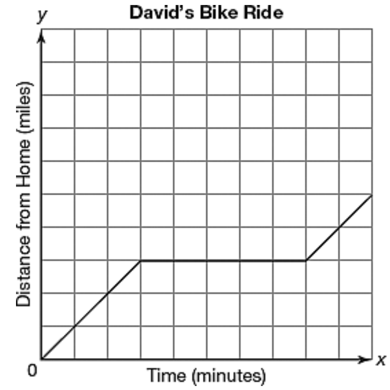
Algebra 1: 1st Semester Exam Review (2017) **Name ___________________________________ Period ______**

COMPLETE EVERY PROBLEM & SHOW ALL WORK FOR 5% BONUS!

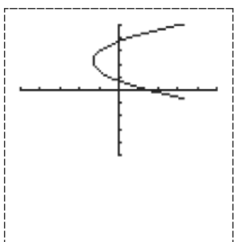
1. Hector knows there is a relationship between the **number of cars** he washes and the **time** it takes to wash those cars. Identify the independent quantity and the dependent quantity in the problem situation.

2. David rode his bike to the park. He stopped to watch the other children play for a few minutes, then continued his ride to the grocery store. The graph shows this relationship. **What is the independent quantity and dependent quantity**?

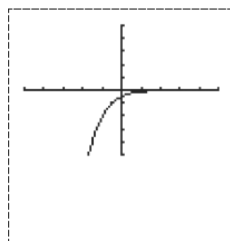


3. Determine whether each graph represents a function. Explain your reasoning.

   1. Circle one: Yes or No

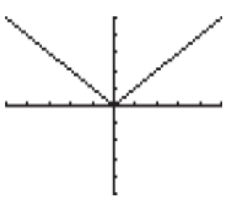


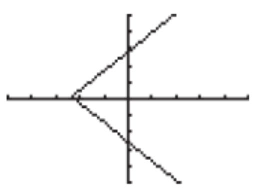
   b. Circle one: Yes or No

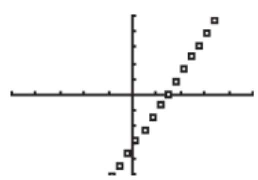


4. Which graph does **NOT** represent a function?

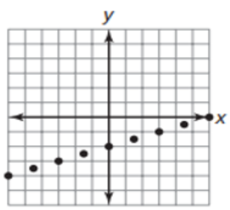
a. 

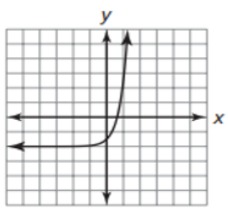
b. 

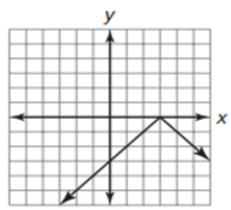
c. 

d. 

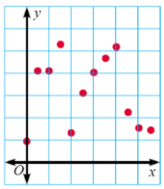
5. Determine whether each graph is discrete or continuous.

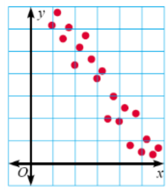
a. 

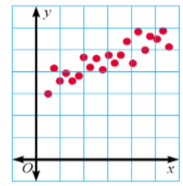
b. 

c. 

6. Determine if there is a positive, negative, or no correlation for each graph.

a. 

b. 

c. 

7. Classify each function as increasing, decreasing, or constant.

a. $f(x) = \frac{1}{2}x - 2$ b. $f(x) = -2^x$ c. $f(x) = -3x + 6$ d. $f(x) = 5$

8. The attendance for the freshmen football games at Hoover High School can be represented by the linear equation:

$y = 73x + 1963$
x = the number of games played
y = the number of people attending the games

a. Predict the attendance for game 9.

b. At which game will the attendance be **about** 3000?

9. An elevator in a high-rise building moves upward at a constant rate. The table shows the height of the elevator above the ground floor after various times.

a. What are the **dependent** and **independent quantities** in this problem situation? Explain your reasoning.

b. Determine the unit rate of change for the problem situation.

c. Complete the table.

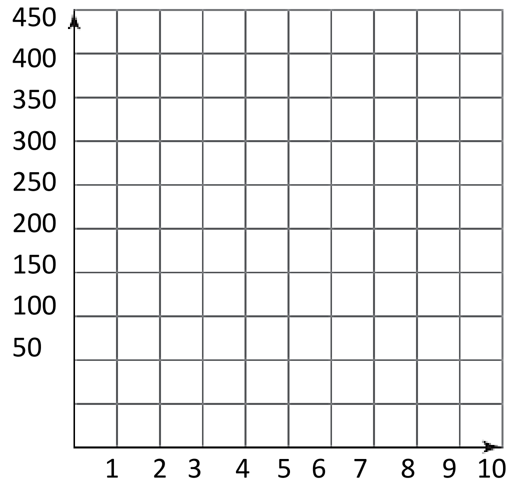
d. Write an expression that represents the height for at time *t* seconds in the last row of the table.

e. Use function notation to determine the height of the elevator at 14 seconds.

$f(14) =$ ________________________________

	Time	**Height**
Units	Seconds	Feet
	0	0
	1	12
	2	24
	3	
	4.5	
	5	
Expression	*t*	

10. Suppose an elevator **starts** at the top floor of a high-rise building at a **height of 350 feet** above the ground floor and ***descends*** without stopping at a **constant rate of 25 feet per second**.



a. Write a linear function that describes the height, h, of the elevator after t seconds.

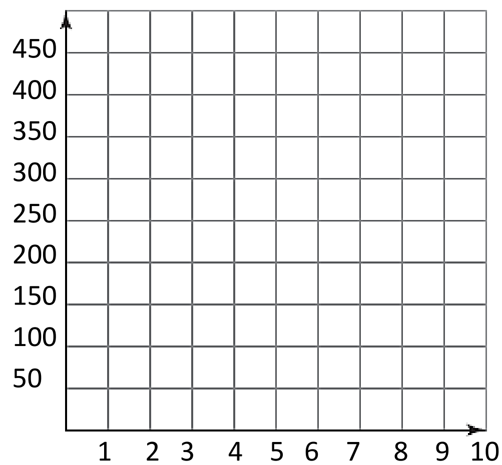
$h(t)$ = ________________________________

b. Graph the function you wrote in part *a*. Label your axes.

c. Use the graph to estimate when the elevator will be at a height of 200 feet.

d. Determine the exact time when the elevator will be at a height of 200 feet. Hint: $h(t) = 200$.

11. Taylor received a $450 gift card from his grandparents and is using it to pay for his singing lessons, which cost $50 per month.



a. Write a linear function that describes the dollar amount, d, on the card after t months.

$d(t)$ = ________________________________

b. Graph the function that you wrote in part *a*. Label your axes.

c. Use the graph to estimate when there will be $100 remaining on the card.

d. Determine the exact time when there will be $100 remaining on the card. Hint: $d(t) = 100$.

12. Joy has $200 to spend at the Galleria. She decides to buy sweaters and pants with her money. Sweaters cost $35 each and pants cost $20 each.

a. Write an equation to represent this problem situation.
s = the number of sweaters
p = the number of pants

____________________________________ = 200

b. If Joy buys 3 sweaters, what is the greatest number of pants she can buy?

c. If Joy buys **<u>no</u>** pants, what is the greatest number of sweaters she can buy?

13. Josh has \$125 to spend at the electronics store and decides to buy video games and DVDs with his money. Video games cost \$40 each and DVDs cost \$15 each.

a. Write an equation to represent this problem situation.

v = number of video games

d = number of DVDs

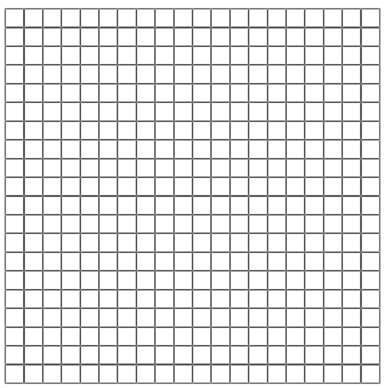
__________________________________ = 125

b. If Josh buys 2 video games, what is the greatest number of DVDs he can buy?

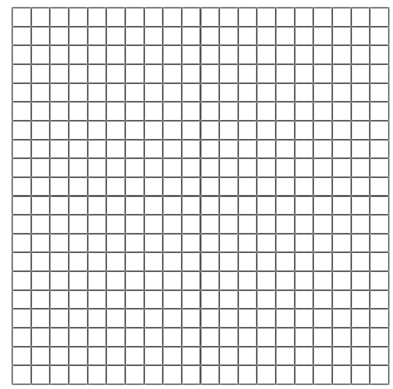
c. If Josh buys **<u>no</u>** DVDs, what is the maximum number of video games he can buy?

14. Write an equation and sketch the graph for each set of given characteristics.

a.
- is a function
- is linear
- is discrete
- is increasing



b.
- is a function
- is exponential
- is continuous
- is decreasing



15. Match the function with its appropriate function name.

Absolute value function: __________

Constant function: __________

Exponential function: __________

Linear function: __________

a. $f(x) = \frac{3}{4}x - 7$

b. $f(x) = -6$

c. $f(x) = -4^x$

d. $f(x) = |x - 9|$

16. Evaluate the function $f(x) = 31.572x - 17.741$ for each of these values.

a. $f(6.2)$

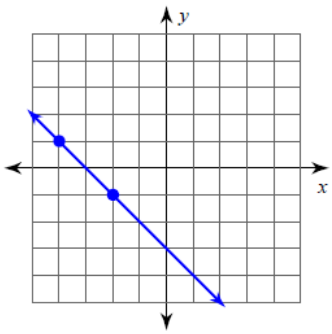
b. $f(-27.5)$

17. Solve each of the equations.

a. $5(x+4)-8=x+32$

b. -3(x - 6) – 5 = 175

18. Find the slope using the graph. $m = \frac{rise}{run}$

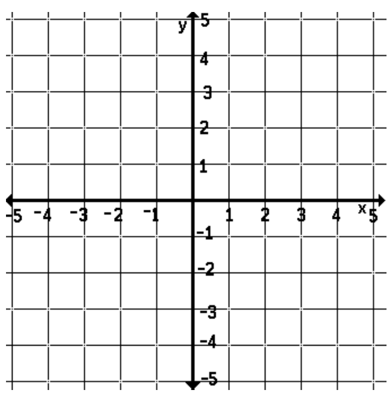


19. Find the slope using two points. $m = \frac{y_2 - y_1}{x_2 - x_1}$

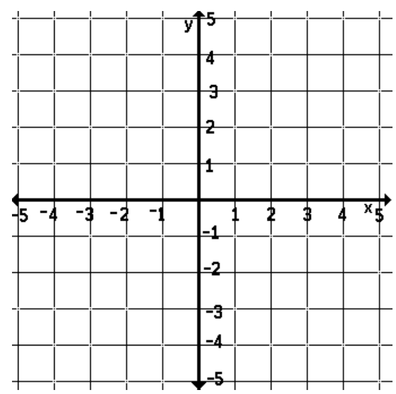
$(-2,6)$ and $(6,8)$

Graph each equation.

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

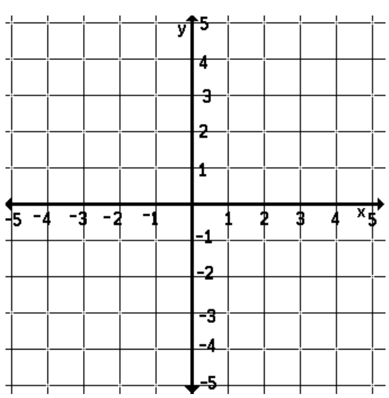


21. $4x+3y=6$



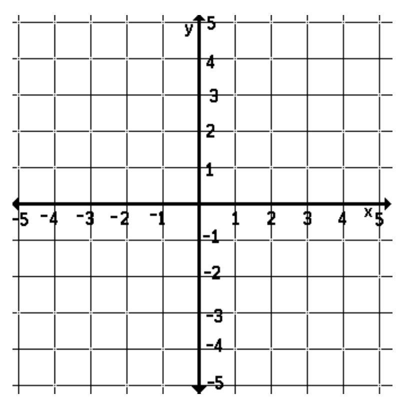
22. $x=4$

Slope = _____



23. $y=-3$

Slope = _____



Write the slope-intercept form of each equation given a point and slope or two points. Use point-slope form: $y - y_1 = m(x - x_1)$ first. Then, rewrite the equation in slope-intercept form: y=mx + b.

24. $(4, -6),\ m = 2$

25. $(-9, 6),\ m = \frac{1}{3}$

Find the slope first! $m = \frac{y_2 - y_1}{x_2 - x_1}$

26. (2, -5) and (7, 0)

27. (4, -3) and (6, -7)

Solve each literal equation.

28. Solve $C = 2\pi r$ for r.

29. Solve $A = \frac{1}{2}(b_1 + b_2)h$ for h.

30. Solve $A = 2(L + W)$ for L.

31. Solve $K = xr^2$ for r.

Write each equation in standard form. Ax + By = C

32. $y = -\frac{1}{4}x + 3$

33. $y = 2x - 7$

Write each equation in slope-intercept form. y = mx + b

34. $5x + 2y = -6$

35. $2x + 3y = 9$

36. What is the y-intercept for the equation $7x+2y=-14$?

37. What is the x-intercept for the equation $-3x-5y=-15$?

38. Rewrite each function using the Distributive Property.

a. $d(x) = 6(x + 4) =$ ____________________

b. $d(x) = 2(5x + 3.5) =$ ____________________

39. Write a compound inequality that represents a number that is less than 24 or greater than 35. Then, graph the compound inequality on the number line.

40. Solve each inequality and graph the solution on the number line.

a. $4(x+1) \le 12$

b. $-3(x-3) < 12$

c. $90 \le 15m \le 135$

d. $65 \le -13x < 104$

41. Solve and graph each compound inequality on the number line.

a. $-6 \le 2x+2 \le 10$

b. $x+2 \le -4$ *or* $-2x < -8$

c. $4x - 4 < -24$ *or* $4x + 6 > 14$

42. Joey has \$50 and earns \$12.50 per day. He wants to save **at least** \$250.00. Write an inequality that represents this scenario. Do Not Solve!

43. Evaluate each absolute value expression.

a. $|4-12|$

b. $|-8(7)|$

c. $|-13|-|6-10|$

d. $\left|\frac{-15+13}{5}\right|$ *Write your answer as a fraction!

44. Solve each absolute value equation. Remember, get the absolute value sign by itself (as if it were a variable). Then, set what is inside the absolute value sign equal to the positive and negative values of the number on the other side of the equals sign.

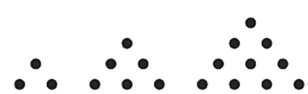
a. $|2x-5|=7$

b. $|-2x+7|=11$

c. $|x-6|+8=41$

d. $52=7|x-2|-4$

45. Consider the sequence shown.



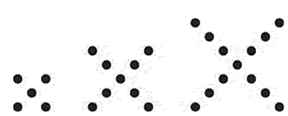
a. Describe the pattern.

b. Draw the next two figures of the pattern.

c. Write a numeric sequence to represent the first 5 figures.

_______, ________, _______, ______, ______

46. Consider the sequence shown.



a. Describe the pattern.

b. Draw the next two figures of the pattern.

c. Write a numeric sequence to represent the first 5 figures.

_______, ________, _______, ______, ______

47. JoJo's Pizza Shop made 16 pizzas on Monday, 22 pizzas on Tuesday, and 28 pizzas on Wednesday. If this pattern continues, how many pizzas will JoJo's Pizza Shop make on Friday?

48. Bradley sends two text messages to his friends to tell them school is cancelled because of snow. **Each** of those friends send two text messages to tell their friends the same news. **Each** of those friends send two text messages to tell their friends the same news, and so on.

    a. Write a numeric sequence to represent the number of calls made in each of the first 5 sets of phone calls.

       1, _____, ______, _______, ______, _____

    b. Is this an arithmetic or geometric sequence?

49. The Robinsons are draining their family swimming pool. After $\frac{1}{2}$ hour, there are 7500 gallons of water in the pool. After 1 hour, there are 7200 gallons of water in the pool. After $1\frac{1}{2}$ hours, there are 6900 gallons of water in the pool. If this pattern continues, how much water will be in the pool after 3 hours?

50. Identify each sequence as **arithmetic** or **geometric**. Then, determine the **common difference** or **common ratio** for each sequence.

    a. 2, 5, 8, 11, 14, 17

    b. -6, 12, -24, 48, -96

    c. $1, \frac{1}{4}, \frac{1}{16}, \frac{1}{64}, \frac{1}{256}$

    d. 0.13, 0.38, 0.63, 0.88, 1.13

    e. $-6, -8, -10, -12, -14$

    f. 200, 20, 2, 0.2, 0.02

    g. $1, \frac{1}{3}, \frac{1}{9}, \frac{1}{27}, \frac{1}{81}$

    h. $8, -1, -10, -19, -28$

51. For each sequence, determine whether it is **arithmetic** or **geometric**. Then, use the appropriate formula to determine the **15th term** in the sequence.

$$a_n = a_1 + d(n-1) \qquad g_n = g_1 \cdot r^{n-1}$$

a. 5, 10, 20, 40, 80, 160

b. $\frac{1}{2}, 1, \frac{3}{2}, 2, \frac{5}{2}, 3, \frac{7}{2}$

c. −0.25, 0.5, 1.25, 2, 2.75

d. $4, 2, 1, \frac{1}{2}, \frac{1}{4}$

52. Determine the **50th term** in the sequence defined by $a_n = -11 + 5(n-1)$.

53. Determine the **7th term** in the sequence defined by $g_n = 2 \cdot \left(\frac{1}{2}\right)^{n-1}$.

54. Determine the pattern in the sequence: 7, 14, 21, 28, …. Then, write a function to represent the pattern.

Complete the table and graph each exponential function. Identify the *x*-intercept, *y*-intercept, asymptote, domain, and range. **Type each expression into the calculator exactly as it is written, replacing *x* with its value.**

55. $f(x) = -4 \cdot 2^x$

a. *x*-intercept(s)

b. *y*-intercept

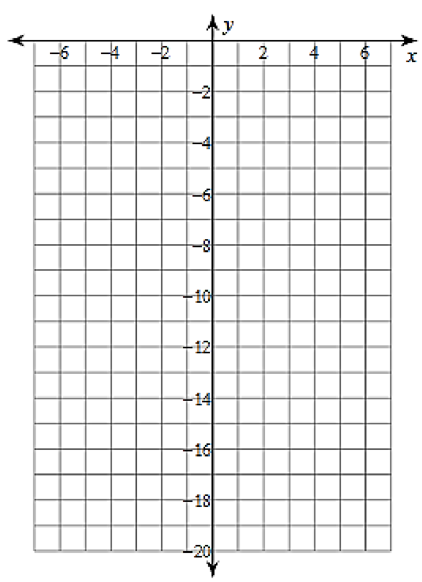
c. asymptote

d. domain

e. range

f. Circle one: increasing or decreasing

x	y
-2	
-1	
0	
1	
2	



56. $f(x) = 3 \cdot 2^x$.

a. x-intercept(s)

b. y-intercept

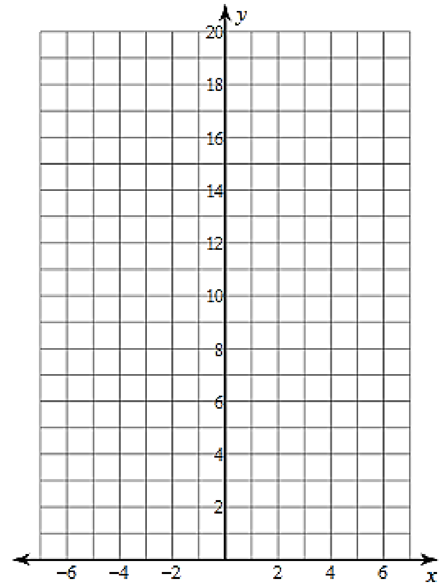
c. asymptote

d. domain

e. range

f. Circle one: increasing or decreasing

x	y
-2	
-1	
0	
1	
2	



57. Use the simple and compound interest formulas to complete the table. Round to the nearest **cent**.

Simple: $A = P + (Pr)t$

Compound: $A = P \cdot (1 + r)^t$

a. Complete the table given an initial deposit of $20,000 and an interest rate of 2.5%.

Time	Simple Interest Balance	Compound Interest Balance
6 months		
1 year		
5 years		
20 years		

b. Would it be worth paying a fee of $250 to keep your money in the compound interest account for 20 years? Why or why not?

c. How would you find the rate of change for a simple interest account? Would you use the common difference or the common ratio?

d. Which account is growing exponentially?

58. Carrie plans to deposit $1,480 into an account that pays compound interest. How much will be in her account given the rate of interest over a specified period of time? Round to the nearest **cent.** $A = P(1 + r)^t$

a. 1.9% for 10 years

b. 3.6% for 15 years

59. The utility costs for Hoover High School this year were $74,000. Write a function that represents HHS's utility costs as a function of time in years for each scenario. Choose the correct formula!

$A = P(1+r)^t$ *or* $A = P(1-r)^t$

a. Costs ***increase*** at a rate of 2.3% per year

b. Costs ***decrease*** at a rate of 1.7% per year

60. Enrollment at the University of Alabama has reached 60,000 and is expected to increase at a rate of 7.5% per year. How many students are expected to be enrolled after 3 years? $A = P(1+r)^t$

61. Approximately, 456 bacteria are living in a Petrie dish. Scientists are testing a new vaccine that is expected to decrease the number of bacteria at a rate of 2% per year. How many bacteria will be left after 6 years?

$A = P(1-r)^t$

62. Write the equation of each new function *g*(*x*) after the translation described.

a. $f(x) = -10x$ after a translation 5 units to the right

b. $f(x) = 3^x$ after a translation 4 units up

c. $f(x) = 2x^2$ after a translation 2 units left

d. $f(x) = x^3$ after a translation 2 units up

63. Describe each graph in relation to its basic function, i.e. vertical translation up 2 units.

a. Compare $g(x) = (x+3)^2$ to the basic function $f(x) = x^2$.

b. Compare $g(x) = b^x + 1$ to the basic function $f(x) = b^x$.

c. Compare $g(x) = b^{-x}$ to the basic function $f(x) = b^x$.

d. Compare $g(x) = x^3 + 9$ to the basic function $f(x) = x^3$.

e. Compare $g(x) = b^{(x-1)}$ to the basic function $f(x) = b^x$.