Algebra 1 Semester 1
Review Packet

Name Key

Exam Date December 20

Part 1: Translate each verbal phrase into an algebraic expression:

1. The sum of a number x and the square of a number y. $x + y^2$	2. Six less than a number x $x - 6$	3. Three more than twice a number b. $2b + 3$	4. The product of 8 and a number x increased by 10. $8(x + 10)$
5. Three times the sum of a number x and 6. $3(x + 6)$	6. The square of the difference of a number and 4. $(x - 4)^2$	7. 10 less than the product of a number x and 3. $3x - 10$	8. The quotient of 4 and a number x increased by 6. $\frac{4}{x + 6}$

Part 2: Evaluate each expression using the order of operations:

1. $16 \div (4 - 2) \bullet 3$ 24	2. $3\left[15 - \left(2^3 - 6\right)^2\right]$ $3(15 - 4)$ 33	3. $\lvert -6.25 \rvert - 5.25$ 1
4. $\lvert 14 \rvert - 2^3$ 6	5. $-\lvert x \rvert \bullet w^2$ *when* $x = 8$ *and* $w = -3$ -72	6. $8 + 4(q - 3) + q$ *when* $q = 6$ 26
7. $\frac{2m - n}{m^2 - 2n + 2}$ *when* $m = -5$ *and* $n = 3$ $\frac{-10}{21}$	8. $\frac{5}{x} + 3y$ *when* $x = \frac{2}{3}$ *and* $y = -\frac{3}{4}$ $5\left(\frac{3}{2}\right) + 3\left(-\frac{3}{4}\right)$ $\frac{15}{2} - \frac{9}{4} = \boxed{\frac{21}{4}}$	9. $4x^2 - y(w + 4x)$ *when* $x = 3, y = -2,$ *and* $w = -4$ $4(9) - (-2)(8)$ $36 + 16$ $\boxed{52}$

Part 3: State why or why not the following would be considered functions:

1.

input	output
3	5
4	7
5	9
6	11

yes different inputs

2. $x = 4$

No, fails vertical line test

3. $5x - 7y = 14$

yes, linear

4. $\{(1,2),(4,-1),(6,2),(9,6)\}$

yes, all different x values

Part 4: Evaluate the following functions given:

$f(x) = 7x + 2 \qquad g(x) = \frac{2}{5}x + \frac{1}{2} \qquad h(x) = 4x^2$

1. $f\left(\frac{3}{14}\right)$

$= \frac{21}{14} + 2$

$= \frac{3}{2} + 2 = \frac{7}{2}$

2. $g(-10)$

$= \frac{2}{5}(-10) + \frac{1}{2}$

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

$= -\frac{7}{2}$

3. $h(-3)$

$= 4(-3)^2$

$= 36$

4. $g(15)$

$= \frac{2}{5}(15) + \frac{1}{2}$

$= 6 + \frac{1}{2} = \frac{13}{2}$

5. $h(2)$

$= 4(2)^2$

$= 16$

6. $f(0)$

$= 7(0) + 2$

$= 2$

Part 5: Determine if each relation given is a *linear function*:

1. $7y - 4x = 28$

yes

2. $4x^2y - 3x = 10$

No

3. $y = -5$

yes

4.

x	y
1	4
2	9
3	16
4	25

+1, +1, +1 / +5, +7, +9

No

5.

x	y
1	-4
3	0
5	4
7	8

+2, +2, +2 / +4, +4, +4

Yes

6.

x	y
0	11
1	8
3	2
5	-4

+1, +2, +2 / -3, -6, -6

Yes

Part 6: Simplify the following expressions:

1. $-6(x+8)+4x$ $-6x-48+4x$ $-2x-48$	2. $-3-5(x-9)+6x$ $-3-5x+45+6x$ $x+42$	3. $2(3x-5)-3(4x-6)$ $6x-10-12x+18$ $-6x+8$
4. $9x+7(-x-10)+14-3x$ $9x-7x-70+14-3x$ $-x-56$	5. $3(xy+w^2)+2xy-2w^2$ $3xy+3w^2+2xy-2w^2$ $5xy+w^2$	6. $-6x-4(3x^2+2x)+4x^2+3$ $-6x-12x^2-8x+4x^2+3$ $-8x^2-14x+3$

Part 7: Identify the property being illustrated:

A. Commutative B. Associative C. Distributive D. Reflexive

1. $(-2+3)+5=-2+(3+5)$ Associative	2. $2(x+3)=2x+6$ Distributive	3. $3(x+2)=3(2+x)$ Commutative
4. $3(x+2)=(x+2)3$ Commutative	5. $3x+4y+2=3x+4y+2$ Reflexive	6. $0(3\cdot 2)=(0\cdot 3)2$ Associative

7. The product of a number and its reciprocal is always 1. This represents which property? multiplicative inverse.

Part 8: Name the set(s) of number to which each of the following belongs:

W= Whole Z= Integers Q=Rational I=Irrational R=Real

1. 5 $\mathbb{R}, \mathbb{Q}, \mathbb{Z}, \mathbb{W}$	2. -3.5 $\mathbb{R}, \mathbb{Q}$	3. $-\sqrt{36} = -6$ $\mathbb{R}, \mathbb{Q}, \mathbb{Z}$	4. 2.134329675... $\mathbb{R}, I$
5. π $\mathbb{R}, I$	6. 3.14 $\mathbb{R}, \mathbb{Q}$	7. 1.23232323... $\mathbb{R}, \mathbb{Q}$	8. $\sqrt{7}$ $\mathbb{R}, I$

Part 9: Order the numbers in the list from Least to Greatest.

1. $-\sqrt{12},\ -3.5,\ -3\frac{2}{5},\ -3.48$ $-3.5,\ -3.48,\ -\sqrt{12},\ -3\frac{2}{5}$	2. $-\frac{8}{7},\ -\sqrt{6},\ -\sqrt{1},\ -1\frac{1}{8},\ -2$ $-\sqrt{6},\ -2,\ -\frac{8}{7},\ -1\frac{1}{8},\ -\sqrt{1}$

Part 10: Solve each equation. Show all work and check your answers!!

1. $-3x+28=10$ $-3x=-18$ $x=6$	2. $7x-9=12$ $7x=21$ $x=3$	3. $\frac{x-5}{4}=\frac{-12}{3}$ $3(x-5)=-48$ $x-5=-16$ $x=-11$
4. $\frac{x}{7}-4=8$ $\frac{x}{7}=12$ $x=84$	5. $2(x-7)+3=9$ $2(x-7)=6$ $x-7=3$ $x=10$	6. $\frac{2x}{3}+8=-4$ $\frac{2x}{3}=-12$ $2x=-36$ $x=-18$
7. $4x-16=-7x+6$ $11x=22$ $x=2$	8. $8x+7=5(x-4)$ $8x+7=5x-20$ $3x=-27$ $x=-9$	9. $\frac{x}{65}=\frac{5}{13}$ $13x=325$ $x=25$
10. $8x+3(5-x)=10$ $8x+15-3x=10$ $5x=-5$ $x=-1$	11. $8x-10x=3x+25$ $-5x=25$ $x=-5$	12. $4-5(x-3)+2x=-2$ $4-5x+15+2x=-2$ $-3x=-21$ $x=7$

Part 11: Use percents or proportions to solve:

1. 6 is what percent of 16?	2. What is 35% of 70?	3. 9 is 36% of what number?
$\frac{6}{16} = \frac{x}{100}$ $x = 37.5$ 37.5%	.35(70) 24.5	$\frac{9}{x} = \frac{36}{100}$ $x = 25$
4. What percent of 125 is 65?	**5. What number is 15% of 120?**	**6. 62.4 is 48% of what number?**
$\frac{65}{125} = \frac{x}{100}$ 52%	$\frac{x}{120} = \frac{15}{100}$ $x = 18$	$\frac{62.4}{x} = \frac{48}{100}$ $x = 130$

Find the new price of each item with the given discount:

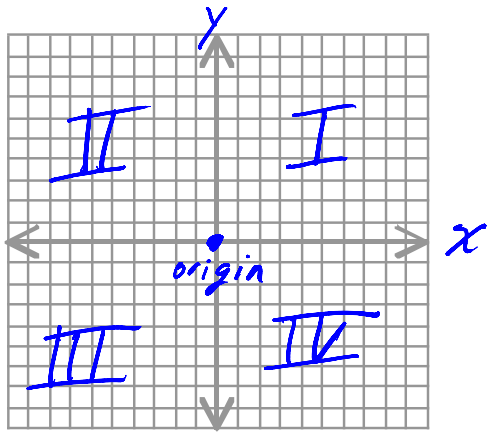
7. T.V. $999.99; discount 15%	8. I-Pod $249; 30% off	9. Purse $400 marked down 40%
999.99(1-.15) $849.99	249(1-.30) $174.30	400(1-.40) $240

Part 12: Identify and Label each of the parts of the Coordinate Plane

1. The origin
2. The x-axis
3. The y-axis
4. The 4 quadrants
5. Give 2 examples of ordered pairs that are located in Quadrant:

I_____ II _____

III_____ IV_____



Part 13: Find the slope of a line containing the two given points. Write the equation of each line in slope-intercept form and then convert each to Standard Form.

1. (-3, -2), (-7, 2)	2. (2, -6), (-5, 8)	3. (10, -5), (-5, 1)
$m = \frac{-2-2}{-3-(-7)} = \frac{-4}{4} = -1$	$m = \frac{8-(-6)}{-5-2} = \frac{14}{-7} = -2$	$m = \frac{1+5}{-5-10} = \frac{6}{15} = \frac{2}{5}$
$y-2 = -1(x+7)$ $y = -1x - 5$	$y+6 = -2(x-2)$ $y = -2x-2$	$y-1 = \frac{2}{5}(x+5)$ $(y = \frac{2}{5}x + 3) \times 5$
m = -1	m = -2	m = $\frac{2}{5}$
Slope-intercept form: $y = -x - 5$	Slope-intercept form: $y = -2x-2$	Slope-intercept form: $y = \frac{2}{5}x + 3$
Standard form: $x + y = 5$	Standard form: $2x + y = -2$	Standard form: $2x - 5y = -15$

Part 14: Graph the following equations on the plane provided:

1. Graph $y = 3x - 4$

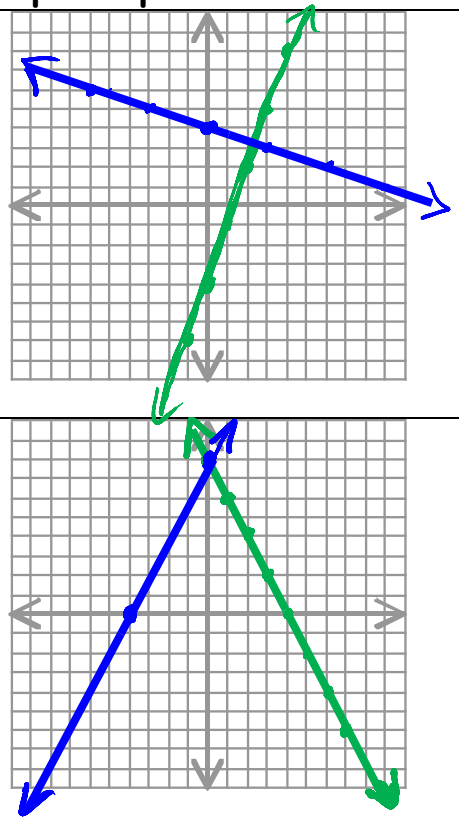
2. Graph $x + 3y = 12$

3. Is there a relationship between the lines? (parallel, perpendicular, neither) perpendicular

5. Graph $y = -2x + 8$

6. Graph $2x - y = -8$

7. Is there a relationship between the lines? (parallel, perpendicular, neither) Neither



Part 15: Identify the x and y intercepts for each linear function (write your answers as ordered pairs):

1. $6x - 4y = 12$	2. $-2x + 5y = -10$	3. $4y = 12$
x-intercept: $(2, 0)$	x-intercept: $(5, 0)$	x-intercept: none
y-intercept: $(0, -3)$	y-intercept: $(0, -2)$	y-intercept: $(0, 3)$

Part 16: Horizontal and Vertical Lines:

1. a) Describe the slope of any horizontal line. no slope / slope is 0 b) What would the slope look like in fraction form? $\frac{0}{n}$	2. Describe the slope of any vertical line. undefined slope b) What would the slope look like in fraction form? $\frac{n}{0}$
3. Write 2 examples of equations of horizontal lines. a) $y = 5$ b) $y = -5$	4. Write 2 examples of equations of vertical lines. a) $x = 5$ b) $x = -5$

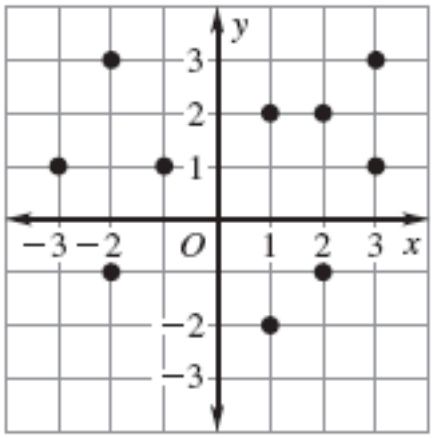
Part 17: Identify which of the following lines are parallel or perpendicular to the graph of $3x + 2y = 10$.

$m = -\frac{3}{2}$ $\left(-\frac{A}{B}\right)$

1. $4y + 6x = 12$ $m = -\frac{6}{4} = -\frac{3}{2}$ parallel	2. $y = -\frac{3}{2}x - 7$ m parallel
3. $y - 18 = \frac{2}{3}(x - 6)$ $m = \frac{2}{3}$ perpendicular	4. $3x - 2y = -18$ $m = \frac{3}{2}$ neither

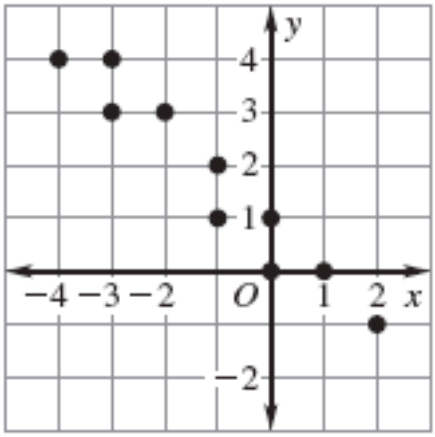
Part 18: State whether the scatter plot has a positive, a negative, or no correlation:

1.



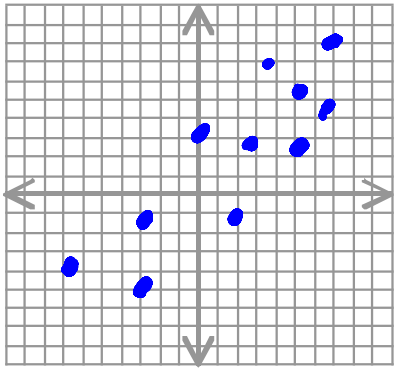
no correlation

2.



negative

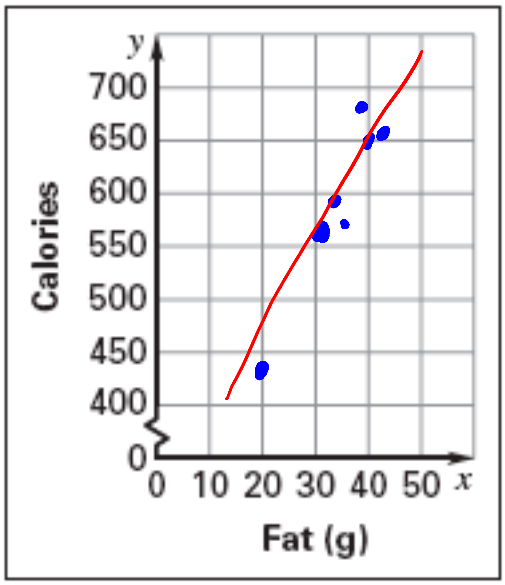
3. Draw an example of a scatter plot with a positive correlation.



Part 19: Use the data comparing the number of calories to grams of fat.

Fat (g)	31	39	20	34	43	40	35
Calories	580	680	430	590	660	650	570

1. Make a scatter plot of the data.



2. Describe the correlation. positive

3. Draw a line of best fit for the data.

4. Use the ordered pairs (20,430) and (40,650) to write a prediction equation.

$m = \frac{650-430}{40-20} = \frac{220}{20} = 11$

$y - 430 = 11(x - 20)$

$y = 11x + 210$

What is your prediction equation? $y = 11x + 210$

5. Use your equation to predict the number of calories in a hamburger that contains 28 grams of fat. $11(28) + 210 = 518$ calories

Part 20: Write an equation to model the following scenarios and solve.

1. A racquetball club charges $30 for a registration fee and $12 per month for dues.

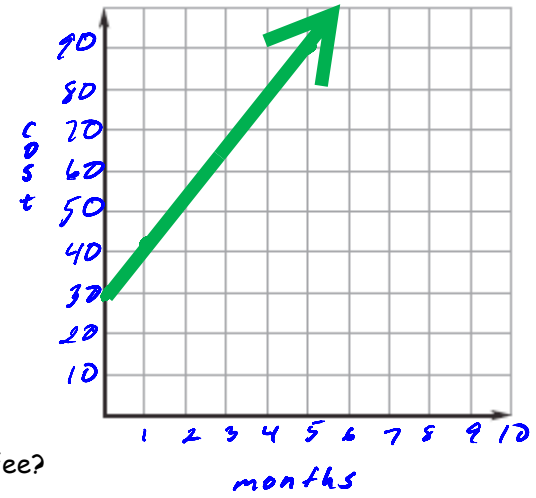
A) Write an equation that gives the total cost of a membership (y) as a function of the length of membership in months (x).

$y = 12x + 30$

B) Use your equation to find the total cost of membership for one year.

$12(12) + 30 = \$174$

C) Graph your cost equation.



D) What does $12 represent in this equation?

variable cost / cost per month

E) What does $30 represent in this equation?

fixed cost / cost to register

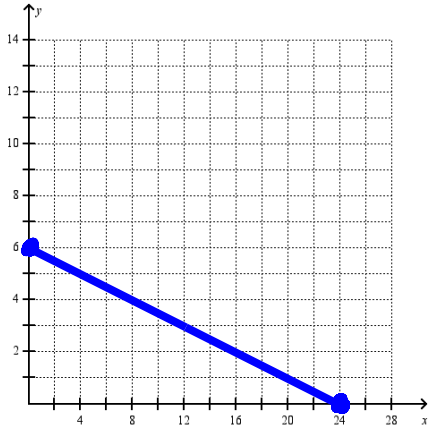
F) How would the graph change if the club eliminated the registration fee?

It would start at the origin

2. At the store, I found holiday gift cards for $5 and $20. I had a budget of $120 to spend on gift cards. Let x be the number of $5 gift cards and let y be the number of $20 gift cards.

A) Write an equation to model this situation.

$5x + 20y = 120$



B) Graph this equation.

C) What are the x- and y-intercepts?

(24, 0) (0, 6)

D) Interpret what the x- and y-intercepts mean in this situation.

24 is the most $5 cards I can buy.

6 is the most $20 cards I can buy.

Part 21: Solve each inequality.

1. $2x + 12 > 32$

$x > 10$

2. $4x - 17 \le 31$

$x \le 12$

3. $-8(x-2) > 4(x-2)$

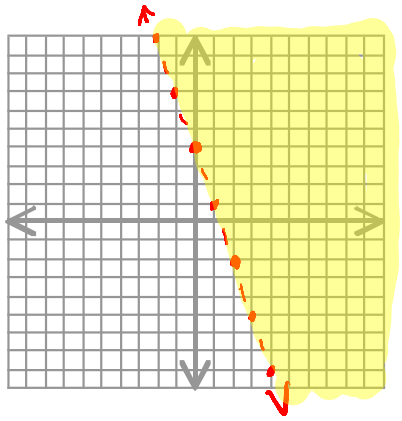
$-8x + 16 > 4x - 8$

$-4x > -24$

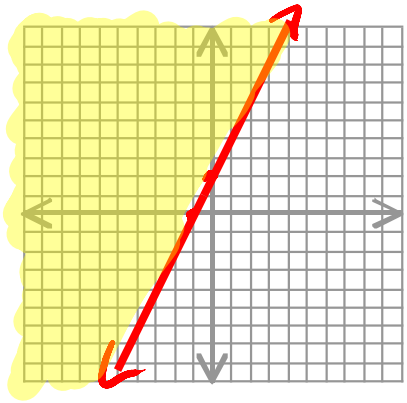
$x < 6$

Part 22: Graph each inequality.

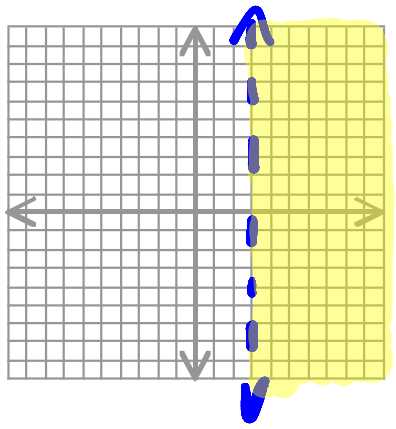
1. $3x + y > 4$



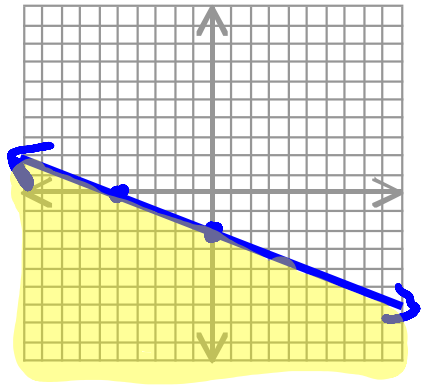
2. $2x - y \le -2$



3. $x > 3$



4. $-2x - 5y \ge 10$

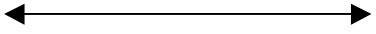


Part 23: Solve and graph each compound inequality.

1. $2(x-3) > 2$ *and* $3x < -9$

$x > 4$ and $x < -3$

1. _____



2. $x \le -3$ *or* $3x + 4 \ge 13$

$x \le -3$ or $x \ge 3$

2. _____

Part 24: Mixed Review

1. Solve the following equation for y: $-2x + 4y = 12$

$4y = 2x + 12$

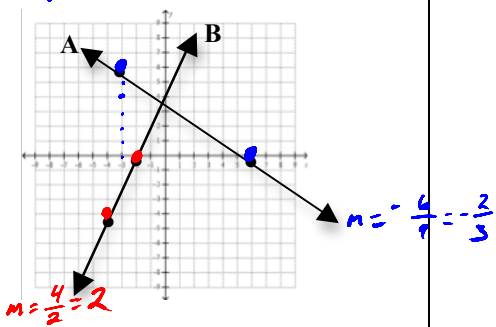
$y = \frac{1}{2}x + 3$

2. Solve the following equation for y: $\frac{1}{2}x - 3y = -9$

$-3y = -\frac{1}{2}x - 9$

$y = \frac{1}{6}x + 3$

3. Graph is a little off.



a) What is the rate of change for line A? $-\frac{2}{3}$

b) What is the rate of change for line B? 2

4. Determine the value of y so that the slope of the line between (2,7) and (-4,y) is $\frac{1}{2}$

$\frac{y-7}{-4-2} = \frac{1}{2}$

$2(y-7) = -6$

$y - 7 = -3$

$y = 4$

5. Determine the value of x so that the slope of the line between (x,-2) and (10,3) is $-\frac{5}{6}$

$\frac{-2-3}{x-10} = -\frac{5}{6}$

$-5(x-10) = -5(6)$

$x - 10 = 6$

$x = 16$

6. How does the graph of $y = \frac{1}{3}x$ compare to the graph of $y = x$?

Less steep

7. How does the graph of $y = -4x$ compare to the graph of $y = x$?

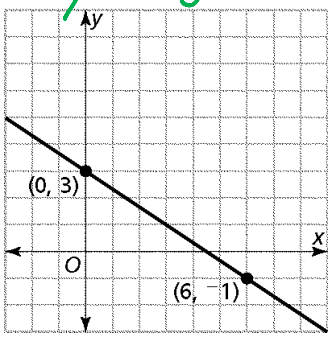
More steep and negative

Part 25: Use the graph column 1 to answer #1-7!!!

1. Write the equation of this graph in:

A) $y = mx + b$ form

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



2. If a line with the same slope passes through (-6,4) what would be the value of y if it also passes through (6,y)

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

$3(y-4) = -24$

$y = -4$

3. What is the x-intercept of this graph?

$0 = -\frac{2}{3}x + 3$

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

$x = \frac{9}{2}$

$(\frac{9}{2}, 0)$

4. What is the slope of a line perpendicular to this line?

$\frac{3}{2}$

5. What is the slope of a line parallel to this line?

$-\frac{2}{3}$

6. Write an equation in Standard form of a line that is perpendicular to this graph and passes through point (9,7).

$y - 7 = \frac{3}{2}(x - 9)$

$y - 7 = \frac{3}{2}x - \frac{27}{2}$

$2y - 14 = 3x - 27$

$3x - 2y = 13$

7. Write the equation of a line in slope-intercept form that is parallel to this graph AND passes through point (6,10).

$y - 10 = -\frac{2}{3}(x - 6)$

$y = -\frac{2}{3}x + 14$

Part 26: Write a proportion to model the following scenarios and solve.

1. The ratio of Snickers to Nestle Crunch is 3:5. There are a total of 56 candy bars. Find the number of Nestle Crunch bars.

$$\frac{5 \text{ crunch}}{8 \text{ total}} = \frac{x \text{ crunch}}{56 \text{ total}}$$

$x = 35$ crunch

2. The ratio of cows to horses on a farm is 9:4. There are a total of 104 animals on the farm. Find the number of cows on the farm.

$$\frac{9 \text{ cows}}{13 \text{ total}} = \frac{x \text{ cows}}{104 \text{ total}}$$

$x = 72$ cows

Part 27: Finding the Nth term

1. 7, 11, 15, 19, …

a) Write a rule for the nth term

$a_n = 7 + (n-1)(4)$

$a_n = 4n + 3$

b) Find the 60th term

$a_{60} = 4(60) + 3$

$a_{60} = 243$

2. 1.0, 0.5, 0.0, -0.5, …

a) Write a rule for the nth term

$a_n = 1 + (n-1)(-.5)$

$a_n = -.5n + 1.5$

b) Find the 45th term

$a_{45} = -.5(45) + 1.5$

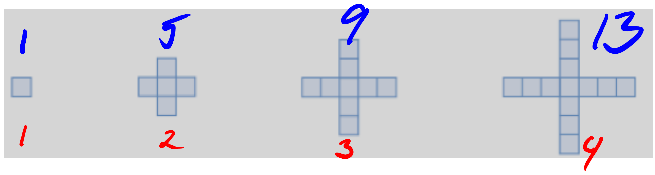
$a_{45} = -21$

3. The table contains the results of a biology experiment. Assuming the pattern continues, what is the value of *b*?

Record of Blooms

Week	1	2	3	4	5
Number of Blooms	3	9	27	81	*b*
	×3	×3	×3	×3	

$b = 243$

4. 

a) Construct a table listing the number of squares in each figure.

b) Write a rule for the number of squares in the nth figure.

$a_n = 1 + (n-1)(4)$

$a_n = 4n - 3$

Part 28: DESCRIBE and CORRECT the error in solving each equation

1. $\frac{18}{14} = \frac{b+2}{b}$

$18b = 14(b+2)$

$4b = 28$

$b = 7$

2. $5x - 3(x-6) = 2$

$5x - 3x + 18 = 2$

$2x + 18 = 2$

$2x = -16$

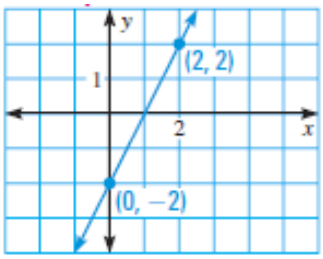
$x = -8$

Part 29: Rate of Change

1. Which of the following functions has the ***greatest*** rate of change? B

2. Which of the following functions has the ***least*** rate of change? D

a.



$m = 2$

b.

x	y
1	-4
2	0
3	4
4	8

$m = 4$

c. $3x - 2y = -18$

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

d. {(-2, -1), (0, 1), (3, 4), (7, 8)}

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

3. Kate is a plumber who made \$90 working on a 3-hour job. When she worked a 5-hour job, she made \$130. She charges a constant hourly rate. Ethan, her competitor, only charges \$22 per hour.

a) Who has the more reasonable hourly rate? Kate

b) You are experiencing plumbing issues in your bathroom and estimate it will take 8 hours to completely fix the problem. Who are you going to call? ~~Ethan~~

Kate: (3, 90) (5, 130)

Ethan: $y = 22x$

$m = \frac{130-90}{5-3} = \frac{40}{2} = 20$

$y - 90 = 20(x-3)$

$y = 20x + 30$