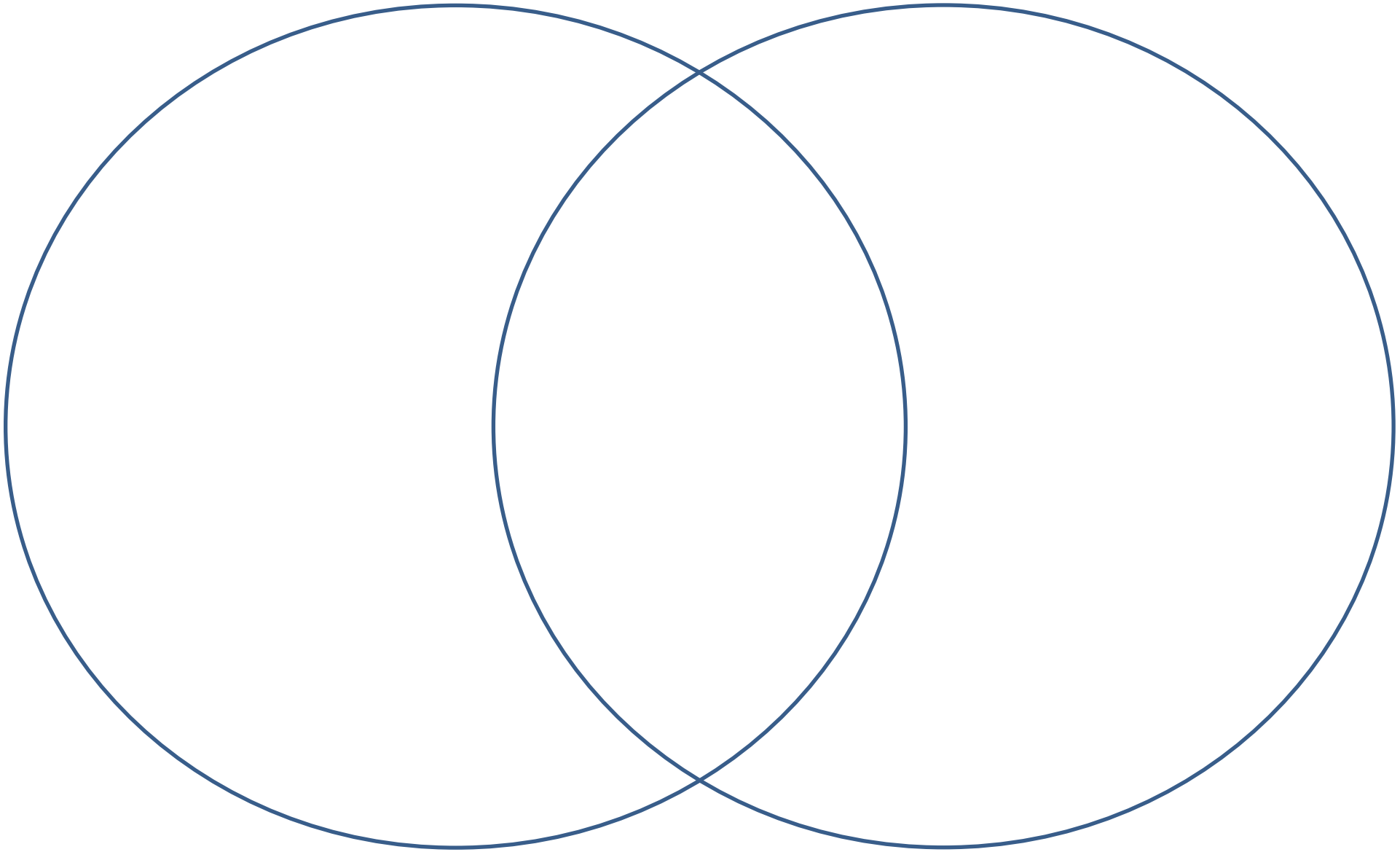
Name: _____ Period: _____ Score: _____

Unit 2: Arithmetic & Geometric Sequences							
Dates for Sec1	**Dates for Sec1H**	**Section #**	**Classwork:** Objective	**Classwork Score 5 - 2 - 0**	**Homework**	**HW Complete ☑**	**HW Effort Score:**
Sep 14 & 17	Sep 12 & 13	2-1	**Writing Linear Equations from Context**		HW 2-1 & Practice Test		
Sep 18 & 19	Sep 14 & 17	2-2	**Graphing Linear Equations:** I can graph an equation when put in slope-intercept form or standard form.		HW 2-2 & Finish Practice Test		
Sep 20 & 21	Sep 18 & 19		**UNIT 1 TEST**		Finish HW 2-2 & Critical Review		
Sep 24 & 25	Sep 20 & 21	2-3	**Function Notation:** I can identify functions and use function notation.		HW 2-3		
Sep 26 & 27	Sep 24 & 25	2-4	**Function Notation:** I can use function notation to determine inputs and outputs.		HW 2-4		
Sep 28 & Oct 1	Sep 26 & 27	2-5	**Growing Dots:** Recognize and describe arithmetic and geometric sequences.		HW 2-5		
Oct 2 & 3	Sep 28 & Oct 1	2-6	**Recursive Patterns:** I can write a recursive equation for arithmetic and geometric sequences		HW 2-6 & **Practice Test**		
Oct 4 & 5	Oct 2 & 3	2-7	**Explicit Formula:** I can write an explicit equation for arithmetic and geometric sequences		HW 2-7		
Oct 8 & 9	Oct 4 & 5	2-8	**I Know…What Do You Know?** Using Explicit and Recursive Formulas		HW 2-8		
Oct 10 & 11	Oct 8 & 9	2-9 3-1 (H)	**Review** **(H) Connecting the Dots:** Recognize Linear & Exponential		Practice Test (H) HW 3-1		
Oct 12 & 15	Oct 10 & 11		**UNIT 2 TEST**				

4-Extra
3-Complete
2-Did What You Could
1-Started It


Arithmetic Sequences
Geometric Sequences

Classwork 2-1: Writing Equations from Context

Score:_____/5__

A

Write an equation for the following:

The school choir is selling cases of frozen food items for a fundraiser. A case of pretzels sells for $12 and a case of pizza bites sells for $9. They made a total of $432.

What variables did you use and what did they represent?

Identify the following:
- Terms:
- Coefficients:
- Constants:

5

B

Write an equation for the following:

Faith has $36 in her purse. She has some $5 bills and some $1 bills.

What variables did you use and what did they represent?

Identify the following:
- Terms:
- Coefficients:
- Constants:

7

C

Write an equation for the following:

At a sports store, Edwin bought T-shirts and basketball magazines. The T-shirts cost $9 each and the basketball magazines cost $4 each. If Edwin spent $36, how many shirts and basketball magazines did he buy?

What variables did you use and what did they represent?

Identify the following:
- Terms:
- Coefficients:
- Constants:

6

D

Write an equation for the following:

Mr. Finch weighed 260 pounds in January. He started exercising for his New Year's resolution and has been consistently losing 4 pounds a month and plans on continuing this trend.

What variables did you use and what did they represent?

Identify the following:
- Terms:
- Coefficients:
- Constants:

1

Write an equation for the following: E

Chloe has $y to spend on school shoes. There currently is a sale at the shoe store for buy one pair and get the second pair half off (when both shoes are the same price). How much could she spend on the two pairs of shoes?

What variables did you use and what did they represent?

Identify the following:
- Terms:
- Coefficients:
- Constants:

2

Write an equation for the following: F

To purchase a song from Napster, you must be a member. The Napster membership fee is $10. In addition, each purchased song costs $0.75. How many downloaded songs must be purchased for the monthly price of Napster?

What variables did you use and what did they represent?

Identify the following:
- Terms:
- Coefficients:
- Constants:

4

Write an equation for the following: G

You have a 100 point test to take. There are some 2 point questions and some 4 point questions.

What variables did you use and what did they represent?

Identify the following:
- Terms:
- Coefficients:
- Constants:

8

Write an equation for the following: H

On average Ms. Thomas drives 70 miles per hour to school. How many miles does she travel for any hour, h?

What variables did you use and what did they represent?

Identify the following:
- Terms:
- Coefficients:
- Constants:

3

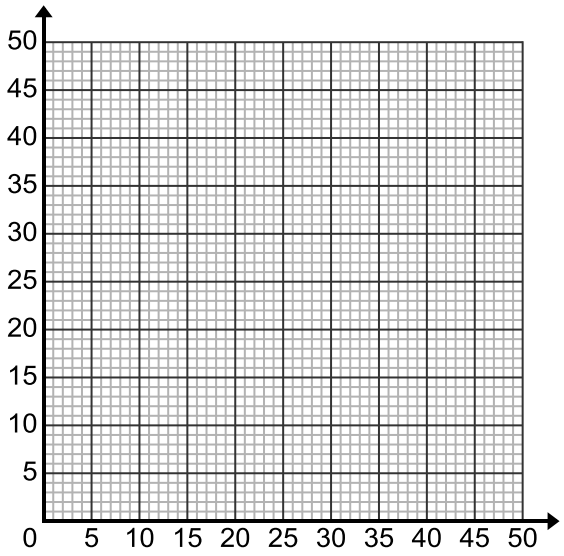
Classwork 2-2: Graphing Equations from Context

Score:_____/5__

Directions: Use your Classwork 2-1 to complete questions for 2-2.

A

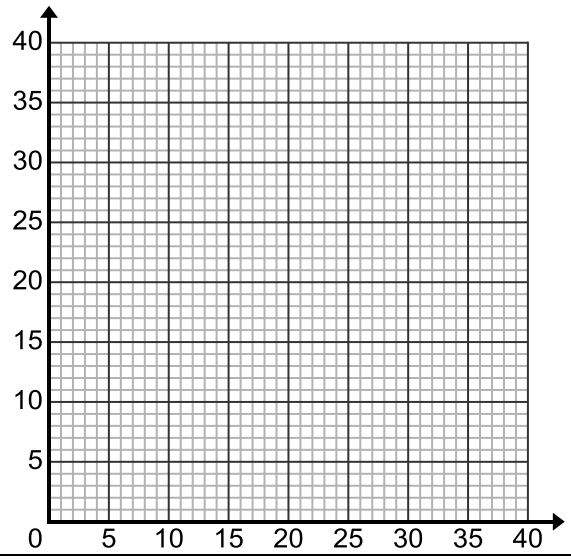
Using the equation from A, find the several values that make the equation true, plot the points and graph the line.



5

B

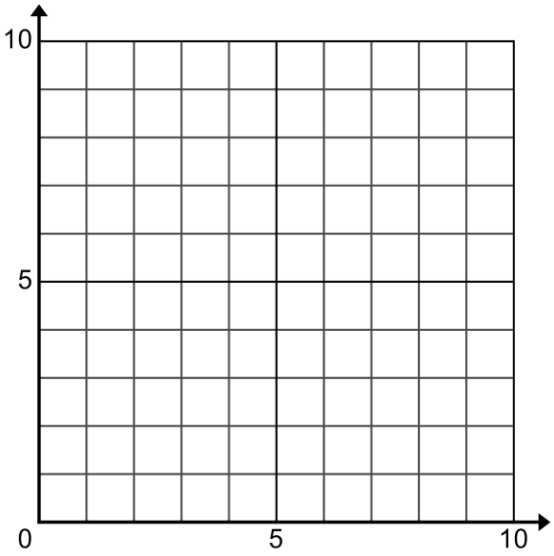
Using the equation from B, find the several values that make the equation true, plot the points and graph the line. Rewrite your equation into slope-intercept form.



7

C

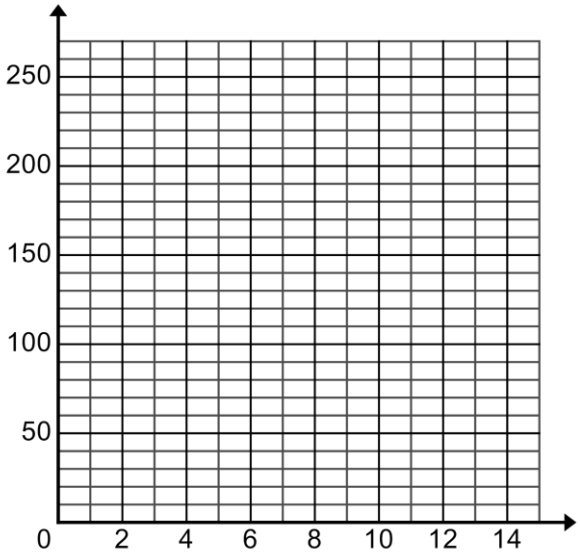
Using the equation from C, find the several values that make the equation true, plot the points and graph the line.



6

D

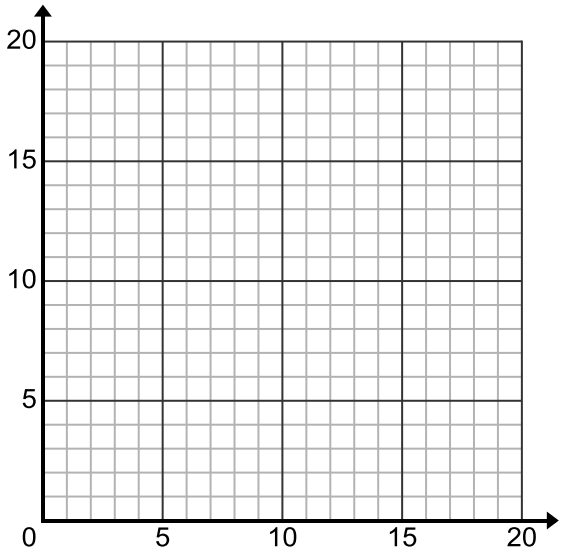
Using the equation from D, find the several values that make the equation true, plot the points and graph the line.



1

E

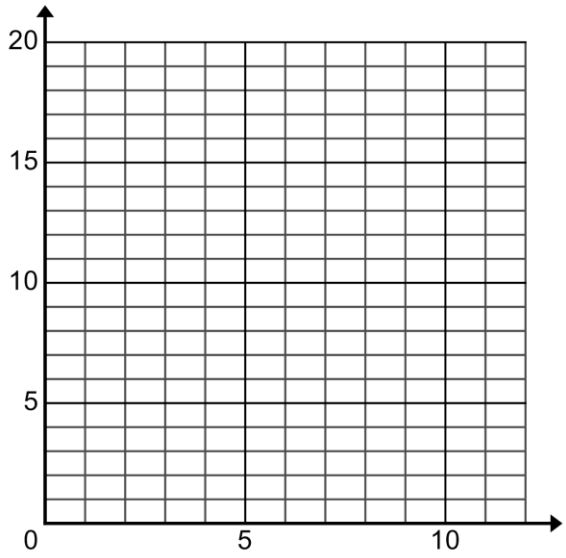
Using the equation from E, find the several values that make the equation true, plot the points and graph the line.



2

F

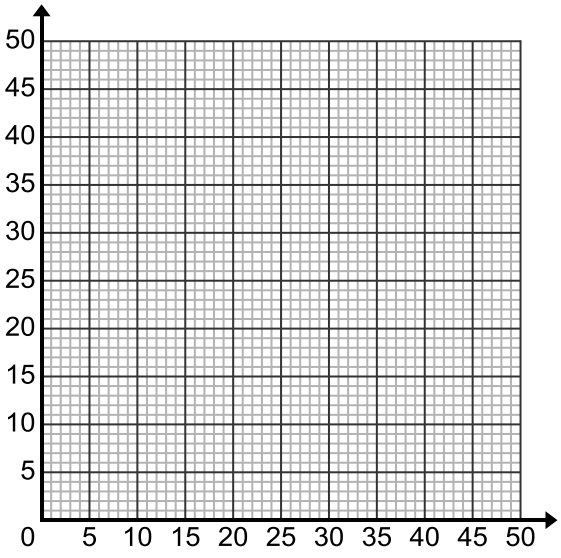
Using the equation from F, find the several values that make the equation true, plot the points and graph the line.



4

G

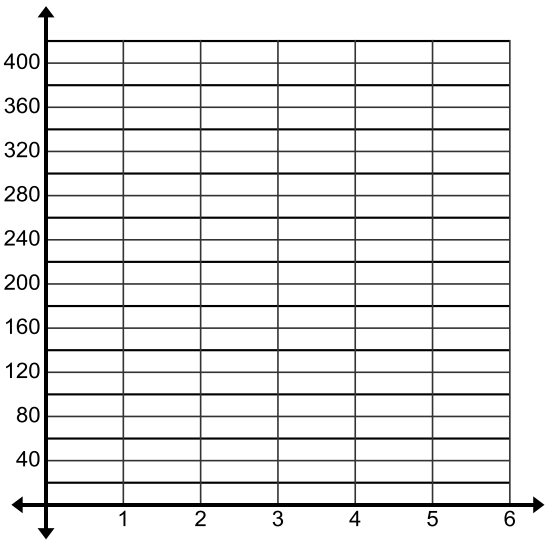
Using the equation from G, find the several values that make the equation true, plot the points and graph the line.



8

H

Using the equation from G, find the several values that make the equation true, plot the points and graph the line.



3

Score:_____/5__

Classwork 2-3: Can You Predict the Outcome?

You have studied relations and have learned that each relation defines a relationship between the input and the output values. But what happens when your relation gives you unpredictable results? You will study this situation and will be introduced to a special type of relation called a function.

1. The Cola Machine

The cola machine in the faculty room offers several types of soda. There are two buttons for your favorite drink, *Blast*, while the other drinks (*Slurp, Lemon Twister*, and *Diet Slurp*) each have one button.

a. What are the input and output of this soda machine? This is called the domain and range.

b. While buying a soda, Ms. Whitney pushed the button for *Lemon Twister* and got a can of *Lemon Twister*. Later she went back to the same machine, but this time pushing the *Lemon Twister* button got her a can of *Blast*. Is the machine functioning consistently? Why or Why not?

c. When Mr. Smith pushed the top button for *Blast* he received a can of *Blast*. Mr. Garcia decided to be different and pushed the second button for *Blast*. He, too, received a can of *Blast*. Is the machine functioning consistently? Why or Why not?

d. When Ms. Call pushed a button for *Slurp*, she received a can of *Lemon Twister*! Later Ms. Webb also pushed the *Slurp* button and received a can of *Lemon Twister*. Still later, Ms. Webb noticed that everyone else who pushed the *Slurp* button received a *Lemon Twister*. Is the machine functioning consistently? Explain why or why not.

e. When a relation is functioning consistently and predictably, we call that relation a function. What is the main difference between a relation that is a function and a relation that is not a function?

2. Below are different ways to represents a functional relationship.

a. What is the domain and range? Color the domain and range values different colors.

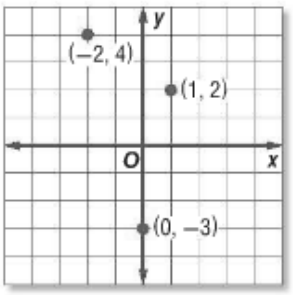
Ordered Pairs

(1, 2)
(−2, 4)
(0, −3)

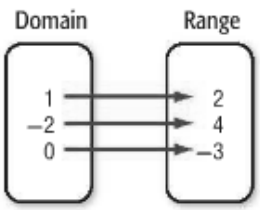
Table

x	y
1	2
−2	4
0	−3

Graph



Mapping



Function Notation

f( ) =

f( ) =

f( ) =

f( ) =

b. Make each representation not a function.

3. Examine each of the relations below. Compare the inputs and the outputs and determine if the relation is a function. If it is a function state the domain and range. If not, explain why.

a.

Button pushed	1	1	2	4	2	3
Candy received	Stix	Stix	M&Ns	M&Ns	Duds	Duds

Button (3) =_____ Button (___) = Stix

Function?
Domain:
Range:

b.

x	7	-2	0	4	9	-3	6
y	6	-3	4	2	10	-3	0

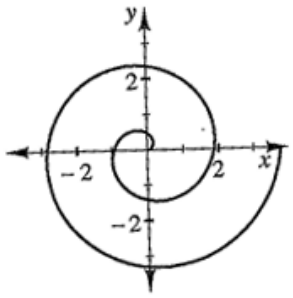
Function?
Domain:
Range:
f(6) = ____

c.

x	3	-1	2	0	1	2	9
y	4	-5	9	7	4	-8	2

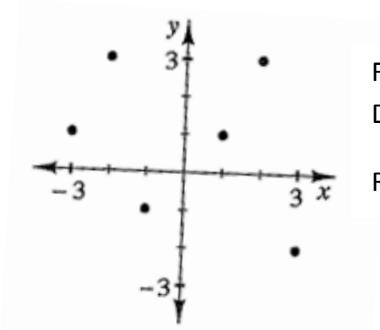
Function?
Domain:
Range:
f(___) = 9

d.



Function?
Domain:
Range:

e.



Function?
Domain:
Range:

Vertical Line Test:

To **evaluate** an equation such as y = 5x + 1 when given a specific value for x, replace the variable x with the given value and work the problem to find the value of y.

Example: If given $\boldsymbol{y = 5x + 1}$. Find y when x = 2.

Therefore, y = 11 when x = 2. The point (2, 11) is one solution to the equation **y = 5x + 1**.

Instead of using x and y in an equation, mathematicians often write $\boldsymbol{f(x) = 5x + 1}$ because it gives us additional information. With this notation, the direction to find $\boldsymbol{f(2)}$ means to replace the value of *x* with 2 and work the problem to find $\boldsymbol{f(x)}$. The point $(\boldsymbol{x}, \boldsymbol{f(x)})$ is in the same location on the graph as **(x, y)** where x describes the location along the x-axis, and $\boldsymbol{f(x)}$ is the height of the graph.

Example: If given $\boldsymbol{f(x) = 5x + 1}$. Find $\boldsymbol{f(2)}$.

4. Given $f(x) = 8n - 3$ and $g(x) = 3n - 10$, evaluate the following functions with the indicated values.

$\boldsymbol{f(5) =}$ $\boldsymbol{g(5) =}$ $\boldsymbol{f(0) =}$ $\boldsymbol{g(-4) =}$

5. What does the following notation mean? ***f*(*x*), *g*(*s*), *h*(*t*)**

Score:_____/5__

Classwork 2-4: Function Notation

DEFINE:

Function:

Function Notation:

Domain:

Range:

1. Evaluate the following with the given Domain: $g(x) = x^2 - 5$ with $\{-2, 2, 3, 10\}$.

2. Find x given: $f(x) = 25$ if $f(x) = 5x + 20$

3. Write an equation that gives you the cost of solar panels for each company given the square footage of the panels.

A. Company A charges $2,000 for installation and $2 per square foot of panels.

B. Company B charges $3,000 for installation and $1.50 per square foot of panels.

C. Company C charges $4,200 for installation and $1 per square foot of panels.

4. Write your equations from #1 in function notation.

A. **B.** **C.**

5. Explain: What does $f(x) = 2$ mean?

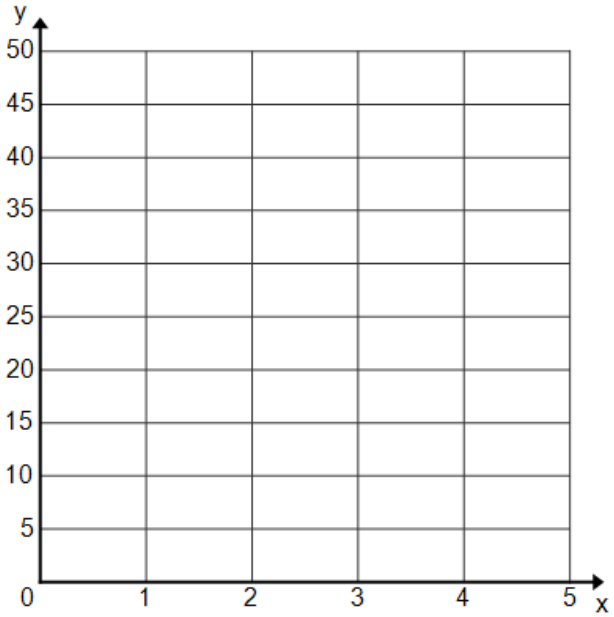
6. Explain: What does $f(4) = y$ mean?

7. Explain: What would $f(x + 1)$ mean? $f(x - 1)$?

8. You are saving up money and are going to start doing extra chores each day. You already have $25 saved and then you are going to earn $5 a day. Write an equation in **function notation** representing how much money you will have after *x* days.

Complete the table and draw the graph.

x Days	Money f(x)
0	
1	
2	
3	
4	
5	



Evaluate the following (using the equation/table/graph)

$f(3) =$

$f(1) =$

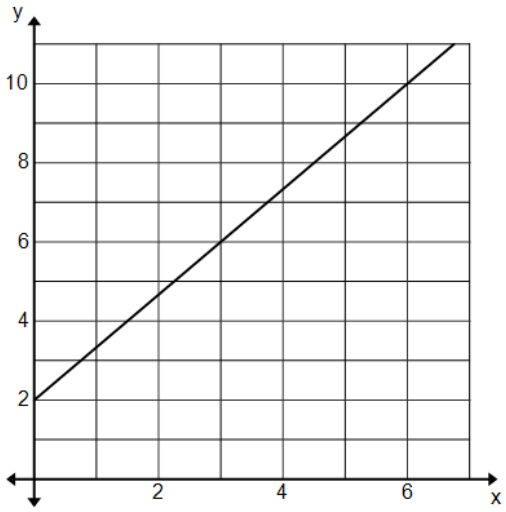
$f(2) =$

$f(x) = 40$

9. Explain what $f(3)$ means in context of the problem.

10. Explain what $(2, f(2))$ means in context of the problem.

11. Use the graph and the table to evaluate the following.



x	*f(x)*
2	4.67
4	7.33
6	10
8	12.67
10	15.33

A. $f(0) =$

B. $f(2) =$

C. $f(x) = 6$

D. $f(4) =$

E. $f(x) = 10$

F. $f(10) =$

Score:_____/5__

Classwork 2-5: Arithmetic and Geometric Sequences

Part 1

At **one** minute

At **two** minutes

At **three** minutes

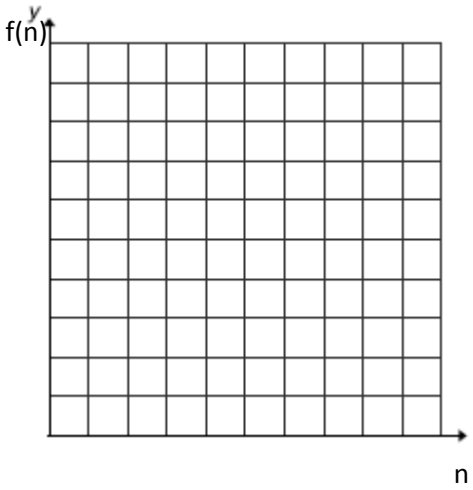
At **four** minutes

1. Draw the figure at four minutes in the space above. Explain how you knew how many dots to draw at three minutes (describe the change in pattern from one minute to the next).

2. Create a table for this data.

Minutes	Pattern	Simplified	Dots
1			
2			
3			
4			
5			
6			
n			

3. Create a graph for this data.



4. What do you notice about the graph?

5. What do you notice about the table?

6. How is this pattern growing?
   Where do you see this rate of change in the table?
   Where do you see this rate of change on the graph?
   Where do you see this rate of change in the picture?

7. How many dots are there at 100 minutes? (Explain how your determined your answer.)

8. What is the domain?
   What is the range?

9. Does it make sense to connect the dots on the graph?

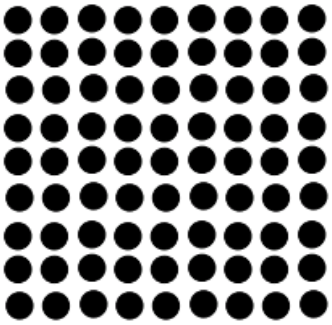
Part 2

At one minute

At **two** minutes

At **three** minutes

At **four** minutes



At **five** minutes

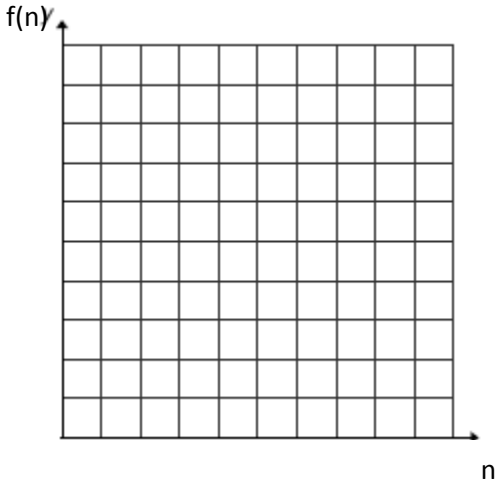
10. Describe and annotate (show in the picture) the pattern of change that you see in the above sequence of figures.

11. Assuming that pattern continues in the same manner, how many dots would there be at five minutes? Explain how you figured out the number of dots.

12. Create a table for this data.

Minutes	Pattern	Simplified	Dots
1			
2			
3			
4			
5			
6			
n			

13. Create a graph for this data.



14. What do you notice about the table?

15. What do you notice about the graph?

16. How is this pattern growing?
    Where do you see this rate of change in the table?
    Where do you see this rate of change on the graph?
    Where do you see this rate of change in the picture?

17. How many dots are there at 10 minutes? (Explain how your determined your answer.)

18. **Compare this pattern to Growing Dots pattern. What is the same?**

    What is different?

Common Difference –

Common Ratio –

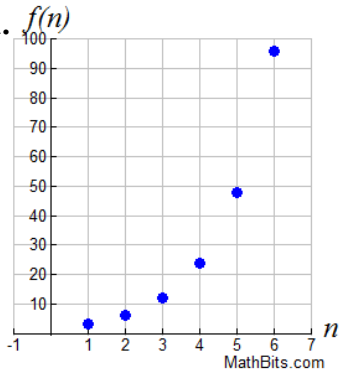
Given the following, determine if the following are arithmetic, geometric or other type of sequences. Then give the domain and range.

18. Rachel is practicing the guitar for a competition. She starts by practicing the guitar for 1 hour on the first day and then increases the practice time by 10 minutes each day.

19. A culture of bacteria doubles every 2 hours and there are 500 bacteria at the beginning.

20. The sum of the interior angles of a triangle is 180º, of a quadrilateral is 360º, and of a pentagon is 540º, etc.

21.



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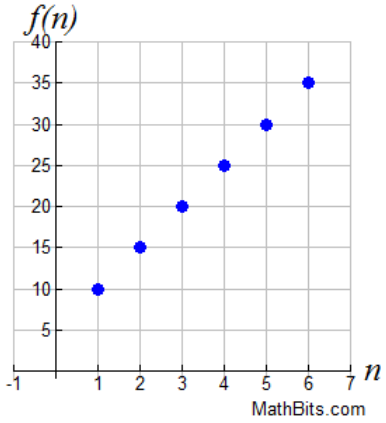

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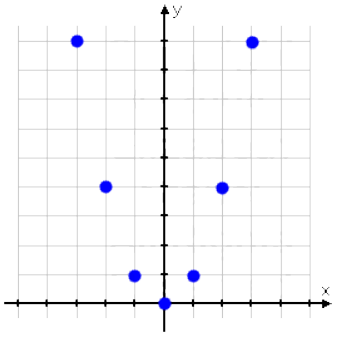

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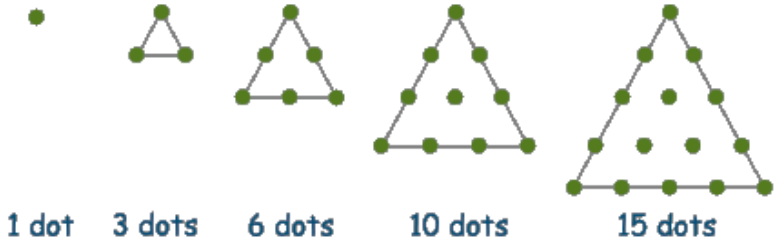
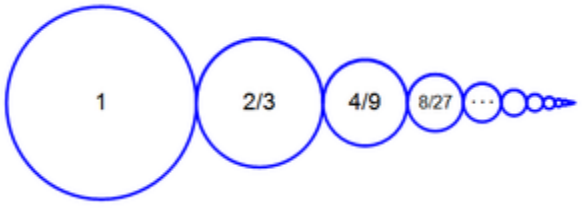


25. 5, 8, 11, 14, 17, …

26. 1, 2, 4, 8, 16, …

27.



28. **81, 27, 9, 3, 1, …**

Score:_____/5__

Classwork 2-6: Recursive Functions

Today we are going to look at a special type of function called a recursive function (formula). In a recursive formula, each term is defined as a function of its preceding term(s). [Each term is found by doing something to the term(s) immediately in front of that term.]

1. Let's take a closer look at the table from Growing Dots. Fill in the table with the mathematical terminology.

			Sequence Notation	Pattern using Sequence Notation	Function Notation	Pattern using function notation
Minutes	Pattern	Dots				
1						
2						
3						
4						
5						
n						

The recursive formula using SEQUENCE notation for an arithmetic sequence is:

The recursive formula using FUNCTION notation for an arithmetic sequence is:

2. Let's take a closer look at the table from Growing, Growing Dots. Fill in the table as previously done.

			Sequence Notation	Pattern using Sequence Notation	Function Notation	Pattern using function notation
Minutes	Pattern	Dots				
1						
2						
3						
4						
5						
n						

The recursive formula using SEQUENCE notation for a geometric sequence is:

The recursive formula using FUNCTION notation for a geometric sequence is:

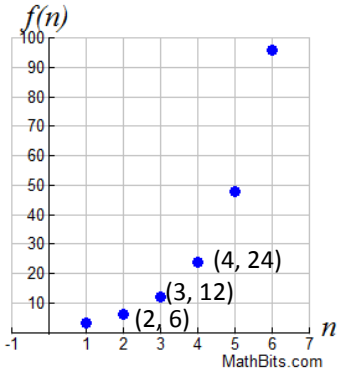
Write a recursive formula in function notation for the following:

3. Rachel is practicing the guitar for a competition. She starts by practicing the guitar for 1 hour on the first day and then increases the practice time by 10 minutes each day.

4. A culture of bacteria doubles every 2 hours and there are 500 bacteria at the beginning.

5. The sum of the interior angles of a triangle is 180º, of a quadrilateral is 360º, and of a pentagon is 540º, etc.

6.



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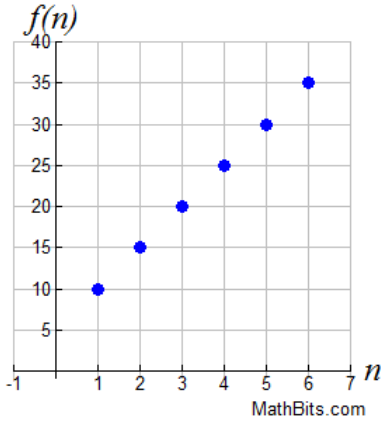
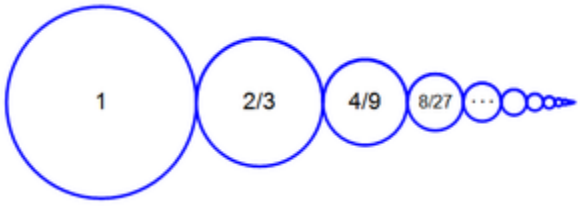


8. 5, 8, 11, 14, 17, …

9. 1, 2, 4, 8, 16, …

10.



11. **81, 27, 9, 3, 1, …**

Classwork 2-7: Explicit Functions

Score:_____/5__

Today we are going to look at a special type of function called a explicit functions (formulas). An explicit formula will create a sequence using *n (or x)*, the number location of each term. If you can find an explicit formula for a sequence, you will be able to quickly and easily find any term in the sequence simply by replacing *n* with the number of the term you seek.

1. Let's take a closer look at the table from Growing Dots. Fill in the table with the mathematical terminology.

			Sequence Notation	Simplified Pattern using Sequence Notation	Function Notation	Simplified Pattern using function notation
Minutes	Simplified Pattern	Dots				
1						
2						
3						
4						
5						
n						

The explicit formula using SEQUENCE notation for an arithmetic sequence is:

The explicit formula using FUNCTION notation for an arithmetic sequence is:

2. Let's take a closer look at the table from Growing, Growing Dots. Fill in the table as previously done.

			Sequence Notation	Pattern using Sequence Notation	Function Notation	Pattern using function notation
Minutes	Pattern	Dots				
1						
2						
3						
4						
5						
n						

The explicit formula using SEQUENCE notation for a geometric sequence is:

The explicit formula using FUNCTION notation for a geometric sequence is:

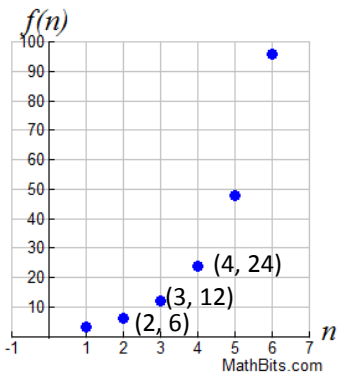
Write an explicit formula in function notation for the following:

3. Rachel is practicing the guitar for a competition. She starts by practicing the guitar for 1 hour on the first day and then increases the practice time by 10 minutes each day.

4. A culture of bacteria doubles every 2 hours and there are 500 bacteria at the beginning.

5. The sum of the interior angles of a triangle is 180º, of a quadrilateral is 360º, and of a pentagon is 540º, etc.

6.



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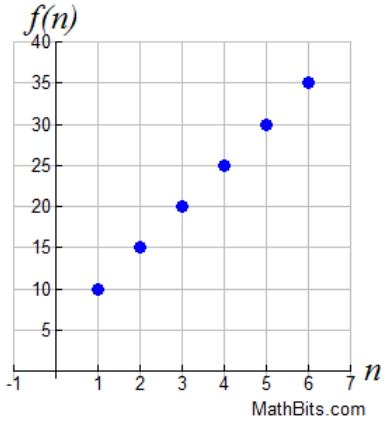
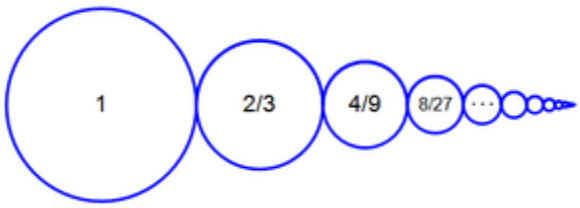


8. 5, 8, 11, 14, 17, …

9. 1, 2, 4, 8, 16, …

10.



11. **81, 27, 9, 3, 1, …**

12. Compare Explicit equations to Recursive equations. What is the same?

What is different?

Score:_____/5__

Classwork 2-8: I know….What do you know???

In each of the problems below, I share some of the information that I know about a sequence. Your job is to add all the things that you know about the sequence from the information that I have given. Depending on the sequence, some of the things you may be able to figure out for the sequence are:

- a table;
- a graph;
- an explicit equation;
- a recursive formula;
- the constant ratio or constant difference between consecutive terms;
- any terms that are missing;
- the type of sequence;
- a story context.

Try to find as many as you can for each sequence, **but you must have at least 4 things for each.**

1. I know that: the recursive formula for the sequence is $f(1) = -12,\ f(n) = f(n-1) + 4$
What do you know?

2. I know that: the first 5 terms of the sequence are $0, -6, -12, -18, -24 \ldots$
What do you know?

3. I know that: the explicit formula for the sequence is $f(n) = -10(3)^n$
What do you know?

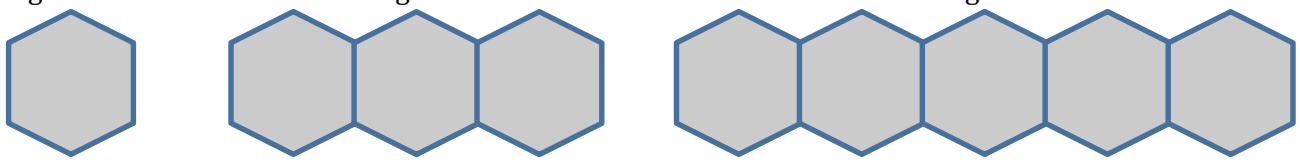
4. I know that: The first 4 terms of the sequence are $2, 3, 4.5, 6.75 \ldots$
What do you know?

5. I know that: the sequence is arithmetic and $f(3) = 10 \; and \; f(7) = 26$
What do you know?

6. I know that: it is a sequence where $f(1) = 5$ and the constant ratio between terms is -2.
What do you know?

7. I know that: the sequence is a model for the perimeter of the following figures:

Figure 1 Figure 2 Figure 3



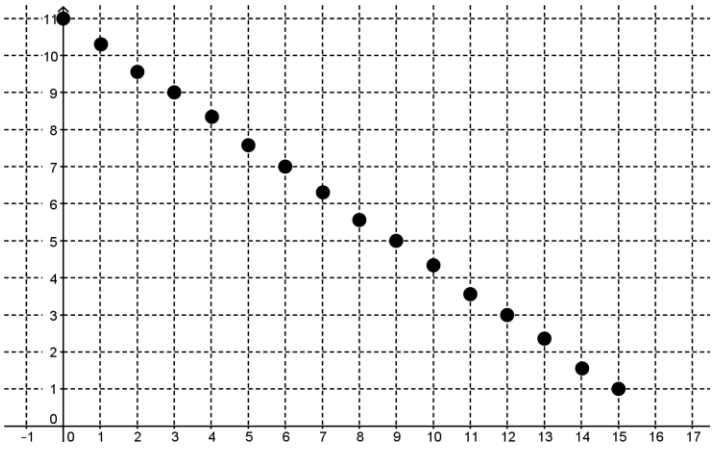
Length of each side = 1

What do you know?

8. I know that: the sequence models the value of a car that originally cost $26,500, but loses 10% of its value each year.
What do you know?

9. I know that: the first term of the geometric sequence is -2, and the fifth term is $-\frac{1}{8}$.
What do you know?

10. I know that: a graph of the sequence is:
What do you know?



Score:_____/5__

Classwork 2-9: Review

1. Complete the sequence by using recursion.

A = {5, 9, 13, 17, *f(5)*, *f(6)*, 29, 33, 37, *f(10*)}

What are the fifth, sixth, and tenth terms of the sequence?

2. Find the missing terms in the sequence explicitly.

B = {6, 18, 54, 162, *f(5)*, *f(6)*, 4374, … , *f(10)*}

What are the fifth, sixth, and tenth terms of the sequence?

3. Write the first four terms of the following sequences. Then write the equation in its other form.

A. $f(n) = f(n-1) + 6; \qquad f(1) = 4$

B. $f(n) = 1(5)^n$

4. Find the common difference in each sequence. Then write the recursive and explicit equations.

A. 1, 3, 5, 7, …

B. 7, 4, 1, –2, –5, …

C. 13, 18, 23, 28, …

D. –22, –15, –8, –1, …

5. Find the common ratio of each sequence. Then write the recursive and explicit equations.

A. 3, 15, 75, 375, …

B. 4, 8, 16, 32, …

C. 36, 12, 4, …

D. -128, -32, -8, -2

6. Identify each formula as arithmetic or geometric. Then, given the formula in sequence notation give the function notation.

A. $a_n = -10n + 33$

B. $a_1 = 5\ ;\ a_n = a_{n-1} + 1$

C. $a_1 = 4\ ;\ a_n = 5a_{n-1}$

D. $a_n = 2.5^{n-1}$

7. Identify each formula as arithmetic or geometric. Then, given one form of the formula in function notation for a sequence, give the other form in function notation.

A. $f(n) = -10n + 33$

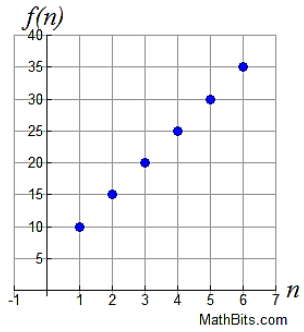
B. $f(1) = 5\ ;\ f(n) = f(n-1) + 1$

C. $f(1) = 4\ ;\ f(n) = 5f(n-1)$

D. $f(n) = 2.5^{n-1}$

8. Given a graph, determine if the sequence is arithmetic or geometric, and then give both formulas in function notation for the sequence.

A.



B.