -5(1) | -5 | (1,-5) |
| 2 | -5(2) | -10 | (2,-10) |

b) x + y = -1 $y = -x - 1$

−x −x

| x | y=-x-1 | y | (x,y) |
|---|---|---|---|
| -1 | -(-1)-1 | 0 | (-1,0) |
| 0 | 0-1 | -1 | (0,-1) |
| 1 | -1-1 | -2 | (1,-2) |
| 2 | -2-1 | -3 | (2,-3) |

4. Each small smoothie x costs $1.50 and each large smoothie y costs $3. Find two solutions of 1.5x + 3y = 12 to determine how many of each type of smoothie Lisa can buy with $12.

plug in any positive x value

$1.5x + 3y = 12$

$-1.5x \quad -1.5x$

$\frac{3y}{3} = \frac{-1.5x}{3} + \frac{12}{3}$

$y = -.5x + 4$

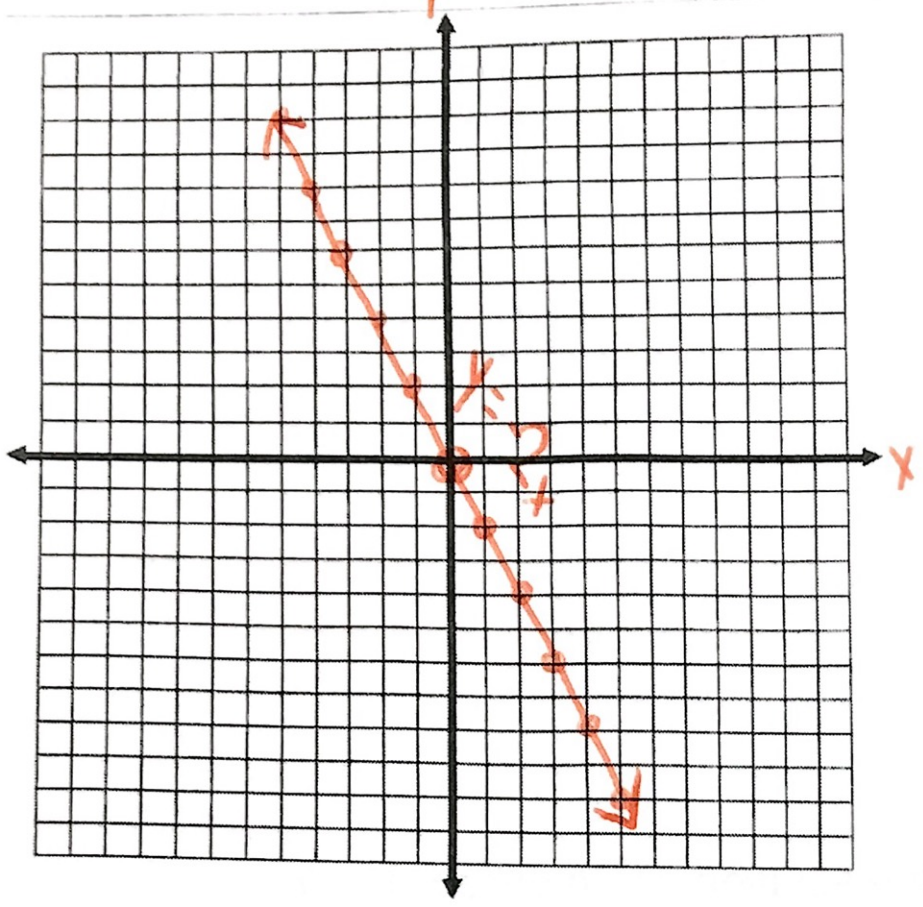
ex: • 2 small smoothies
3 large smoothies
(2,3)

$-.5(2)+4 = 3$

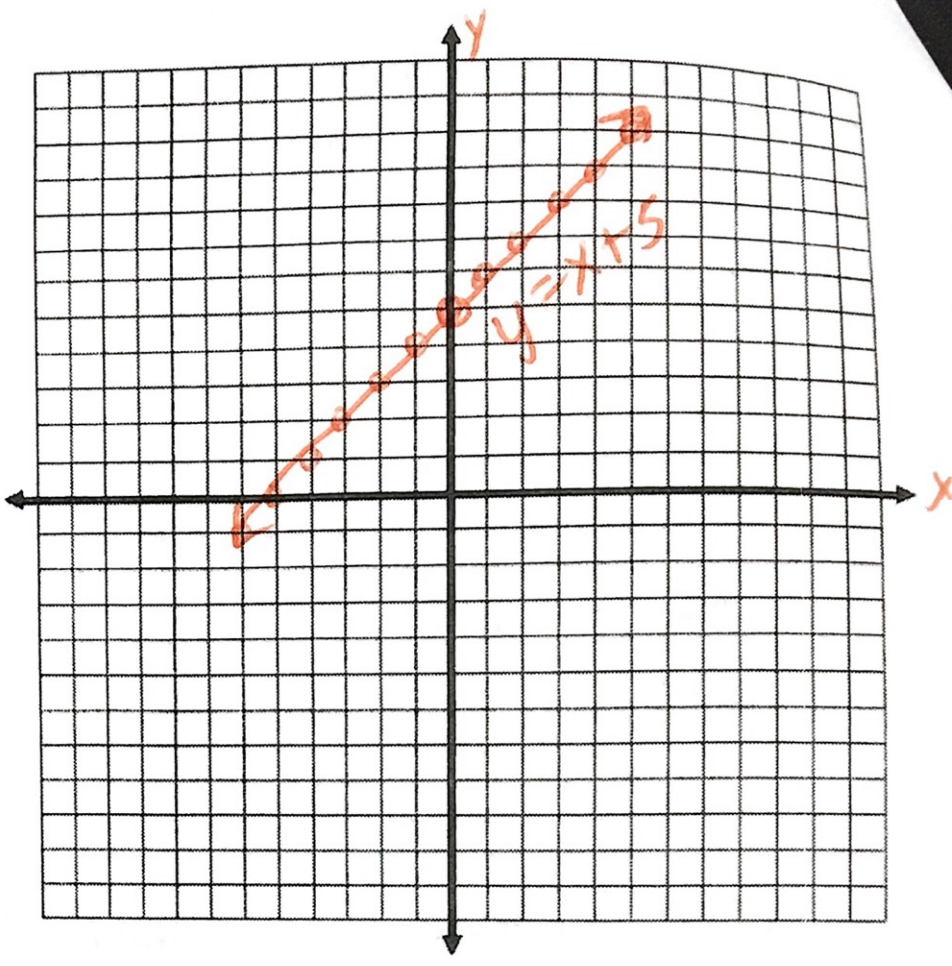
ex: • 4 small smoothies
2 large smoothies
$-.5(4)+4 = 2$

Graph the following:

5. a) $y = -2x$ $m = -\frac{2}{1}$ $b = 0$




b) $y = x + 5$ $m = \frac{1}{1}$ $b = 5$




6. Find the **constant rate of change** between the quantities in the table below.

slope

| | | | | |
|---|---|---|---|---|
| x | Time (h) | 0 | 4 | 8 |
| y | Money Earned ($) | 0 | 31 | 62 |

$(0,0)$ $(4,31)$ $(8,62)$

$x_1\ y_1$ $x_2\ y_2$

$\frac{y_2 - y_1}{x_2 - x_1}$

$\frac{31-0}{4-0} = \frac{31}{4} = 7.75$ $ per hour

7. Find the slope of the line given:

a) F(0,1) G(6,4)

$x_1\ y_1$ $x_2\ y_2$ $\frac{y_2 - y_1}{x_2 - x_1}$

$m = \frac{4-1}{6-0} = \frac{3}{6} = \frac{1}{2}$

b) A(-3, 7) G(5,-1)

$x_1\ y_1$ $x_2\ y_2$

$m = \frac{-1-7}{5--3} = \frac{-8}{8} = \frac{-1}{1}$

Example 3

**Find the constant rate of change in the water level.**

| Time (min) | 0 | 4 | 8 |
|---|---|---|---|
| Water Level (ft) | 5 | 4 | 3 |

$$\text{rate of change} = \frac{\text{change in water level}}{\text{change in time}} = \frac{5\text{ ft} - 4\text{ ft}}{0\text{ min} - 4\text{ min}} = \frac{1\text{ ft}}{-4\text{ min}} \text{ or } -\frac{1}{4}\text{ ft/min}$$

The rate of change is $-\frac{1}{4}$ feet per minute.

8. A lizard is crawling up a hill that rises 5 feet for every horizontal change of 30 feet. Find the slope.

rise 5ft

30ft run

$\frac{5}{30} = \frac{1ft}{6ft}$

9. The distance Mrs. Salazar drives varies directly with how long she has been driving.

x

| Time (hrs) | 2 | 4 | 6 | 8 |
|---|---|---|---|---|
| Distance (miles) | 40 | 80 | 120 | 160 |

y

a. Identify the constant of proportionality $m = \frac{y}{x}$ $\frac{40}{2} = 20$

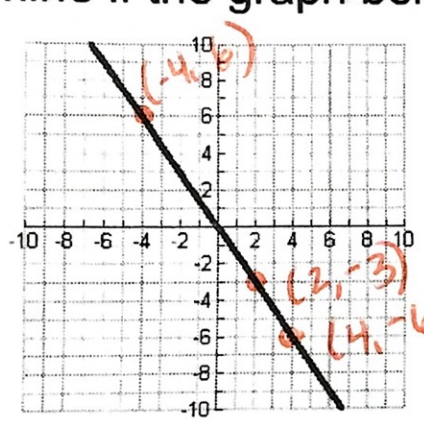
b. Write an equation that models her distance traveled.

$y = 20x$

c. How far has she driven after 13 hours?

$20(13) = 260$ miles

10. Determine if the graph below represents a direct variation. Explain why or why not.




Yes, the graph goes through the origin (0,0)

ALSO $\frac{y}{x} = \frac{-6}{4} = \frac{-3}{2} = \frac{-3}{2}$

same m value

11. The cost of renting a paddle boat varies directly with the number of hours as shown in the table.

$x_1$ $x_2$

x

| Hours | 2 | 3 | 4 | 5 |
|---|---|---|---|---|
| Cost ($) | 18 | 27 | 36 | 45 |

y

$y_1$ $y_2$

a) Identify the constant rate of change slope $\frac{27-18}{3-2} = \frac{9}{1}$

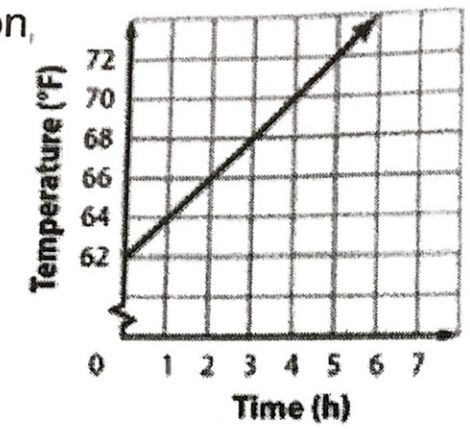
b) Write an equation that relates the number of hours with the cost.

$y = 9x$

c) Find the cost of renting a paddle boat for 7 hours.

$9(7) = \$63$

**12.** Determine whether the relationship between temperature and time is a direct variation.




- NO, because the line does not go through (0,0)
- Also, there is no constant slope of proportionality

**13.** State the slope and y-intercept of the graph of **each** equation.

y=mx+b

A) $y = 4x + 7$

m=4/1 b=7

B) $5x + y = 0$

-5x -5x

y=-5x m=-5/1 b=0

C) $y = -8x - 7$

m=-8/1 b=-7

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

m=-4/3 b=0

E) $-x + y = -8$

+x +x

y=x-8 m=1/1 b=-8

F) $4x - y = 6$

+y +y

4x-6=y

m=4/1 b=-6

**Example 5**

**State the slope and *y*-intercept of the graph of $y = 4x - 1$. Then graph the equation.**

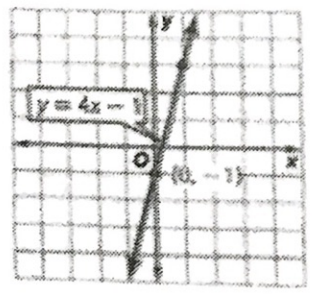
$y = 4x - 1$ Write the original equation

$y = 4x + (-1)$ Write the equation in the form $y = mx + b$.

$y = mx + b$ $m = 4, b = -1$

The slope of the graph is 4 and the *y*-intercept is −1.

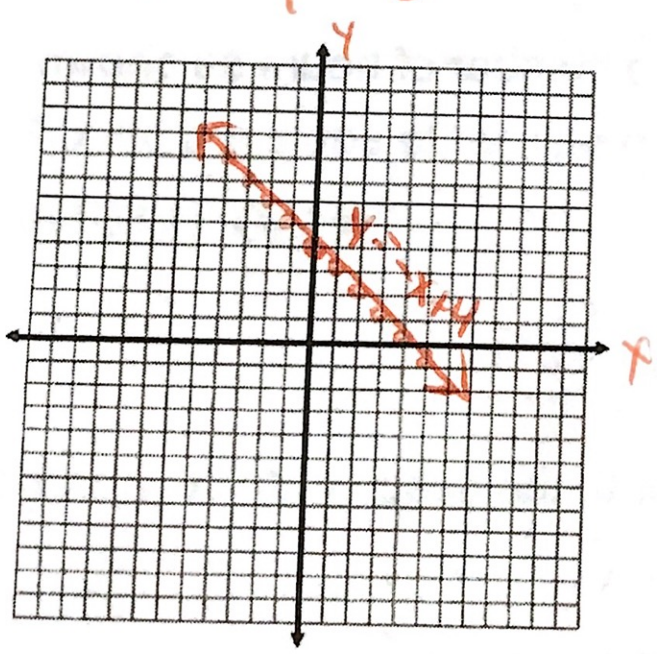
To graph the equation, first write the slope as $\frac{4}{1}$. Plot the point at (0, −1). Then go up 4 and right 1. Connect the points and extend the line.




**14.** Graph each equation using the slope and y-intercept.

a) $y = -x + 4$

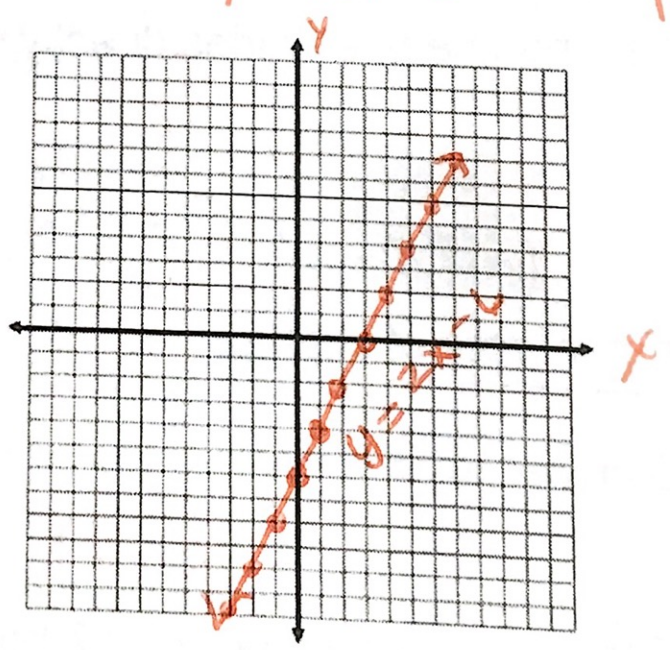
m=-1/1 b=4




b) $y + 6 = 2x$

-6 -6

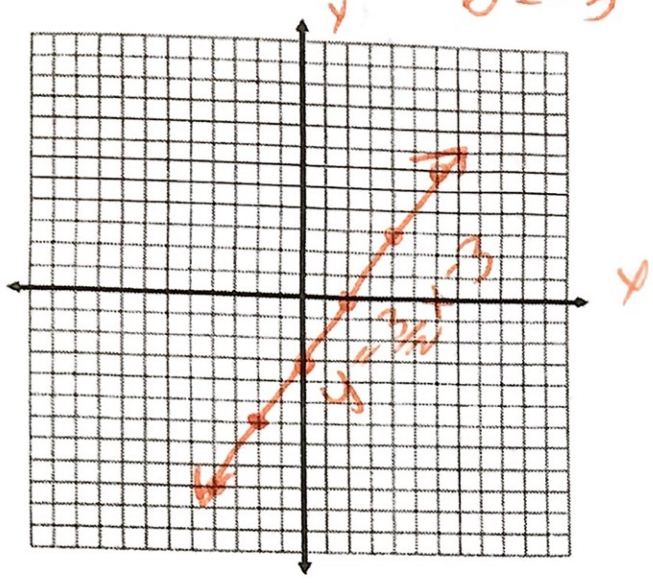
y=2x-6 m=2/1 b=-6



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

$m = \frac{3}{2}$

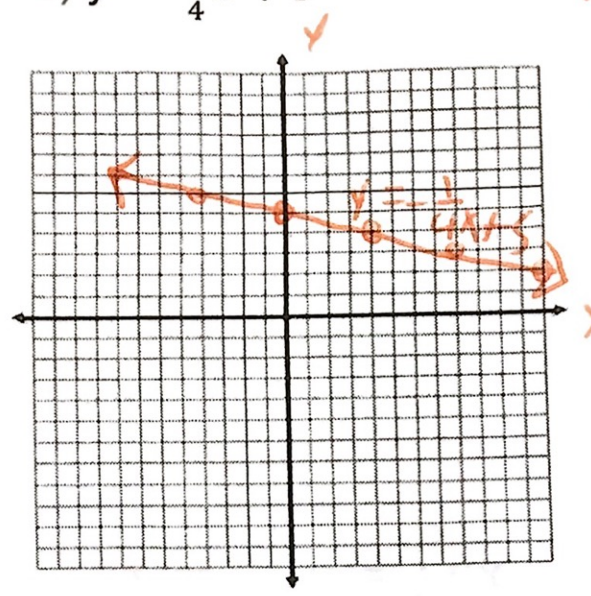
$b = -3$




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

$m = -\frac{1}{4}$

$b = 5$




**15.** A balloon is rising above the ground. The height in feet $y$ of the balloon can be given by $y = 7 + 2x$, where $x$ represents the time in seconds. State the slope and $y$-intercept of the graph of the equation. Describe what they represent.

slope $= \frac{2}{1}$ the balloon rises 2 ft every 1 second

y-intercept = 7 the balloon started at a height of 7 feet

**16.** Jacob is ordering DVDs from a Web site. The site charges a flat rate for shipping, no matter how many DVDs he buys. The total cost $y$ of Jacob's order is given by $y = 9x + 5$, where $x$ represents the number of DVDs he buys. State the slope and $y$-intercept of the equation. Describe what they represent.

slope $= \frac{9}{1}$ $9 for every 1 DVD

y intercept = $5 $5 is the flat rate for shipping

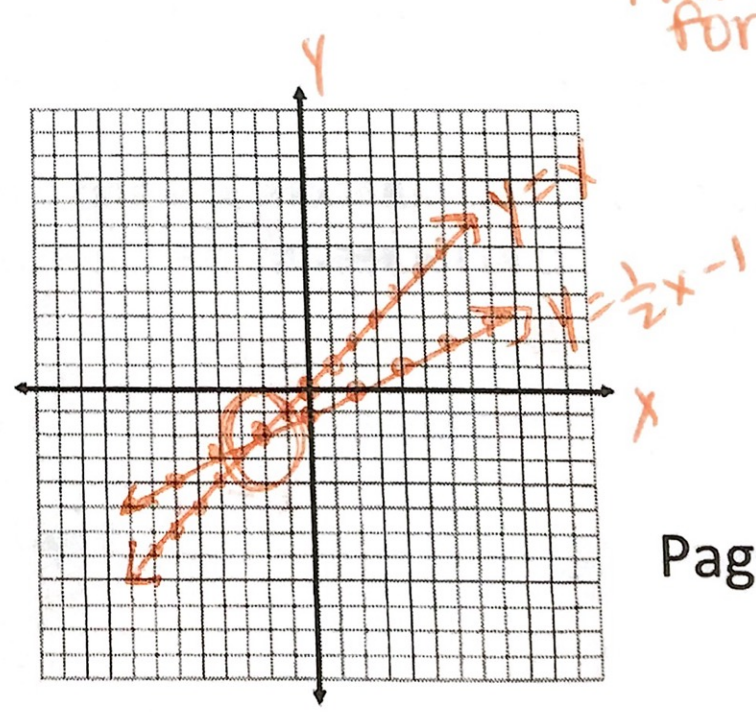
**17.** Solve each system by **graphing**

A) $y = x$ $y = \frac{1}{2}x - 1$

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

$b = 0$ $b = -1$

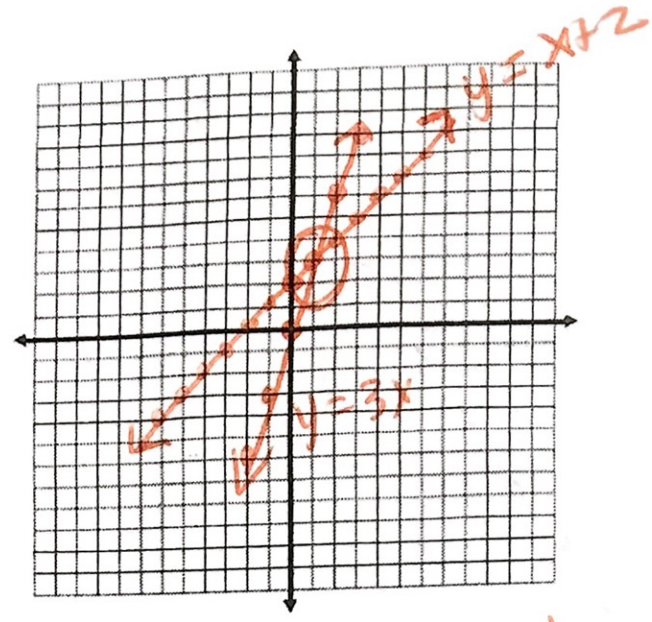
Solution: $(-2, -2)$



B) y= x +2  y= 3x

$m=\frac{1}{1}$ $b=2$  $m=\frac{3}{1}$ $b=0$

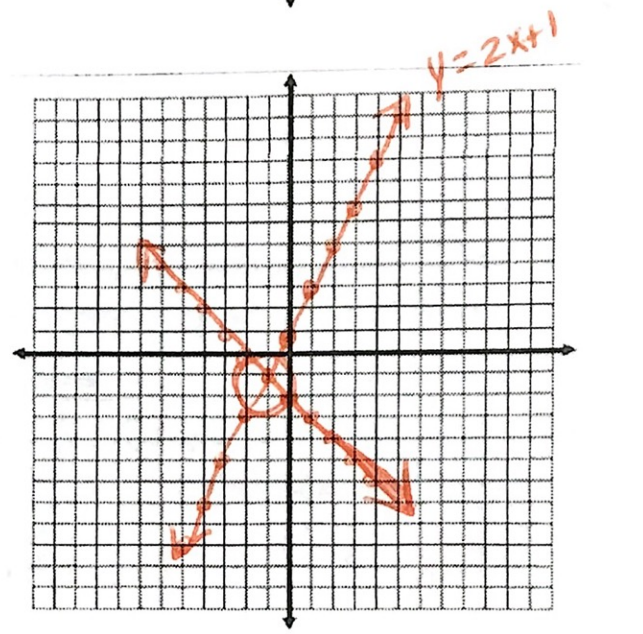
Solution: (1,3)




C) y= 2x + 1  x + y = -2  $y=-x-2$

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

Solution: (-1,-1)




D) 5x -3y = -3  y= -x + 1

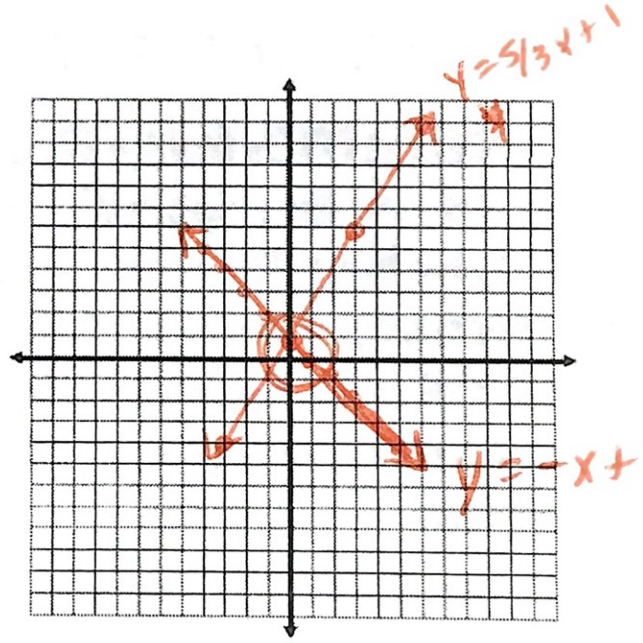
$\frac{-5x}{}$ $\frac{-5x}{}$

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

$m=\frac{-1}{1}$ $b=1$

Solution: $y=\frac{5}{3}x+1$  $m=\frac{5}{3}$ $b=1$

(0,1)




**18.** The sum of two numbers is 9 and the difference of the numbers is 1. Write a system of equations to represent this situation. Then solve the system to find the numbers.

Let x = 1st #

y = 2nd #

$x+y=9$

$x-y=1$

$x=1+y$

$1+y+y=9$

$1+2y=9$

$-1 \quad -1$

$\frac{2y}{2}=\frac{8}{2}$

$y=4$

to find x.

$x+4=9$

$-4 \quad -4$

$x=5$

(5,4)

5 and 4

→ use substitution!

**19.** Solve each system algebraically.

a) $y=4$ $\quad y= 3x -11$

$4 = 3x - 11$

$+11 \quad +11$

$15 = 3x$

$x = 5$

solution: $(5, 4)$

b) $y= 6-x$ $\quad x = -1$

$6-(-1) = 7$

$(-1, 7)$

c) $2x + y = 3$ $\quad y= -3x + 7$

$2x - 3x + 7 = 3$

$-1x + 7 = 3$

$-7 \quad -7$

$\frac{-1x}{-1} = \frac{-4}{-1}$ $\quad x = 4$

$(4, -5)$

to find y:

$-3(4)+7$

$-12+7 = -5$

d) $-5x + y = 2$ $\quad -3x + 6y = 12$

$+5x \quad +5x$

$y = 5x + 2$

$-3x + 6(5x+2) = 12$

$-3x + 30x + 12 = 12$

$27x + 12 = 12$

$-12 \quad -12$

$\frac{27x}{27} = \frac{0}{27}$ $\quad x = 0$

$(0, 2)$

$-5(0) + y = 2$

$0 + y = 2$

$y = 2$

challenge

e) $7x - 3y = -4$ $\quad 7x = -2 + 3y$

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

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

$7(-\frac{2}{7} + \frac{3}{7}y) - 3y = -4$

$-2 + 3y - 3y = -4$

→ NO SOLUTION

f) $-4x + y = 6$ $\quad -5x - y = 21$

$+y \quad +y$

$-5x - 21 = y$

$-4x + (-5x - 21) = 6$

$-9x - 21 = 6$

$+21 \quad +21$

$\frac{-9x}{-9} = \frac{27}{-9}$ $\quad x = -3$

$-12 + y = 6$

$-12 \quad -12$

$y = -6$

$(-3, -6)$

to find y:

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

$12 + y = 6$

g) Tickets to a museum costs $3 for children and $8 for adults. A group of four visitors to the museum spent a total of $22 on tickets. Write and solve a system of equations to represent this situation. Interpret the solution. (Let x= number of children , y= number of adults)

$3x + 8y = 22$

$x + y = 4$

**20.** As a waitress, Rachel earns $25 for a five-hour shift. Her customers tip her an average of $3 per order. Which equation represents her total earnings for one shift?

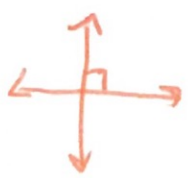
(a) $y=25x+3x$ $\quad$ (b) $y=3+25x$ $\quad$ (c) $y=25+3x$

**21.** What are Parallel lines? (Describe the slopes and draw a visual)

same slope!

**22.** What are Perpendicular lines? (Describe the slopes and draw a visual)





lines that intersect at a right angle.

opposite reciprocal slopes!

same slope → opposite reciprocal slopes

**23.** Are the following sets of lines parallel, perpendicular or neither?

A) $y = 2x + 5$ $\quad y = 2x - 6$ parallel lines

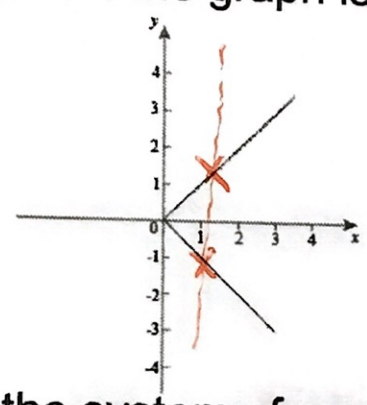
B) $y = 3x + 8$ $\quad y = \frac{1}{3}x - 2$ neither!

C) $2y = -8x + 2$ $\quad y = \frac{1}{4}x + 10$

$\frac{2}{2} \quad \frac{-8x}{2} \quad \frac{2}{2}$

$y = -4x + 1$ perpendicular lines

**24.** Determine if the graph is a function. Explain why or why not.



NO! The function does not pass the vertical line (touches more than once)

**25.** Graph the system of equations on the graph below. Identify the solution. If there is no solution, explain why. Describe the lines as parallel, perpendicular, or neither.

$3y = 5x - 6$

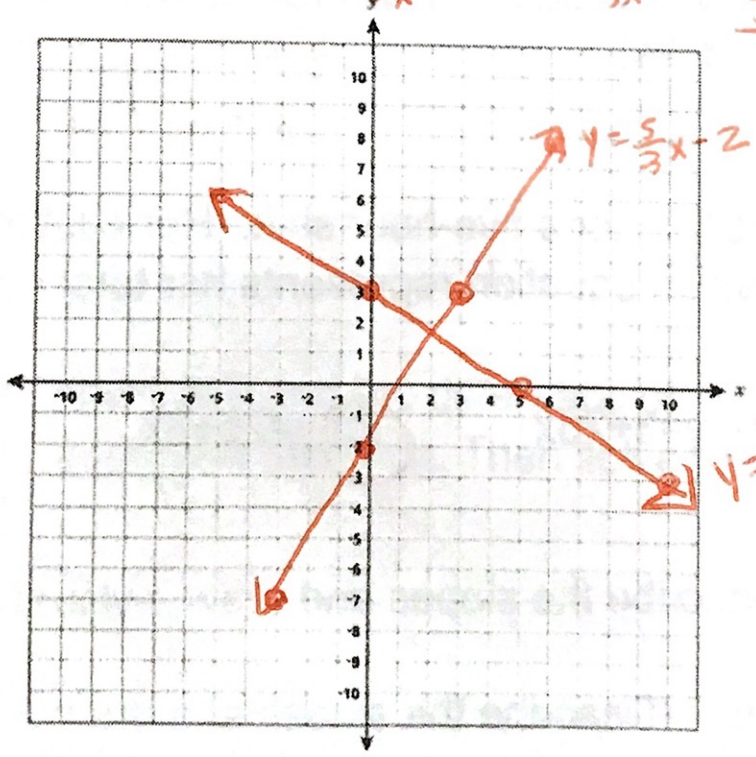
$3x + 5y = 15$

$-3x \quad -3x$

$\frac{5y}{5} = \frac{-3x}{5} + \frac{15}{5}$

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

$m = -3/5 \quad b = 3$



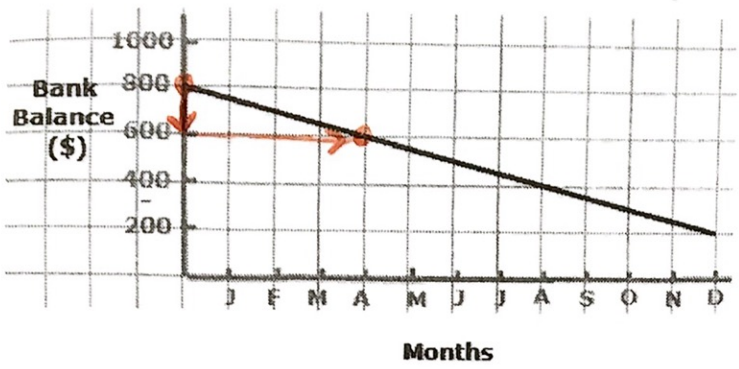

$y = \frac{5}{3}x - 2$

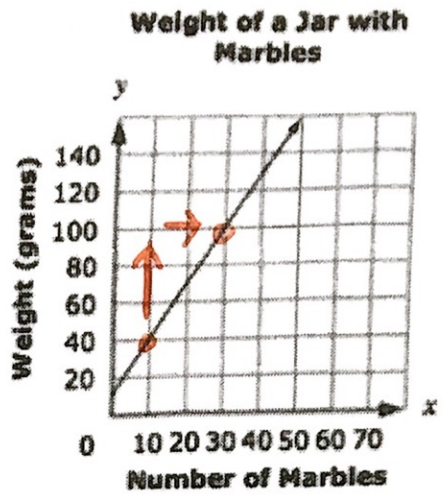
$m = 5/3 \quad b = -2$

perpendicular lines

26. A) Determine the constant rate of change (slope) of each graph below.

B) Interpret the meaning of the slope.




A) $m = \frac{-200}{4} = \frac{-50}{4} = \boxed{\frac{-12.5}{1}}$

B) Every month, the bank balance decreases $12.50

A) $\frac{60}{20} = \boxed{\frac{30}{1}}$

B) For 30 grams, there is 1 marble.

27. What quadrant or axis are the following coordinate points located at?

A) (3,5) I

C) (-1, 0) x-axis

B) (-4, -7) III

D) (0,4) y-axis

II | I

III | IV

E) If the points above were part of a line, which point would be the y-intercept? Explain your reasoning. (0,4) The x coordinate of a y intercept is always 0.

28. Given the line $y = -4x - 5$, one of the points on the line has a y coordinate of 19.

Find the x coordinate of this point.

$19 = -4x - 5$

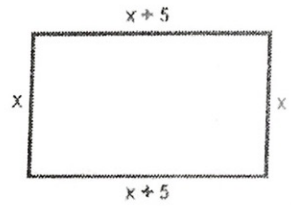
$+5 \quad +5$

$24 = -4x$

$\frac{24}{-4} = \frac{-4x}{-4}$

$\boxed{-6 = x}$

29. Using the figure:




A) Find the perimeter of the figure in terms of x $x + x+5 + x + x+5$

$\boxed{4x+10}$

B) Find the area of the figure in terms of x

$x(x+5)$

$\boxed{x^2+5x}$