Secondary Mathematics I: An Integrated Approach
Module 3
Arithmetic and Geometric Sequences

By

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In partnership with the Utah State Office of Education

Module 3 – Arithmetic and Geometric Sequences

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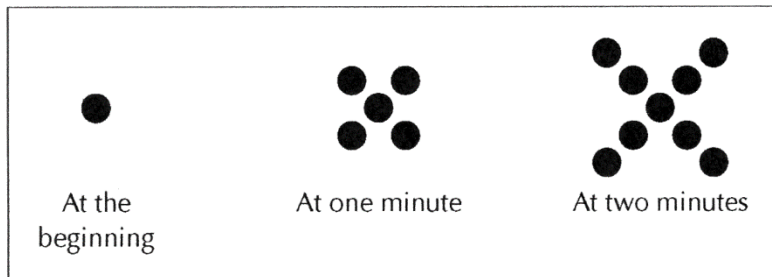**3.10 Classroom Task:** I Know . . . What Do You Know? – A Practice Understanding Task
Developing fluency with geometric and arithmetic sequences
**Ready, Set, Go Homework:** Sequences 3.10

3.1 Growing Dots
A Develop Understanding Task

At the beginning	At one minute	At two minutes

1. Describe the pattern that you see in the sequence of figures above.

2. Assuming the sequence continues in the same way, how many dots are there at 3 minutes?

3. How many dots are there at 100 minutes?

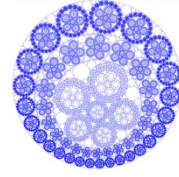4. How many dots are there at t minutes?

Solve the problems by your preferred method. Your solution should indicate how many dots will be in the pattern at 3 minutes, 100 minutes, and t minutes. Be sure to show how your solution relates to the picture and how you arrived at your solution.
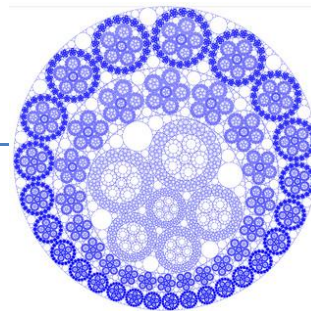
Name: Sequences | **3.1**

Ready, Set, Go!

Ready

Topic: Exponents, Substitution, and Function Notation

Find each value.

1. 3^1 2. 3^2 3. 3^3 4. 3^4

For each of the following, find $f(1), f(2)$ and $f(3)$

5. $f(x) = 2^x$ 6. $f(x) = 3^x$

7. $f(x) = 2(x - 1) + 3$

Complete each table.

8.

Term	1st	2nd	3rd	4th	5th	6th	7th	8th
Value	2	4	8	16	32			

9.

Term	1st	2nd	3rd	4th	5th	6th	7th	8th
Value	66	50	34	18				

10.

Term	1st	2nd	3rd	4th	5th	6th	7th	8th
Value	-3	9	-27	81				

11.

Term	1st	2nd	3rd	4th	5th	6th	7th	8th
Value	160	80	40	20				

12.

Term	1st	2nd	3rd	4th	5th	6th	7th	8th
Value	-9	-2	5	12				
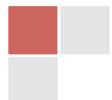
Name: Sequences

Set

Topic: Completing a table

Fill in the table. Then write a sentence explaining how you figured out the values to put in each cell. Explain how to figure out what will be in cell #8.

13. You run a business making birdhouses. You spend $600 to start your business, and it costs you $5.00 to make each birdhouse.

# of birdhouses	1	2	3	4	5	6	7
Total cost to build							

Explanation:

14. You borrow $500 from a relative, and you agree to pay back the debt at a rate of $15 per month.

# of months	1	2	3	4	5	6	7
Amount of money owed							

Explanation:

15. You earn $10 per week.

# of weeks	1	2	3	4	5	6	7
Amount of money earned							

Explanation:

16. You are saving for a bike and can save $10 per week. You have $25 already saved.

# of weeks	1	2	3	4	5	6	7
Amount of money saved							

Explanation:

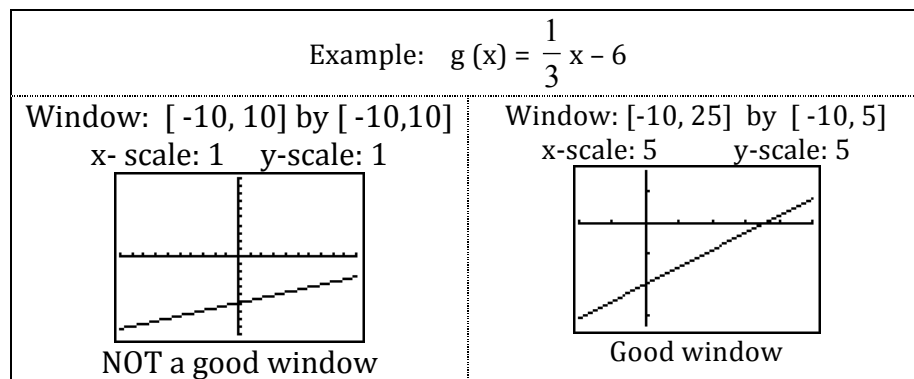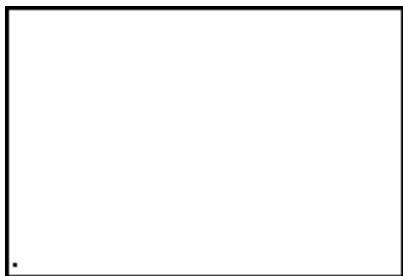# Name:

Go

Topic: Good viewing window

When sketching a graph of a function, it is important that we see important points. For linear functions, we want a window that shows important information related to the story. Often, this means including both the x- and y- intercepts.

Example: $g(x) = \dfrac{1}{3}x - 6$	
Window: [-10, 10] by [-10,10] x- scale: 1 y-scale: 1	Window: [-10, 25] by [-10, 5] x-scale: 5 y-scale: 5
NOT a good window	Good window

17. $f(x) = -\dfrac{1}{10}x + 1$

x: [,   ] by y: [,   ]

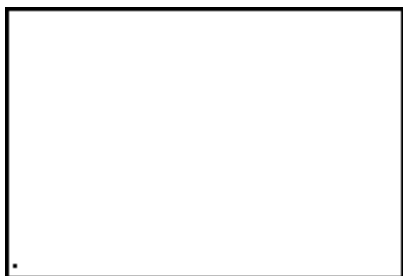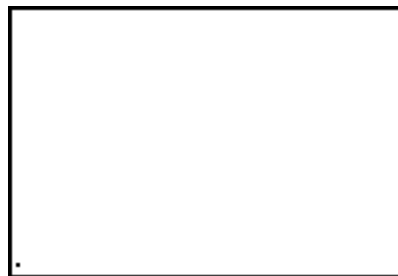x-scale: y-scale:

18. $7x - 3y = 14$

x: [,   ] by y: [,   ]

x-scale: y-scale:

19. $y = 3(x - 5) + 12$

x: [,   ] by y: [,   ]

x-scale: y-scale:

20. $f(x) = -15(x + 10) - 45$
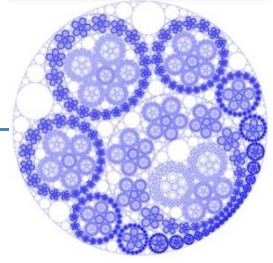
x: [,   ] by y: [,   ]

x-scale: y-scale:

3.2 Growing, Growing Dots
A Develop Understanding Task

At the
beginning

At one minute

At two minutes

At three minutes

At four minutes
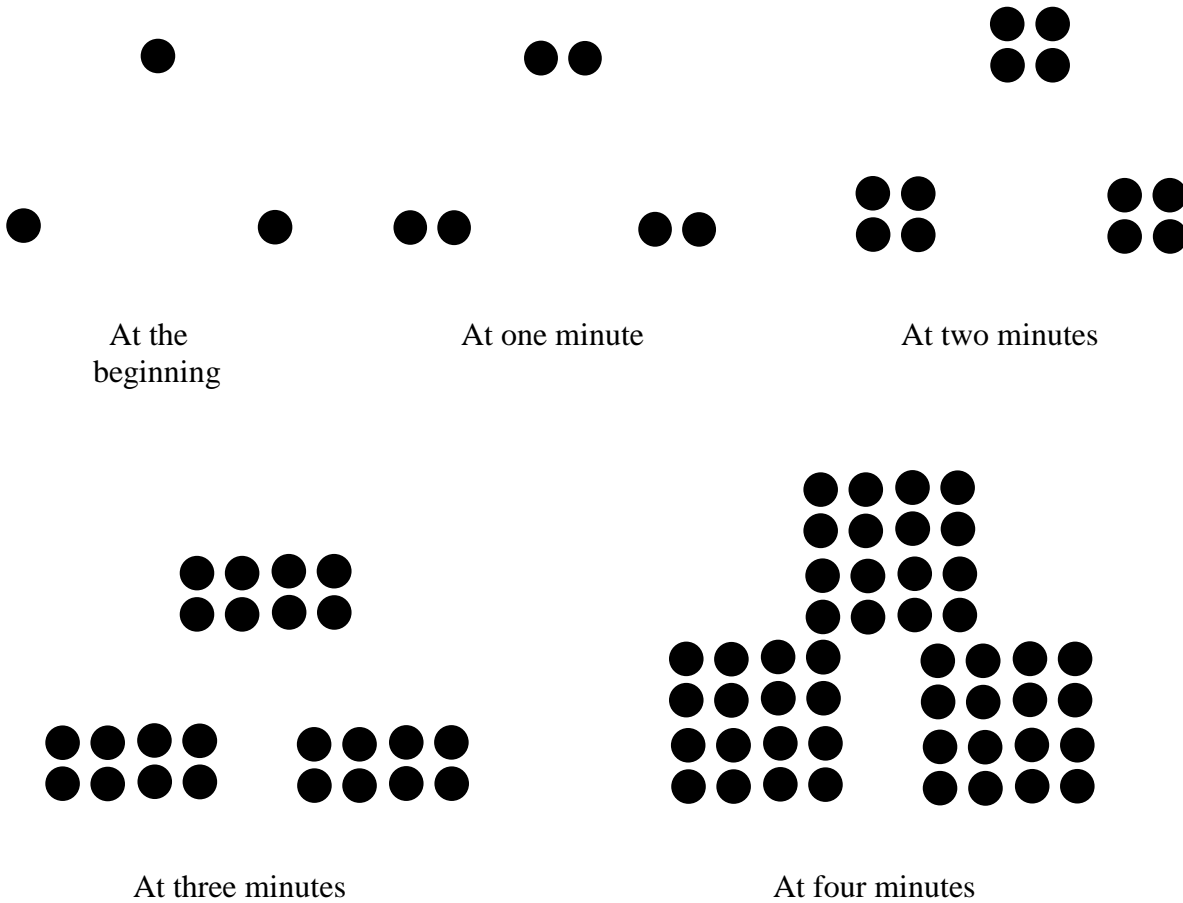
1. Describe and label the pattern of change you see in the above sequence of figures.
2. *Assuming the sequence continues in the same way, how many dots are there at 5 minutes?*
3. Write a recursive formula to describe how many dots there will be after t minutes.
4. Write an explicit formula to describe how many dots there will be after t minutes.

Name: Sequences 3.2

Ready, Set, Go!
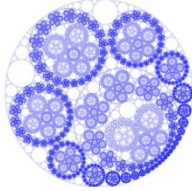
Ready

Topic: Finding values for a pattern

1. Bob Cooper was born in 1900. By 1930 he had 3 sons, all with the Cooper last name. By 1960 each of Bob's 3 boys had exactly 3 sons of their own. By the end of each 30 year time period, the pattern of each Cooper boy having exactly 3 sons of their own continued. How many Cooper sons were born in the 30 year period between 1960 and 1990?

2. Create a diagram that would show this pattern.

3. Predict how many Cooper sons will be born between 1990 and 2020, if the pattern continues.

4. Try to write an equation that would help you predict the number of Cooper sons that would be born between 2020 and 2050. If you can't find the equation, explain it in words.

Set

Topic: Evaluating Equations

Evaluate the following equations when x = { 1, 2, 3, 4, 5 }. Organize your inputs and outputs into a table of values for each equation. Let x be the input and y be the output.

5. $y = 4^x$ 6. $y = (-3)^x$ 7. $y = -3^x$ 8. $y = 10^x$

x	y
1	
2	
3	
4	
5	

x	y
1	
2	
3	
4	
5	

x	y
1	
2	
3	
4	
5	

x	y
1	
2	
3	
4	
5	

Name:

Go

Topic: Solve equations

Solve the following equations for the unknown variable. Check your answer.

9. $3(x - 1) = 2(x + 3)$

10. $7(x + 20) = x + 5$

11. $9(n - 2) = 3n + 3$

12. $2\left(a - \frac{1}{3}\right) = \frac{2}{5}(a + \frac{2}{3})$

13. $3(t + 3) - 2(t - 1) = 0$

14. $6(z + 3) - 5(3z + 2) = 2(2z - 9)$

Need help? Check out these related videos.

Evaluating with exponents
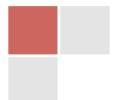http://www.khanacademy.org/math/algebra/exponents-radicals/v/level-1-exponents

Solving equations
http://www.khanacademy.org/math/algebra/solving-linear-equations/v/solving-equations-with-the-distributive-property

# 3.3 Scott's Workout
A Solidify Understanding Task

Scott has decided to add push-ups to his daily exercise routine. He is keeping track of the number of push-ups he completes each day in the bar graph below, with day one showing he completed three push-ups. After four days, Scott is certain he can continue this pattern of increasing the number of push-ups he completes each day.
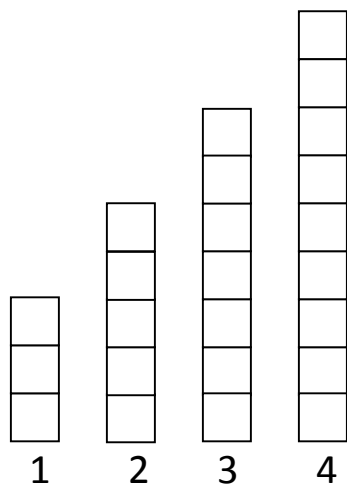
1. How many push-ups will Scott do on day 10?
2. How many push-ups will Scott do on day n?
3. Model the number of push-ups Scott will complete on any given day. Include both explicit and recursive equations.
4. Aly is also including push-ups in her workout and says she does more push-ups than Scott because she does fifteen push-ups every day. Is she correct? Explain.

Ready, Set, Go!

Ready

Topic: Slopes between two points

Find the slope of the line that goes through each set of points.

1. (3,7) and (5, 10)

2. (-1, 4) and (3,3)

3. (0,0) and (-2, 5)

4. (-1, -5) and (-4, -5)

Set

Topic: Finding terms for a given sequence

Find the next 3 terms in each sequence. Identify the constant difference. Write a recursive function and an explicit function for each sequence. (The first number is the 1st term, not the 0th). Circle the constant difference in both functions.

4.   3 , 8 , 13 , 18 , 23 , _____ , _____ , _____ , …   Constant Difference: _____

     Recursive Function: _____   Explicit Function:_____

5.   11 , 9 , 7 , 5 , 3 , _____ , _____ , _____ , …   Constant Difference: _____

     Recursive Function: _____   Explicit Function:_____

6.   3 , 1.5 , 0 , -1.5 , -3 , _____ , _____ , _____ , …   Constant Difference: _____

     Recursive Function: _____   Explicit Function:_____

Go

Topic: Slope-Intercept Form

Write the equations in slope-intercept form.

7. $y = 12 + (x - 1)(-4)$

8. $\frac{2}{3}(6y + 9) = \frac{3}{5}(15x - 20)$

9. $\frac{5}{7}(21y + 7) = \frac{2}{9}(18x + 27)$

Need Help? Check out these related videos:

Finding slope
http://www.khanacademy.org/math/algebra/ck12-algebra-1/v/slope-and-rate-of-change

Writing the explicit equation
http://www.khanacademy.org/math/algebra/solving-linear-equations/v/equations-of-sequence-patterns

Writing equations in slope-intercept form
http://www.khanacademy.org/math/algebra/linear-equations-and-inequalitie/v/converting-to-slope-intercept-form

3.4 Don't Break the Chain
A Solidify Understanding Task

Maybe you've received an email like this before:

> Hi! My name is Bill Weights, founder of Super Scooper Ice Cream. I am offering you a gift certificate for our signature "Super Bowl" (a $4.95 value) if you forward this letter to 10 people.
>
> When you have finished sending this letter to 10 people, a screen will come up. It will be your Super Bowl gift certificate. Print that screen out and bring it to your local Super Scooper Ice Cream store. The server will bring you the most wonderful ice cream creation in the world—a Super Bowl with three yummy ice cream flavors and three toppings!
>
> This is a sales promotion to get our name out to young people around the country. We believe this project can be a success, but only with your help. Thank you for your support.
>
> Sincerely,
>
> Bill Weights
> Founder of Super Scooper Ice Cream

These chain emails rely on each person that receives the email to forward it on. Have you ever wondered how many people might receive the email if the chain remains unbroken? To figure this out, assume that it takes a day for the email to be opened, forwarded, and then received by the next person. On day 1, Bill Weights starts by sending the email out to his 8 closest friends. They each forward it to 10 people so that on day 2, it is received by 80 people. The chain continues unbroken.

1. How many people will receive the email on day 7?
2. How many people with receive the email on day n? Explain your answer with as many representations as possible.
3. If Bill gives away a Super Bowl that costs $4.95 to every person that receives the email during the first week, how much will he have spent?

Name: _____   Sequences | **3.4**
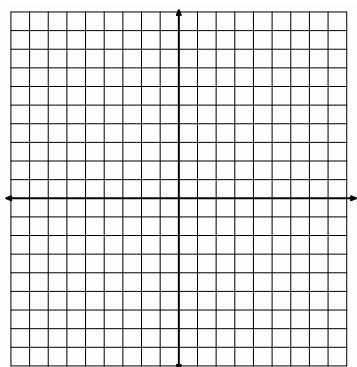
Ready, Set, Go!

© 2012 www.flickr.com/photos/mag3737

Ready

Topic: Write the equation of a line given two points.
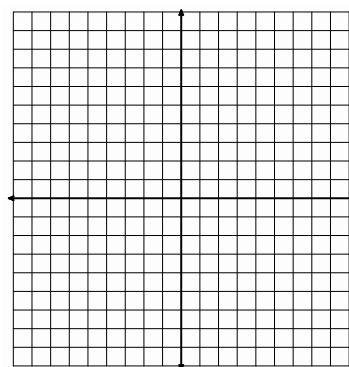
Graph each pair of points, draw a line that goes through both points, and write an equation of that line.
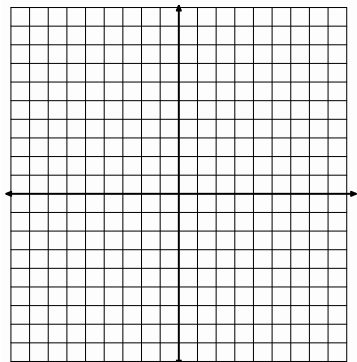
1. (5 , 2) and (7 , 0)

2. (-4 , 2) and (6 , 7)

Equation:_____

Equation:_____

3. (3 , 0) and (0 , 4)

1. (2 , -4) and (2 , 6)
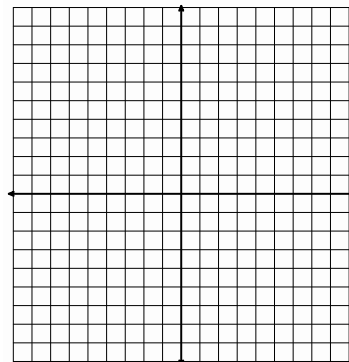
Equation:_____

Equation:_____

5. Write the equation of the line that passes through the points (2 , 2) and (8 , 8) without the help of a graph.

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Name: Sequences | 3.4

Set

Topic: Recursive and explicit functions of arithmetic sequences

Below you are given various types of information. Write the recursive and explicit functions for each arithmetic sequence. Finally, graph each sequence, making sure you clearly label your axes.

6. 2 , 4 , 6 , 8 , ...

Recursive:_____

Explicit:_____

7.

Time (days)	Number of cells
1	3
2	6
3	9
4	12

Recursive:_____

Explicit:_____

8. Claire has $300 in an account. She decides she is going to take out $25 each month.

Recursive:_____

Explicit:_____

9. Each day Tania decides to do something nice for 2 strangers.

Recursive:_____

Explicit:_____

10.

Day 1   Day 2   Day 3

Recursive:_____

Explicit:_____

Name: Sequences 3.4

Go

Topic: Recursive and explicit functions of geometric sequences

Below you are given various types of information. Write the recursive and explicit functions for each geometric sequence. Finally, graph each sequence, making sure you clearly label your axes.
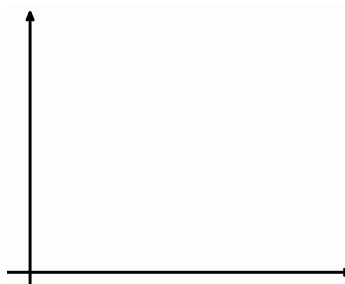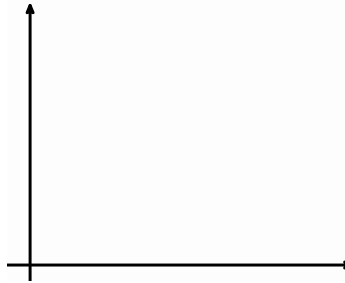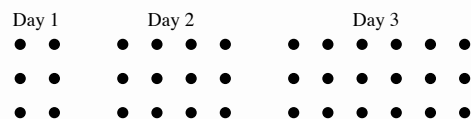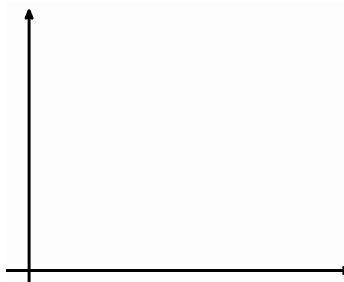
11. 2 , 4 , 8 , 16 , …

Recursive:_____

Explicit:_____

12.
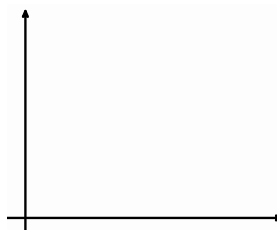
Time (days)	Number of cells
1	3
2	6
3	12
4	24

Recursive:_____

Explicit:_____

13. Claire has $300 in an account. She decides she is going to take out half of what's left in there at the end of each month.

Recursive:_____

Explicit:_____

14. Tania creates a chain letter and sends it to four friends. Each day each friend is then instructed to send it to four friends and so forth.
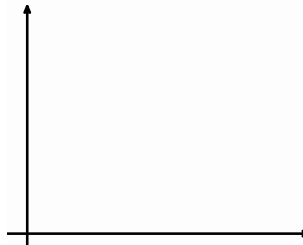
Recursive:_____

Explicit:_____

15.

Day 1   Day 2   Day 3

Recursive:_____

Explicit:_____
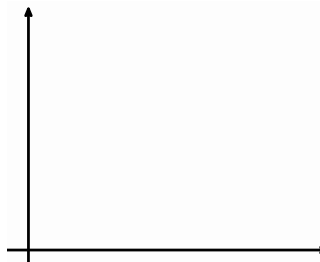
Need Help? Check out these related videos:

Find equation of line http://patrickjmt.com/find-the-equation-of-a-line-using-point-slope-form/

3.5 Something to Chew On
A Solidify Understanding Task

The Food-Mart grocery store has a candy machine like the one pictured here. Each time a child inserts a quarter, 7 candies come out of the machine. The machine holds 15 pounds of candy. Each pound of candy contains about 180 individual candies.

1. Represent the number of candies in the machine for any given number of customers. About how many customers will there be before the machine is empty?
2. Represent the amount of money in the machine for any given number of customers.
3. To avoid theft, the store owners don't want to let too much money collect in the machine, so they take all the money out when they think the machine has about $25 in it. The tricky part is that the store owners can't tell how much money is actually in the machine without opening it up, so they choose when to remove the money by judging how many candies are left in the machine. About how full should the machine look when they take the money out? How do you know?

Name: Sequences **3.5**

Ready, Set, Go!

Ready

Topic: Finding the constant difference

Find the missing terms for each arithmetic sequence and state the constant difference.

1. 5, 11, ____ , 23, 29, ____...

Constant Difference = _____

2. 7, 3, -1, ____ , ____ , -13...

Constant Difference = _____

3. 8, ____ , ____ , 47, 60...

Constant Difference = _____

4. 0, ____ , ____ , 2, $\frac{8}{3}$ ...

Constant Difference = _____

5. 5, ____ , ____ , ____ , 25...

Constant Difference = _____

6. 3, ____ , ____ , ____ , -13 ...

Constant Difference = _____

Set

Topic: Determine recursive equations

Two consecutive terms in an arithmetic sequence are given. Find the constant difference and the recursive equation.

7. If $f(3) = 5$ and $f(4) = 8.$ ...

$f(5)$ = _____. $f(6)$ = _____. Recursive Function: _____

8. If $f(2) = 20$ and $f(3) = 12.$

$f(4)$ = _____. $f(5)$ = _____. Recursive Function: _____

9. If $f(5) = 3.7$ and $f(6) = 8.7.$

$f(7)$ = _____. $f(8)$ = _____. Recursive Function: _____

Name:

Go

Topic: Evaluate using function notation

Find each value.

10. $f(n) = 2^n$ Find $f(3)$.

11. $f(n) = 5^n$ Find $f(2)$.

12. $f(n) = (-2)^n$ Find $f(3)$

13. $f(n) = 3 + 4(n - 1)$ Find $f(5)$ and $f(6)$.

14. $f(n) = 2(n - 1) + 6$ Find $f(1)$ and $f(2)$.

Need Help? Check out these videos:

Arithmetic sequences   http://www.khanacademy.org/math/algebra/solving-linear-equations/v/patterns-in-sequences-1

Function notation   http://www.youtube.com/watch?v=Kj3Aqov52TY

3.6 Chew on This
A Solidify Understanding Task

Mr. and Mrs. Gloop want their son, Augustus, to do his homework every day. Augustus loves to eat candy, so his parents have decided to motivate him to do his homework by giving him candies for each day that the homework is complete. Mr. Gloop says that on the first day that Augustus turns in his homework, he will give him 10 candies. On the second day he promises to give 20 candies, on the third day he will give 30 candies, and so on.

1. Write both a recursive and an explicit formula that shows the number of candies that Augustus earns on any given day with his father's plan.
2. Use a formula to find how many candies Augustus will have on day 30 in this plan.

Augustus looks in the mirror and decides that he is gaining weight. He is afraid that all that candy will just make it worse, so he tells his parents that it would be ok if they just give him 1 candy on the first day, 2 on the second day, continuing to double the amount each day as he completes his homework. Mr. and Mrs. Gloop like Augustus' plan and agree to it.

3. Model the amount of candy that Augustus would get each day he reaches his goals with the new plan.
4. Use your model to predict the number of candies that Augustus would earn on the 30th day with this plan.
5. Write both a recursive and an explicit formula that shows the number of candies that Augustus earns on any given day with this plan.

Augustus is generally selfish and somewhat unpopular at school. He decides that he could improve his image by sharing his candy with everyone at school. When he has a pile of 100,000 candies, he generously plans to give away 60% of the candies that are in the pile each day. Although Augustus may be earning more candies for doing his homework, he is only giving away candies from the pile that started with 100,000. (He's not that generous.)

6. Model the amount of candy that would be left in the pile each day.
7. How many pieces of candy will be left on day 8?
8. When would the candy be gone?

Name: Sequences | 3.6

Ready, Set, Go!

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Ready
Topic: Arithmetic and geometric sequences

Find the missing values for each arithmetic or geometric sequence. Then say if the sequence has a constant difference or a constant ratio, and say what the constant difference/rate is.

1. 5, 10, 15, ___, 25, 30...

Constant difference or a constant ratio?

The constant difference/ratio is _____.

2. 20, 10, ___, 2.5, ___...

Constant difference or a constant ratio?

The constant difference/ratio is _____.

3. 2, 5, 8, ___, 14, ___...

Constant difference or a constant ratio?

The constant difference/ratio is _____.

4. 30, 24, ___, 12, 6...

Constant difference or a constant ratio?

The constant difference/ratio is _____.

Set
Topic: Recursive and explicit equations

Determine whether each situation represents an arithmetic or geometric sequence and then find the recursive and explicit equation for each.

5. 2 , 4 , 6 , 8 , ...

Arithmetic or Geometric?

Recursive: _____

Explicit: _____

6. 2 , 4 , 8 , 16 , ...

Arithmetic or Geometric?

Recursive: _____

Explicit: _____

7.

Time (days)	Number of Dots
1	3
2	7
3	11
4	15

Arithmetic or Geometric?

Recursive: _____

Explicit: _____

8.

Time (days)	Number of cells
1	5
2	8
3	12.8
4	20.48

Arithmetic or Geometric?

Recursive: _____

Explicit: _____

9. Michelle likes chocolate but it causes acne. She chooses to limit herself to three pieces of chocolate every five days.

Arithmetic or Geometric?

Recursive: _____

Explicit: _____

10. Scott decides to add running to his exercise routine and runs a total of one mile his first week. He plans to double the number of miles he runs each week.

Arithmetic or Geometric?

Recursive: _____

Explicit: _____

11. Vanessa has $60 to spend on rides at the State Fair. Each ride cost $4.

Arithmetic or Geometric?

Recursive: _____

Explicit: _____

12. Cami invested $6,000 dollars into an account that earns 10% interest each year.

Arithmetic or Geometric?

Recursive: _____

Explicit: _____

Name: Sequences | **3.6**

Go

Topic: Solving systems of linear equations

Solve the system of equations.

15. $\begin{cases} y = 2x - 10 \\ x - 4y = 5 \end{cases}$

16. $\begin{cases} x - 7y = 6 \\ -3x + 21y = -18 \end{cases}$

17. $\begin{cases} 5x - 4y = 3 \\ 6x + 4y = 30 \end{cases}$

18. $\begin{cases} 2x - 3y = -12 \\ -x + 2y = 4 \end{cases}$

Need help? Check out these related videos

Arithmetic and geometric sequences http://www.youtube.com/watch?v=THV2Wsf8hro

3.7 What Comes Next? What Comes Later?
A Practice Understanding Task

For each of the following tables,

- describe how to find the next term in the sequence,
- write a recursive rule for the function,
- describe how the features identified in the recursive rule can be used to write an explicit rule for the function, and
- write an explicit rule for the function.
- identify if the function is arithmetic, geometric or neither

Example:

x	y
0	5
1	8
2	11
3	14
4	?
…	…
n	?

- To find the next term: add 3 to the previous term
- Recursive rule: $f(0) = 5, f(n) = f(n-1) + 3$
- To find the nth term: start with 5 and add 3 n times
- Explicit rule: $f(n) = 5 + 3n$
- Arithmetic, geometric, or neither? Arithmetic

Function A

x	y
1	5
2	10
3	20
4	40
5	?
…	…
n	?

1. To find the next term: _____
2. Recursive rule: _____
3. To find the nth term: _____
4. Explicit rule: _____
5. Arithmetic, geometric, or neither? _____

Function B

x	y
0	3
1	4
2	7
3	12
4	19
5	?
…	…
n	?

6. To find the next term: _____
7. Recursive rule: _____
8. To find the nth term: _____
9. Explicit rule: _____
10. Arithmetic, geometric, or neither? _____

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Sequences 25

Function C

x	y
1	3
2	5
3	9
4	17
5	33
6	?
...	...
n	?

11. To find the next term: _____

12. Recursive rule: _____

13. To find the nth term: _____

14. Explicit rule: _____

15. Arithmetic, geometric, or neither? _____

Function D

x	y
1	-8
2	-17
3	-26
4	-35
5	-44
6	-53
...	...
n	

16. To find the next term: _____

17. Recursive rule: _____

18. To find the nth term: _____

19. Explicit rule: _____

20. Arithmetic, geometric, or neither? _____

Function E

x	y
1	2
2	-6
3	18
4	-54
5	162
6	-486
...	...
n	

21. To find the next term: _____

22. Recursive rule: _____

23. To find the nth term: _____

24. Explicit rule: _____

25. Arithmetic, geometric, or neither? _____

x	y
0	1
1	$1\frac{3}{5}$
2	$2\frac{1}{5}$
3	$2\frac{4}{5}$
4	$3\frac{2}{5}$
5	4
...	...
n	

Function F

26. To find the next term: _____

27. Recursive rule: _____

28. To find the nth term: _____

29. Explicit rule: _____

30. Arithmetic, geometric, or neither? _____

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x	y
1	10
2	2
3	$\frac{2}{5}$
4	$\frac{2}{25}$
5	$\frac{2}{125}$
6	$\frac{2}{625}$
...	...
n	

Function G

31. To find the next term: _____

32. Recursive rule: _____

33. To find the nth term: _____

34. Explicit rule: _____

35. Arithmetic, geometric, or neither? _____

x	y
1	-1
2	0.2
3	-0.04
4	0.008
5	-0.0016
6	0.00032
...	...
n	

Function H

36. To find the next term: _____

37. Recursive rule: _____

38. To find the nth term: _____

39. Explicit rule: _____

40. Arithmetic, geometric, or neither? _____

Name: _____   Sequences | **3.7**

Ready, Set, Go!

Ready

Topic: Constant Ratios

Find the constant ratio for each geometric sequence.

1. 2, 4, 8, 16…

2. $\frac{1}{2}$, 1, 2, 4, 8…

3. -5, 10, -20, 40…

4. 10, 5, 2.5, 1.25…

Set

Topic: Recursive and explicit equations

Fill in the blanks for each table, then write the recursive and explicit equation for each sequence.

5. Table 1

x	1	2	3	4	5
y	5	7	9		

Recursive: _____   Explicit: _____

6. Table 2

x	y
1	-2
2	-4
3	-6
4	
5	

Recursive:

Explicit:

7. Table 3

x	y
1	3
2	9
3	27
4	
5	

Recursive:

Explicit

8. Table 4

x	y
1	27
2	9
3	3
4	
5	

Recursive:

Explicit:

Name:

Go

Topic: Graphing linear equations and labeling windows

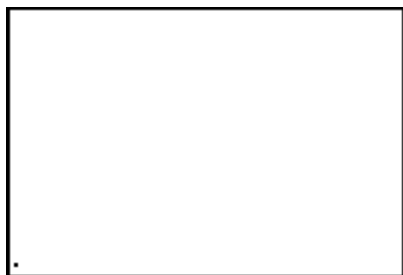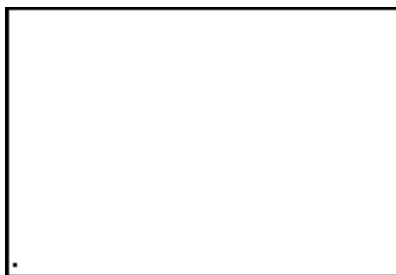**Graph the following linear equations. Label your window**

13. $y = 4x + 7$

14. $y = \frac{-3}{4}x + 5$

15. $2x + 7y = 10$

16. $x - 3y = 7$

Need Help? Check out these related videos:

Graphing equations
http://www.khanacademy.org/math/algebra/linear-equations-and-inequalitie/v/graphs-using-slope-intercept-form

3.8 What Does It *Mean*?
A Solidify Understanding Task

Each of the tables below represents an arithmetic sequence. Find the missing terms in the sequence, showing your method.

x	1	2	3
y	5		11

x	1	2	3	4	5
y	18				-10

x	1	2	3	4	5	6	7
y	12						-6

Describe your method for finding the missing terms. Will the method always work? How do you know?

Here are a few more arithmetic sequences with missing terms. Complete each table, either using the method you developed previously or by finding a new method.

x	1	2	3	4
y	50			86

x	1	2	3	4	5	6
y	40					10

x	1	2	3	4	5	6	7	8
y	-23							5

The missing terms in an arithmetic sequence are called "arithmetic means". For example, in the problem above, you might say, "Find the 6 arithmetic means between -23 and 5". Describe a method that will work to find arithmetic means and explain why this method works.

Name:

Ready, Set, Go!

Ready

Topic: Comparing arithmetic and geometric sequences

1. How are arithmetic and geometric sequences similar?

2. How are they different?

Set

Topic: Arithmetic sequences

Each of the tables below represents an arithmetic sequence. Find the missing terms in the sequence, showing your method.

3. Table 1

x	1	2	3
y	3		12

4. Table 2

x	*y*
1	2
2	
3	
4	26

5. Table 3

x	*y*
1	24
2	
3	6
4	

6. Table 4

x	*y*
1	16
2	
3	
4	4
5	

Go

Topic: Sequences

Then determine the recursive and explicit equations for each (if the sequence is not arithmetic or geometric, try your best).

7. 5, 9, 13, 17,...　　　This sequence is:　Arithmetic , Geometric , Neither
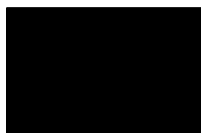
    Recursive Equation: _____　　Explicit Equation: _____

8. 60, 30, 0, -30 ,...　　　This sequence is:　Arithmetic , Geometric , Neither

    Recursive Equation: _____　　Explicit Equation: _____

9. 60, 30, 15, $\frac{15}{2}$, ,...　　　This sequence is:　Arithmetic , Geometric , Neither

    Recursive Equation: _____　　Explicit Equation: _____

10.

(The number of black tiles above)　　　This sequence is:　Arithmetic , Geometric , Neither

    Recursive Equation: _____　　Explicit Equation: _____

11.. 4, 7, 12, 19, ,...　　　This sequence is:　Arithmetic , Geometric , Neither

    Recursive Equation: _____　　Explicit Equation: _____

3.9 Geometric *Meanies*
A Solidify and Practice Task

Each of the tables below represents a geometric sequence. Find the missing terms in the sequence, showing your method.

Table 1

x	1	2	3
y	3		12

Is the missing term that you identified the only answer? Why or why not?

Table 2

x	1	2	3	4
y	7			875

Are the missing terms that you identified the only answers? Why or why not?

Table 3

x	1	2	3	4	5
y	6				96

Are the missing terms that you identified the only answers? Why or why not?

Table 4

x	1	2	3	4	5	6
y	4					972

Are the missing terms that you identified the only answers? Why or why not?

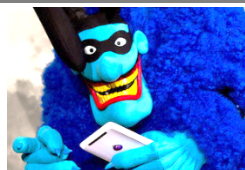**A.** Describe your method for finding the geometric means.

B. How can you tell if there will be more than one solution for the geometric means?

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Name: Sequences │ 3.9

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Ready, Set, Go!

Ready

Topic: Arithmetic and geometric sequences

For each set of sequences, find the first five terms. Compare arithmetic sequences and geometric sequences. Which grows faster? When?

1.   Arithmetic sequence: $f(1) = 2$, common difference, $d = 3$
      Geometric sequence: $g(1) = 2$, common ratio, $r = 3$

Arithmetic:	Geometric:
$f(1) =$	$g(1) =$
$f(2) =$	$g(2) =$
$f(3) =$	$g(3) =$
$f(4) =$	$g(4) =$
$f(5) =$	$g(5) =$

Which value do you think will be more, $f(100)$ or $g(100)$? Why?

2.   Arithmetic sequence: $f(1) = 2$, common difference, $d = 10$
      Geometric sequence: $g(1) = 2$, common ratio, $r = 3$

Arithmetic:	Geometric:
$f(1) =$	$g(1) =$
$f(2) =$	$g(2) =$
$f(3) =$	$g(3) =$
$f(4) =$	$g(4) =$
$f(5) =$	$g(5) =$

Which value do you think will be more, $f(100)$ or $g(100)$? Why?

3.   Arithmetic sequence: $f(1) = 20$, $d = 10$
      Geometric sequence: $g(1) = 2$, $r = 2$

Arithmetic:	Geometric:
$f(1) =$	$g(1) =$
$f(2) =$	$g(2) =$
$f(3) =$	$g(3) =$
$f(4) =$	$g(4) =$
$f(5) =$	$g(5) =$

Who Which value do you think will be more, $f(100)$ or $g(100)$? Why?

4. Arithmetic sequence: $f(1) = 50, common\ difference, d = 10$
   Geometric sequence: $g(1) = 1, common\ ratio, r = 2$

   Arithmetic: Geometric:
   $f(1) =$ $g(1) =$
   $f(2) =$ $g(2) =$
   $f(3) =$ $g(3) =$
   $f(4) =$ $g(4) =$
   $f(5) =$ $g(5) =$

   W Who Which value do you think will be more, $f(100)$ or $g(100)$? Why?

5. Compare arithmetic sequences and geometric sequences growth rates. Which grows faster? When?

Set
Topic: Geometric sequences

Each of the tables below represents a *geometric* sequence. Find the missing terms in the sequence, showing your method.

6. Table 1

x	1	2	3
y	3		12

7. Table 2

x	y
1	2
2	
3	
4	54

8. Table 3

x	y
1	5
2	
3	20
4	

9. Table 4

x	y
1	4
2	
3	
4	
5	324

Go

Topic: Explicit equations of geometric equations

Given the following information, determine the explicit equation for each geometric sequence.

10. $f(1) = 8, common\ ratio,\ r = 2$

11. $f(1) = 4, f(n) = 3f(n - 1)$
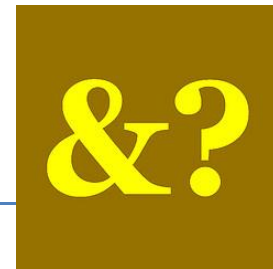
12. $f(n) = 4f(n - 1); f(1) = \frac{5}{3}$

13. Which geometric sequence above has the greatest value at $f(100)$?

Need Help? Check out these videos:

Geometric sequence http://www.khanacademy.org/math/algebra/ck12-algebra-1/v/geometric-sequences--introduction

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3.10 I Know . . . What Do You Know?
A Practice Task

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 things you may be able to figure out for the sequence are: a table, a graph, an explicit equation, a recursive equation, the constant ratio or constant difference between consecutive terms, any terms that are missing, the type of sequence, or 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, -25 . . .
   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 . . .
   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: the sequence is a model for the perimeter of the following figures:

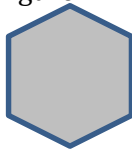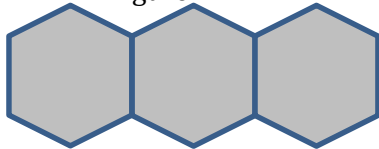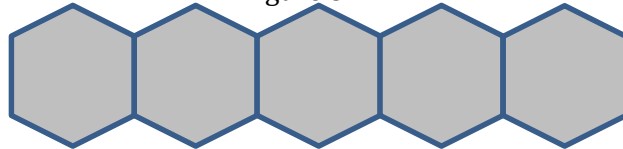Figure 1   Figure 2   Figure 3
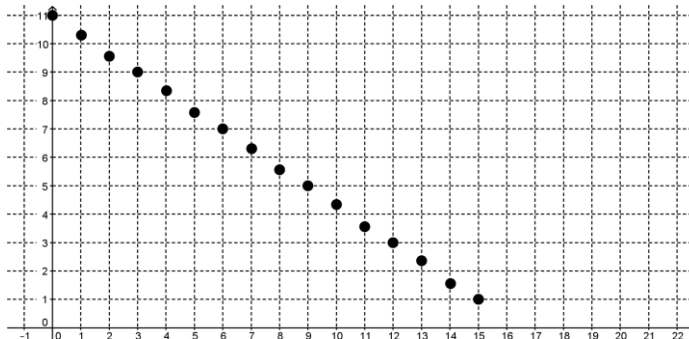
Length of each side = 1

    What do you know?

7. I know that: it is a sequence where a_1 = 5 and the constant ratio between terms is -2.
   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 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?

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Sequences 40

Name: Sequences | 3.10

Ready, Set, Go!

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Ready

Topic: Comparing linear equations and arithmetic sequences

1. Describe similarities and differences between linear equations and arithmetic sequences.

Similarities	Differences

Set

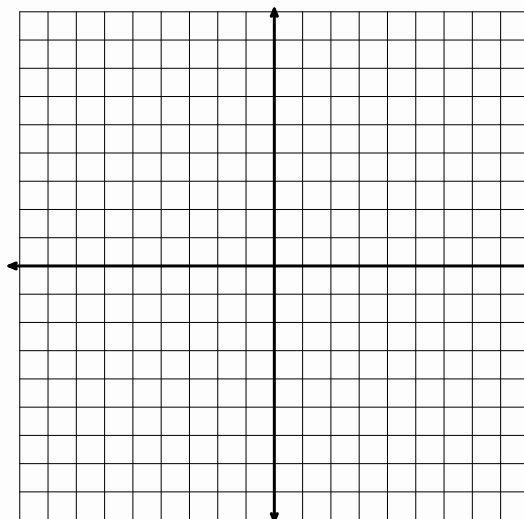Topic: representations of arithmetic sequences

Use the given information to complete the other representations for each arithmetic sequence.

2.   **Recursive Equation:**   **Graph**

     Explicit Equation:

Table

Days	Cost
1	8
2	16
3	24
4	32

Create a context
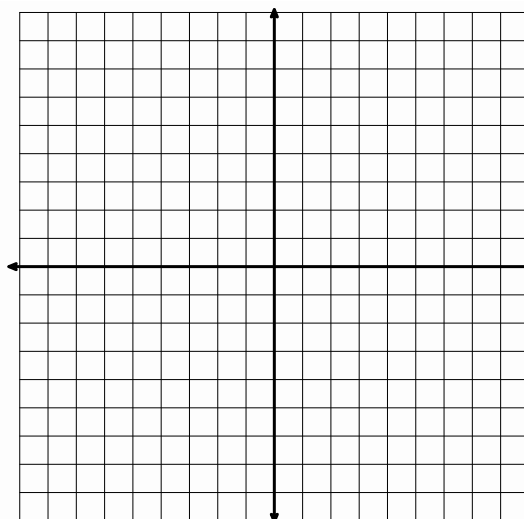
Name: Sequences **3.10**

3. **Recursive Equation:** $f(1) = 4, \quad f(n) = f(n-1) + 3$ **Graph**

Explicit Equation:

Table
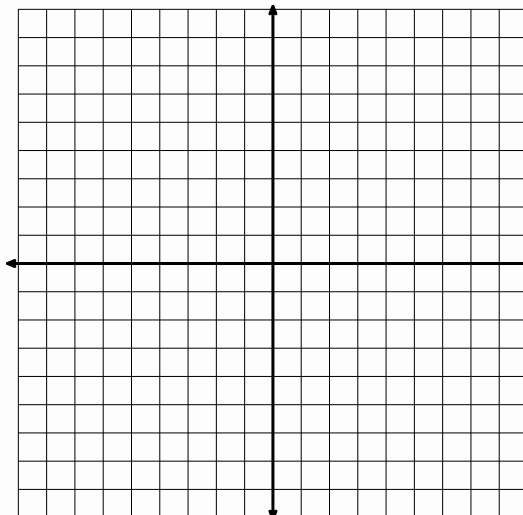
Create a context

4. **Recursive Equation:** **Graph**

Explicit Equation: $f(n) = 4 + 5(n-1)$

Table

Create a context

5. **Recursive Equation:**
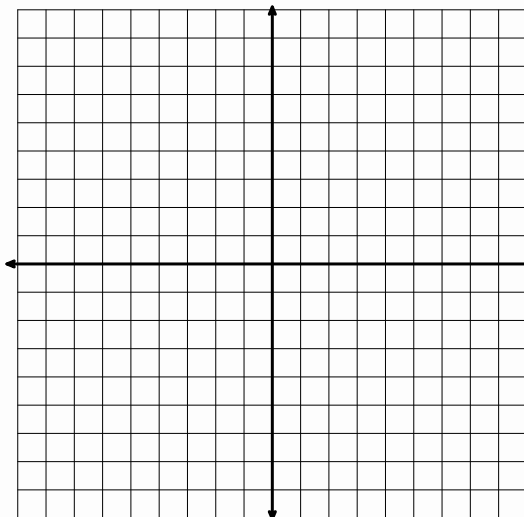
    Explicit Equation:

Graph

Table

Create a context

Janet wants to know how many seats are in each row of the theater. Jamal lets her know that each row has 2 seats more than the row in front of it. The first row has 14 seats.

Go

Topic: Writing explicit equations

Given the recursive equation for each arithmetic sequence, write the explicit equation.

6. $f(n) = f(n-1) - 2; f(1) = 8$

7. $f(n) = 5 + f(n-1); f(1) = 0$

8. $f(n) = f(n-1) + 1; f(1) = \frac{5}{3}$