Name: **Arithmetic and Geometric Sequences** **3.1**

Ready, Set, Go!

Ready

Topic: Exponents, substitution, and function notation

Find each value.

1. 3^1 **3**
2. 3^2 **9**
3. 3^3 **27**
4. 3^4 **81**

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

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

   $f(1) = 2, f(2) = 4, f(3) = 8$

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

   $f(1) = 3, f(2) = 9, f(3) = 27$

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

   $f(1) = 3, f(2) = 5, f(3) = 7$

Complete each table.

8.

Term	1st	2nd	3rd	4th	5th	6th	7th	8th
Value	2	4	8	16	32	**64**	**128**	**256**

9.

Term	1st	2nd	3rd	4th	5th	6th	7th	8th
Value	66	50	34	18	**2**	**−14**	**−30**	**−46**

10.

Term	1st	2nd	3rd	4th	5th	6th	7th	8th
Value	−3	9	−27	81	**−243**	**729**	**−2187**	**6561**

11.

Term	1st	2nd	3rd	4th	5th	6th	7th	8th
Value	160	80	40	20	**10**	**5**	**2.5**	**1.25**

12.

Term	1st	2nd	3rd	4th	5th	6th	7th	8th
Value	−9	−2	5	12	**19**	**26**	**33**	**40**

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	0	1	2	3	4	5	6
Total cost to build	**600**	**605**	**610**	**615**	**620**	**625**	**630**

Explanation: **For the first birdhouse it costs $600 to start the business, plus $5 for the first birdhouse, and after that it is just $5 more for each additional birdhouse. The cost for making 8 birdhouses is then $600 + 8 · 5, or $640.**

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	**500**	**485**	**470**	**455**	**440**	**425**	**410**

Explanation: **On month #1 you owe the total, $500, then every month after that you owe $15 less because you paid $15 toward the debt at the end of each month. On the 8th month, the amount of money owed would be 410 − 15, or $395**

15. You earn $10 per week.

# of weeks	1	2	3	4	5	6	7
Amount of money earned	**10**	**20**	**30**	**40**	**50**	**60**	**70**

Explanation: **The money earned is $10 every week, so add $10 to the total earned each week. On the 8th week the amount of money earned would then be 70 + 10, or $80.**

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

# of weeks	0	1	2	3	4	5	6
Amount of money saved	**25**	**35**	**45**	**55**	**65**	**75**	**85**

Explanation: **On week 1 you have the $25 you already saved plus the $10 for that week, so $35. For every week after that add $10 to the money saved for the additional $10 saved that week. On the 8th week the total amount of money saved is 95 + 10, or $105.**

Go

Topic: Good viewing window

When sketching a graph of a function, it is important that we see key 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

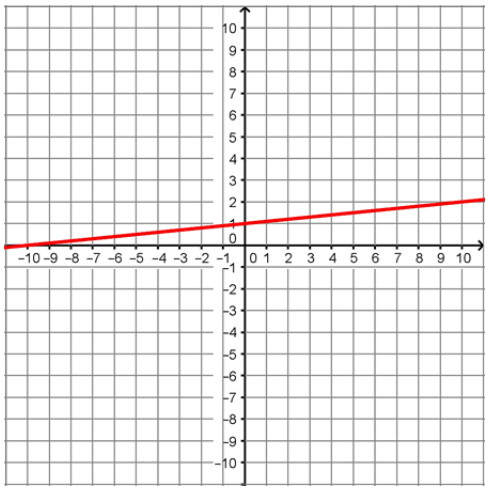
Find an appropriate graphing window for each of the following linear functions. Sketch the graph. Fill in the blanks showing the lower and upper values and include the scale for each axis.

You may use an online graphing utility such as Desmos (https://www.desmos.com/calculator) or MATHPAPA (https://www.mathpapa.com/calc.html?q=)

Answers may vary. Sample answers provided below:

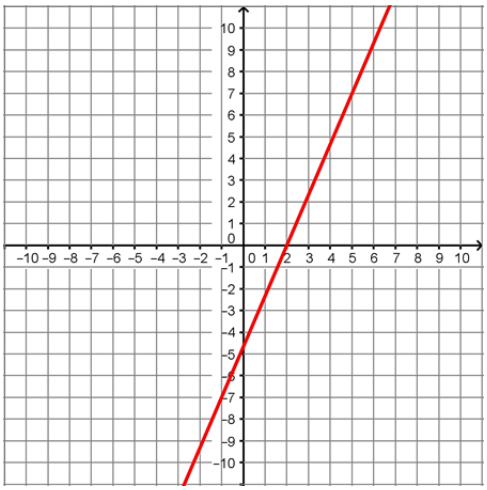
17. $f(x) = \frac{1}{10}x + 1$

***x*: [−10 , 10] by *y*: [−10 , 10]**
***x*-scale: 1 *y*-scale: 1**



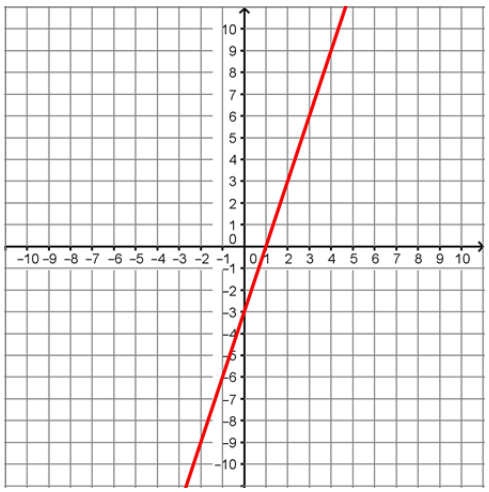
18. $7x - 3y = 14$

***x*: [−10 , 10] by *y*: [−10 , 10]**
***x*-scale: 1 *y*-scale: 1**



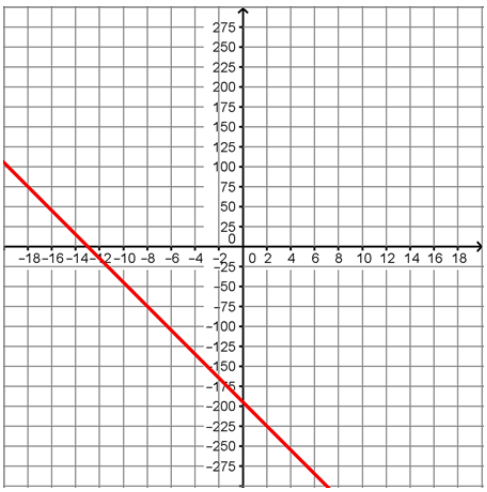
19. $y = 3(x - 5) + 12$

***x*: [−10 , 10] by *y*: [−10 , 10]**
***x*-scale: 1 *y*-scale: 1**



20. $f(x) = -15(x + 10) - 45$

***x*: [−20 , 20] by *y*: [−300 , 300]**
***x*-scale: 2 *y*-scale: 25**



Name: **Arithmetic and Geometric 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?
   27

2. Create a diagram that would show this pattern.

Year	1900	1930	1960	1990	2020
# of sons	0	3	9	27	81

3. Predict how many Cooper sons will be born between 1990 and 2020, if the pattern continues.
   81

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.
   $f(n) = 3^{\frac{2050-1900}{30}} = 243$

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. $y = 4^x$

x	y
1	**4**
2	**16**
3	**64**
4	**256**
5	**1024**

6. $y = (-3)^x$

x	y
1	**−3**
2	**9**
3	**−27**
4	**81**
5	**−243**

7. $y = -3^x$

x	y
1	**−3**
2	**−9**
3	**−27**
4	**−81**
5	**−243**

8. $y = 10^x$

x	y
1	**10**
2	**100**
3	**1000**
4	**10000**
5	**100000**

Go

Topic: Solve equations

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

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

$\boldsymbol{x=9}$

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

$\boldsymbol{x=-22.5}$

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

$\boldsymbol{n=\frac{21}{6}}$ **or** $\boldsymbol{3.5}$

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

$\boldsymbol{a=\frac{7}{12}}$

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

$\boldsymbol{t=-11}$

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

$\boldsymbol{z=2}$

Name: **Arithmetic and Geometric Sequences** **3.3**

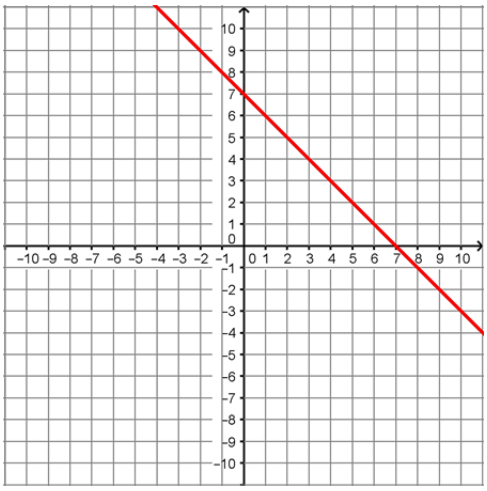
Ready, Set, Go!

Ready

Topic: Write the equation of a line given two points.

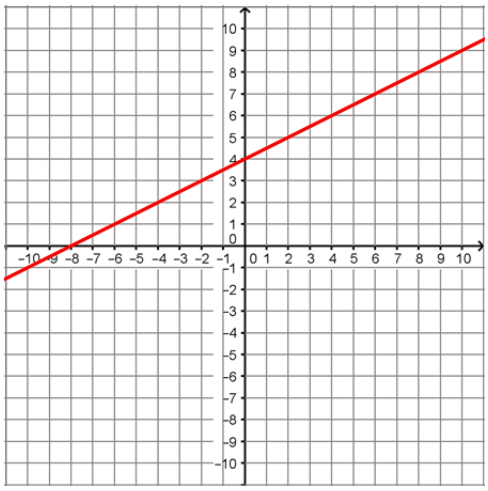
Graph each pair of points, draw a line that goes through both points, and write an equation of that line.

1. $(5, 2)$ and $(7, 0)$



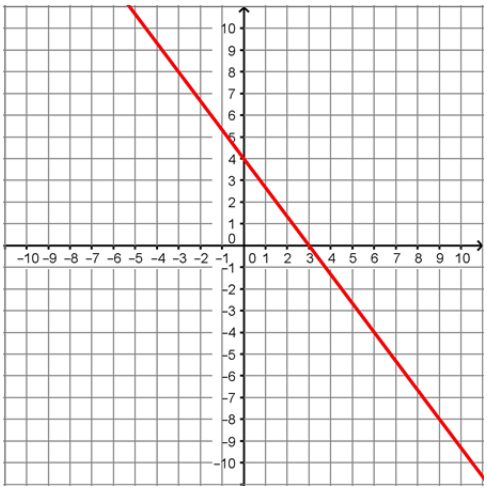
Equation: $y = -x + 7$

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



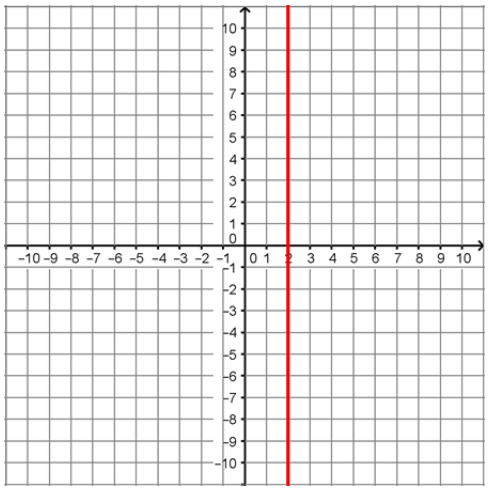
Equation: $y = \frac{1}{2}x + 4$

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



Equation: $y = -\frac{4}{3}x + 4$

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



Equation: $x = 2$

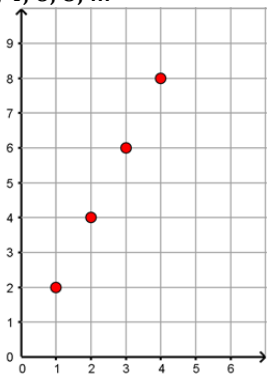
5. Write the equation of the line that passes through the points $(2, 2)$ and $(8, 8)$ without the help of a graph.
$y = x$

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.

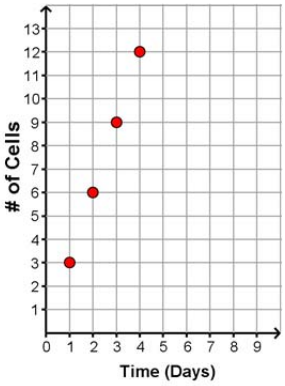
6. 2, 4, 6, 8, …



Recursive:
$f(1) = 2, f(n) = f(n-1) + 2$

Explicit:
$f(n) = 2n$

7.

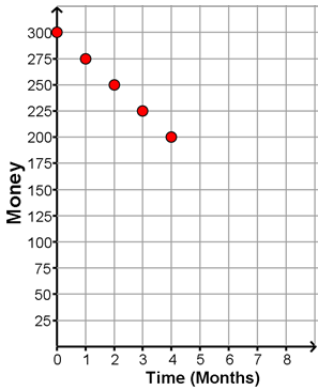


Time (Days)	# of cells
1	3
2	6
3	9
4	12

Recursive:
$f(1) = 3, f(n) = f(n-1) + 3$

Explicit:
$f(n) = 3n$

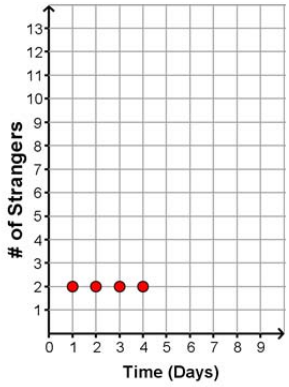
8. Claire has $300 in an account. She decides she is going to take out $25 each month.



Recursive:
$f(0) = 300, f(n) = f(n-1) - 25$

Explicit:
$f(n) = 300 - 25n$

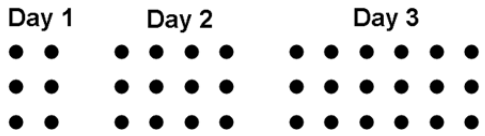
9. Each day Tania decides to do something nice for 2 strangers. Write recursive and explicit equations that represent the number of strangers Tania that does something nice for each day (not total number of strangers).

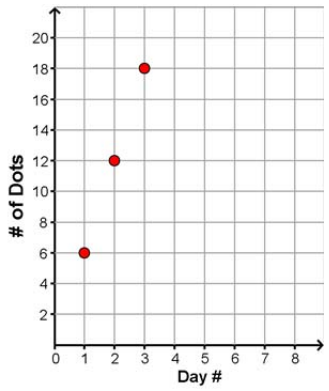


Recursive:
$f(1) = 2, f(n) = f(n-1)$

Explicit:
$f(n) = 2$

10.





Recursive:
$f(1) = 6, f(n) = f(n-1) + 6$

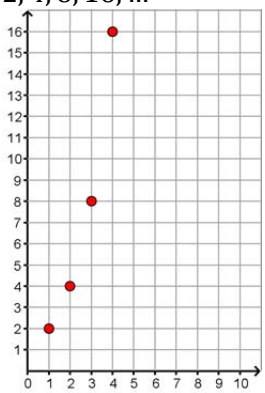
Explicit:
$f(n) = 6n$

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.

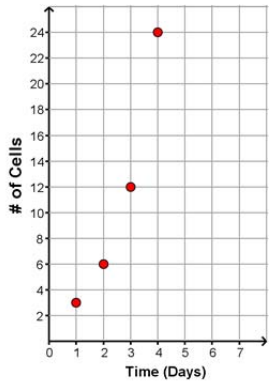
11. 2, 4, 8, 16, …



Recursive:
$f(1) = 2, f(n) = f(n-1) \times 2$

Explicit:
$f(n) = 2^n$

12.

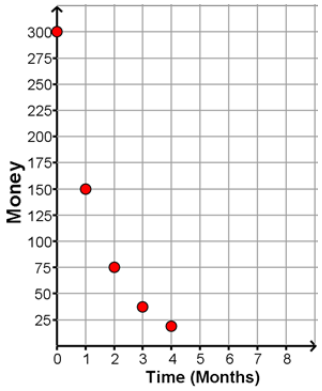


Time (Days)	# of cells
1	3
	6
3	12
4	24

Recursive:
$f(1) = 3, f(n) = f(n-1) \times 2$

Explicit:
$f(n) = 3(2)^{n-1}$

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.



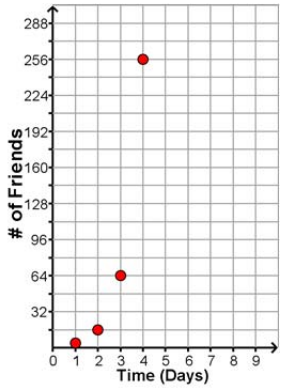
Recursive:

$f(0) = 300, f(n) = f(n-1) \times \frac{1}{2}$

Explicit:

$f(n) = 300\left(\frac{1}{2}\right)^n$

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.



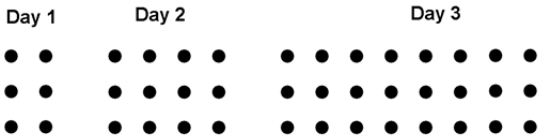
Recursive:

$f(1) = 4, f(n) = f(n-1) \times 4$

Explicit:

$f(n) = 4^n$

15.

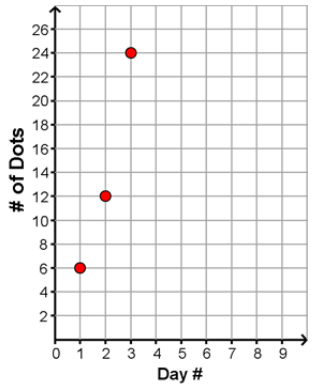


Recursive:

$f(1) = 6, f(n) = f(n-1) \times 2$

Explicit:

$f(n) = 6(2)^{n-1}$



Name: **Arithmetic and Geometric Sequences** **3.4**

Set, Go!

Set

Topic: Determine recursive equations

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

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

   $f(5) = \mathbf{11}, f(6) = \mathbf{14}$ Recursive Function: $\boldsymbol{f(1) = -1,\ f(n) = f(n-1) + 3}$

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

   $f(4) = \mathbf{4}, f(5) = \mathbf{-4}$ Recursive Function: $\boldsymbol{f(1) = 28,\ f(n) = f(n-1) - 8}$

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

   $f(7) = \mathbf{13.7}, f(8) = \mathbf{18.7}$ Recursive Function: $\boldsymbol{f(1) = -16.3,\ f(n) = f(n-1) + 5}$

Go

Topic: Evaluate using function notation

Find each value.

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

   8

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

   25

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

   −8

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

   $\boldsymbol{f(5) = 19, f(6) = 23}$

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

   $\boldsymbol{f(1) = 6, f(2) = 8}$

Name: **Arithmetic and Geometric Sequences** **3.5**

Ready, Set, Go!

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, **20**, 25, 30 …

   Constant difference or a constant ratio?

   Constant Difference

   The constant difference/ratio is
   5

2. 20, 10, **5**, 2.5, **1.25**, …

   Constant difference or a constant ratio?

   Constant Ratio

   The constant difference/ratio is
   $\frac{1}{2}$

3. 2, 5, 8, **11**, 14, **17**, …

   Constant difference or a constant ratio?

   Constant Difference

   The constant difference/ratio is
   3

4. 30, 24, **18**, 12, 6, …

   Constant difference or a constant ratio?

   Constant Difference

   The constant difference/ratio is
   -6

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?
   Arithmetic

   Recursive: $f(1) = 2, f(n) = f(n-1) + 2$

   Explicit: $f(n) = 2n$

6. 2, 4, 8, 16, …

   Arithmetic or Geometric?
   Geometric

   Recursive: $f(1) = 2, f(n) = f(n-1) \cdot 2$

   Explicit: $f(n) = 2^n$ or $f(n) = 2 \cdot 2^{n-1}$

7.

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

Arithmetic or Geometric?
Arithmetic

Recursive: $f(1) = 3, f(n) = f(n-1) + 4$

Explicit: $f(n) = 3 + 4(n-1)$

8.

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

Arithmetic or Geometric?
Geometric

Recursive: $f(1) = 5, f(n) = f(n-1) \cdot 1.6$

Explicit: $f(n) = 5(1.6)^{n-1}$

9. 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?
Geometric

Recursive: $f(1) = 1, f(n) = f(n-1) \cdot 2$

Explicit: $f(n) = 2^{n-1}$

10. Michelle likes chocolate so much that she eats it every day and she always eats 3 more pieces than the previous day. She ate 3 pieces on day 1.

Arithmetic or Geometric?
Arithmetic

Recursive: $f(1) = 3, f(n) = f(n-1) + 3$

Explicit: $f(n) = 3n$

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

Arithmetic or Geometric?
Arithmetic

Recursive: $f(0) = 0, f(n) = f(n-1) + 4$

Explicit: $f(n) = 4n$

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

Arithmetic or Geometric?
Geometric

Recursive: $f(0) = 6000, f(n) = f(n-1) \cdot 1.1$

Explicit: $f(n) = 6000(1.1)^n$

Go

Topic: Solving systems of linear equations

Solve the system of equations.

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

(5, 0)

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

Infinitely Many Solutions

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

(3, 3)

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

(−12, −4)

Name: **Arithmetic and Geometric Sequences** **3.6**

Ready, Set, Go!

Ready

Topic: Constant Ratios

Find the constant ratio for each geometric sequence.

1. $2, 4, 8, 16, \ldots$
   2

2. $\frac{1}{2}, 1, 2, 4, 8, \ldots$
   2

3. $-5, 10, -20, 40, \ldots$
   -2

4. $10, 5, 2.5, 1.25, \ldots$
   $\frac{1}{2}$

Set

Topic: Recursive and explicit equations

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

5. Table 1

n	1	2	3	4	5
$f(n)$	5	7	9	**11**	**13**

Recursive: $\boldsymbol{f(1) = 5, f(n) = f(n-1) + 2}$ Explicit: $\boldsymbol{f(n) = 5 + 2(n-1)}$

6. Table 2

x	y
1	-2
2	-4
3	-6
4	**-8**
5	**-10**

Recursive:
$\boldsymbol{f(1) = -2,\ f(n) = f(n-1) - 2}$

Explicit:
$\boldsymbol{f(n) = -2(n-1) - 2}$

7. Table 3

x	y
1	3
2	9
3	27
4	**81**
5	**243**

Recursive:
$\boldsymbol{f(1) = 3,\ f(n) = f(n-1) \times 3}$

Explicit:
$\boldsymbol{f(n) = 3^n}$ **or** $\boldsymbol{f(n) = 3 \cdot 3^{n-1}}$

8. Table 4

x	y
1	27
2	9
3	3
4	**1**
5	**$\frac{1}{3}$**

Recursive:
$\boldsymbol{f(1) = 27, f(n) = f(n-1) \times \frac{1}{3}}$

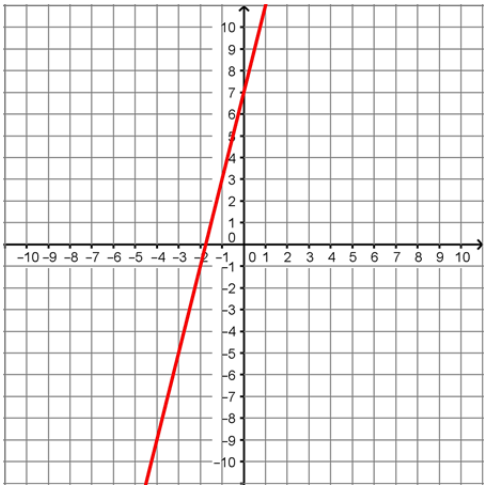
Explicit:
$\boldsymbol{f(n) = 27\left(\frac{1}{3}\right)^{n-1}}$

Go

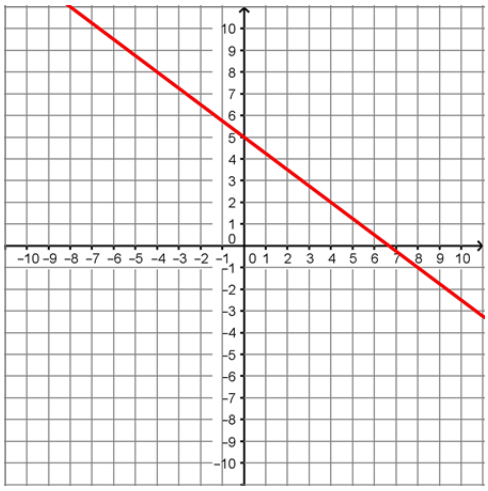
Topic: Graphing linear equations and labeling your axes.

Graph the following linear equations. Label your axes.

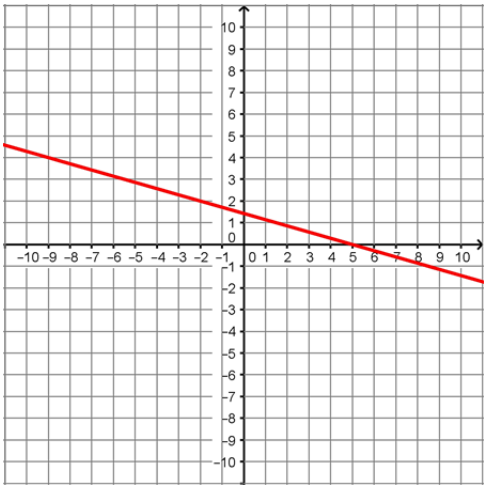
9. $y = 4x + 7$



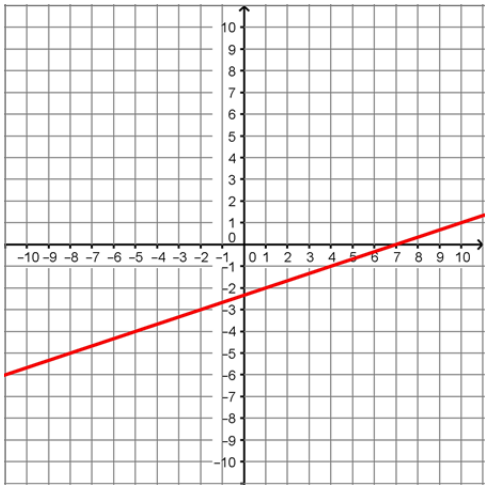
10. $y = -\frac{3}{4}x + 5$



11. $2x + 7y = 10$



12. $x - 3y = 7$



Name: **Arithmetic and Geometric Sequences** **3.7**

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:
   $f(1) = \mathbf{2}$
   $f(2) = \mathbf{5}$
   $f(3) = \mathbf{8}$
   $f(4) = \mathbf{11}$
   $f(5) = \mathbf{14}$

   Geometric:
   $g(1) = \mathbf{2}$
   $g(2) = \mathbf{6}$
   $g(3) = \mathbf{18}$
   $g(4) = \mathbf{54}$
   $g(5) = \mathbf{162}$

   Which value do you think will be more, $f(100)$ or $g(100)$? Why?
   $g(100)$ because the value increases much faster when multiplying the previous term by the same value as opposed to adding the same value to the previous term.

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

   Arithmetic:
   $f(1) = \mathbf{2}$
   $f(2) = \mathbf{12}$
   $f(3) = \mathbf{22}$
   $f(4) = \mathbf{32}$
   $f(5) = \mathbf{42}$

   Geometric:
   $g(1) = \mathbf{2}$
   $g(2) = \mathbf{6}$
   $g(3) = \mathbf{18}$
   $g(4) = \mathbf{54}$
   $g(5) = \mathbf{162}$

   Which value do you think will be more, $f(100)$ or $g(100)$? Why?
   $g(100)$ because the value increases much faster when multiplying the previous term by the same value as opposed to adding the same value to the previous term, even if the value added is much larger than the value multiplied by as seen in this example.

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

n	1	2	3
$f(n)$	3	**7.5**	12

$\frac{12-3}{2} = 4.5$

4. Table 2

n	$f(n)$
1	2
2	**10**
3	**18**
4	26

$\frac{26-2}{3} = 8$

5. Table 3

n	$f(n)$
1	24
2	**15**
3	6
4	**−3**

$\frac{6-24}{2} = -9$

6. Table 4

n	$f(n)$
1	16
2	**12**
3	**8**
4	4
5	**0**

$\frac{4-16}{3} = -4$

Topic: Geometric sequences

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

7. Table 1

n	1	2	3
$f(n)$	3	**6**	12

$3r^2 = 12, \quad r = 2$

8. Table 2

n	$f(n)$
1	2
2	**6**
3	**18**
4	54

$2r^3 = 54,\ r = 3$

9. Table 3

n	$f(n)$
1	5
2	**10**
3	20
4	**40**

$5r^2 = 20,\ r = 2$

10. Table 4

n	$f(n)$
1	4
2	**12**
3	**36**
4	**108**
5	324

$4r^4 = 324,\ r = 3$

Go

Topic: Sequences

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

11. 5, 9, 13, 17, … This sequence is: (Arithmetic), Geometric , Neither

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

12. 60, 30, 0, −30 , … This sequence is: (Arithmetic), Geometric , Neither

    Recursive Equation: $f(1) = 60,\ f(n) = f(n-1) - 30$ Explicit Equation: $f(n) = 60 - 30(n-1)$

13. 60, 30, 15, $\frac{15}{2}$, … This sequence is: Arithmetic, (Geometric), Neither

    Recursive Equation: $f(1) = 60,\ f(n) = f(n-1) \times \frac{1}{2}$ Explicit Equation: $f(n) = 60\left(\frac{1}{2}\right)^{n-1}$

14.

    (The percentage of tiles shaded black)

    This sequence is: Arithmetic, (Geometric), Neither

    Recursive Equation: $f(1) = 100, f(n) = f(n-1) \times \frac{1}{2}$ Explicit Equation: $f(n) = 100\left(\frac{1}{2}\right)^{n-1}$

15. 4, 7, 12, 19, … This sequence is: Arithmetic, Geometric, (Neither)

    Recursive Equation: $f(1) = 4,\ f(n) = f(n-1) + 2n - 1$ Explicit Equation: $f(n) = n^2 + 2n + 1$

    ****Note: Students are not expected to be able to write the recursive or explicit equations for question 15 at this point****

Name: **Arithmetic and Geometric Sequences** **3.8**

Ready, Set, Go!

Ready

Topic: Comparing linear equations and arithmetic sequences

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

Similarities	Differences
• **Both have a consistent change for every interval.** • **Both can be represented as functions of a variable.** • **Both have points lie on a line.**	• **Linear equations represent all solutions to all x-values, whereas arithmetic sequences choose only specific values.**

Set

Topic: representations of arithmetic sequences

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

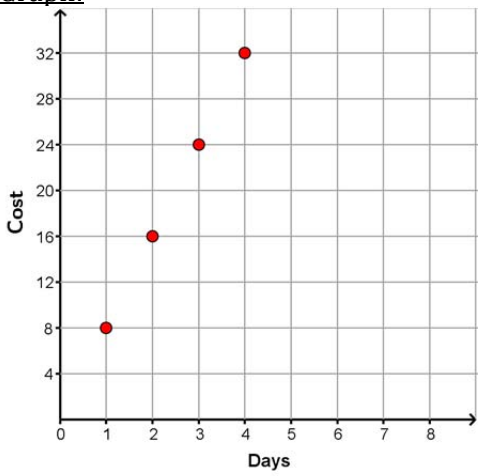
2. Recursive Equation:
$f(1) = 8, f(n) = f(n-1) + 8$

Explicit Equation:
$f(n) = 8(n-1) + 8$

Table:

Days	Cost
1	8
2	16
3	24
4	32

Graph:



Create a Context:
It costs $8 per day to rent a kayak.

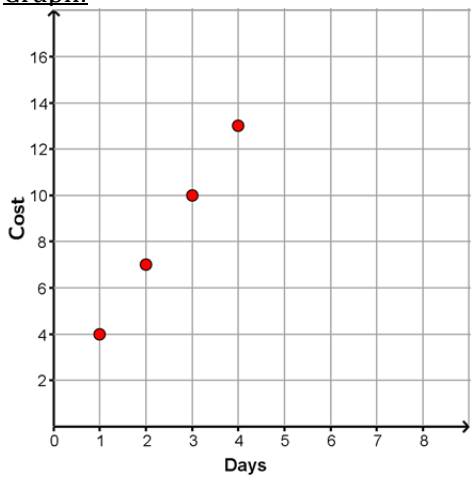
3. Recursive Equation:
$f(1) = 4, f(n) = f(n-1) + 3$

Explicit Equation: $\boldsymbol{f(n) = 4 + 3(n-1)}$

Table:

Hour	Cost
1	4
2	7
3	10
4	13

Graph:



Create a Context:
It costs a flat fee of $1 to check out skates, and then $3 per hour for the rental.

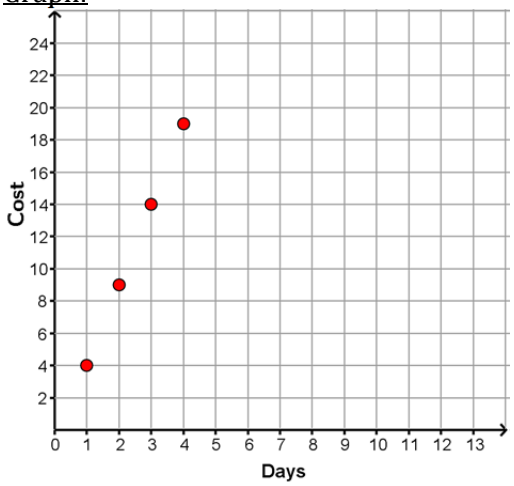
4. Recursive Equation:
$\boldsymbol{f(1) = 4,}$
$\boldsymbol{f(n) = f(n-1) + 5}$

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

Table:

Days	Cost
1	4
2	9
3	14
4	19

Graph:



Create a Context:
It Costs $4 to rent snorkel gear on the first day, and then $5 every day after that.

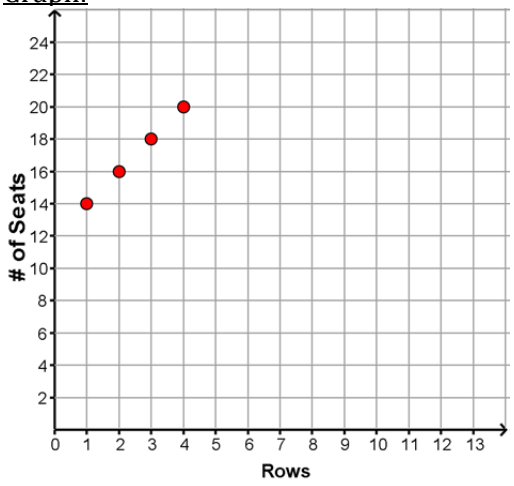
5. Recursive Equation:
$f(1) = 14, f(n) = f(n-1) + 2$

Explicit Equation:
$f(n) = 14 + 2(n-1)$

Table:

Row	# of seats
1	14
2	16
3	18
4	20

Graph:



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

$f(n) = 8 - 2(n-1)$

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

$f(n) = 5(n-1)$

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

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

Name: **Arithmetic and Geometric Sequences** **3.9**

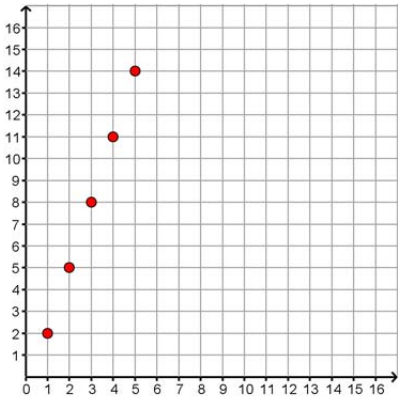
Use the given information to state as much as possible about each sequence. Your answer should include: type of sequence, the common difference or common ration, a table of at least 5 terms, a graph, the recursive rule, and the explicit rule.

1. Type: **Arithmetic**

n	$f(n)$
1	**2**
2	**5**
3	**8**
4	**11**
5	**14**

Common difference/ratio: **3**

Recursive rule:
$f(1) = 2,\ f(n) = f(n-1) + 3$



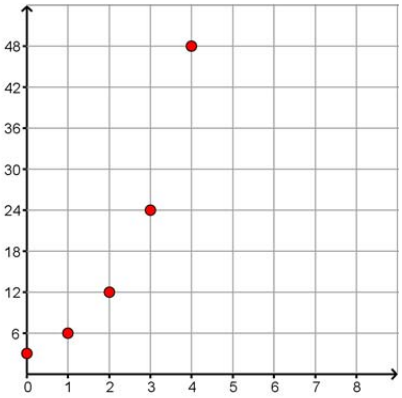
Explicit rule:
$\boldsymbol{f(n) = 2 + 3(n-1)}$

2. Type: **Geometric**

n	$f(n)$
0	**3**
1	**6**
2	**12**
3	**24**
4	**48**

Common difference/ratio: **2**

Recursive rule:
$\boldsymbol{f(1) = 6, f(n) = f(n-1) \times 2}$



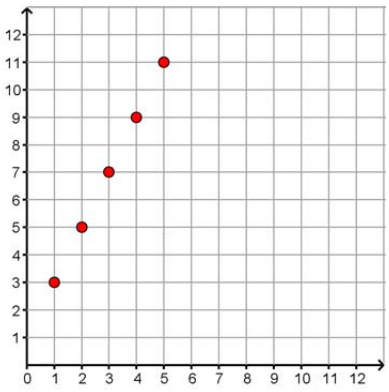
Explicit rule:
$f(n) = 3 \cdot 2^n$

3. Type: Arithmetic

n	$f(n)$
1	3
2	**5**
3	**7**
4	**9**
5	**11**

Common difference/ratio: 2

Recursive rule:
$\boldsymbol{f(1) = 3, f(n) = f(n-1) + 2}$



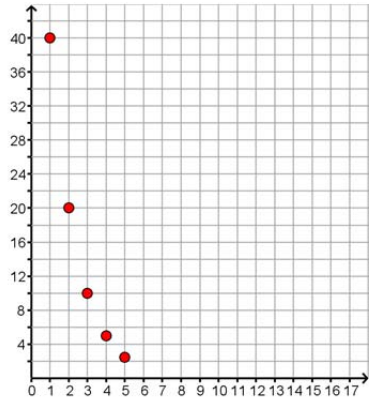
Explicit rule:
$\boldsymbol{f(n) = 3 + 2(n-1)}$

4. Type: **Geometric**

n	$f(n)$
1	40
2	**20**
3	**10**
4	**5**
5	**2.5**

Common Ratio = $\frac{1}{2}$

Recursive rule:
$\boldsymbol{f(1) = 40, f(n) = f(n-1) \times \frac{1}{2}}$



Explicit rule:
$\boldsymbol{f(n) = 40\left(\frac{1}{2}\right)^{n-1}}$

5. Explain how you tell if a sequence is arithmetic and if a sequence is geometric.

If a sequence is arithmetic there is a common difference that is added or subtracted from the previous value to get the next value, whereas, if a sequence is geometric there is a common ratio that is multiplied by the previous value to get the next value. In addition, an arithmetic sequence creates a linear function, whereas a geometric sequence creates an exponential function.

For #6-8, determine if each sequence is arithmetic or geometric. Find the values of the next two terms. Then write the explicit and recursive formulas for each sequence.

6. $90, 30, 10, \frac{10}{3}, \ldots$

   Arithmetic or Geometric

   Next 2 terms: $\frac{10}{9}, \frac{10}{27}$

   Recursive Formula: $f(1) = 90, f(n) = f(n-1) \times \frac{1}{3}$ Explicit Formula: $f(n) = 90\left(\frac{1}{3}\right)^{n-1}$

7. $42, 34, 26, 18, \ldots$

   Arithmetic or Geometric

   Next 2 terms: $10, 2$

   Recursive Formula: $f(1) = 42, f(n) = f(n-1) - 8$ Explicit Formula: $f(n) = 42 - 8(n-1)$

8. $6, 13, 20, 27, \ldots$

   Arithmetic or Geometric

   Next 2 terms: $34, 41$

   Recursive Formula: $f(1) = 6, f(n) = f(n-1) + 7$ Explicit Formula: $f(n) = 6 + 7(n-1)$

9. Find the missing terms of the arithmetic sequence below. Be sure to show all work.

n	1	2	3	4	5	6
$f(n)$	7	2	-3	-8	-13	-18

$\frac{-18-7}{5} = -5$