THIRD SPACE LEARNING

Geometric Sequence Formula Worksheet

Algebra

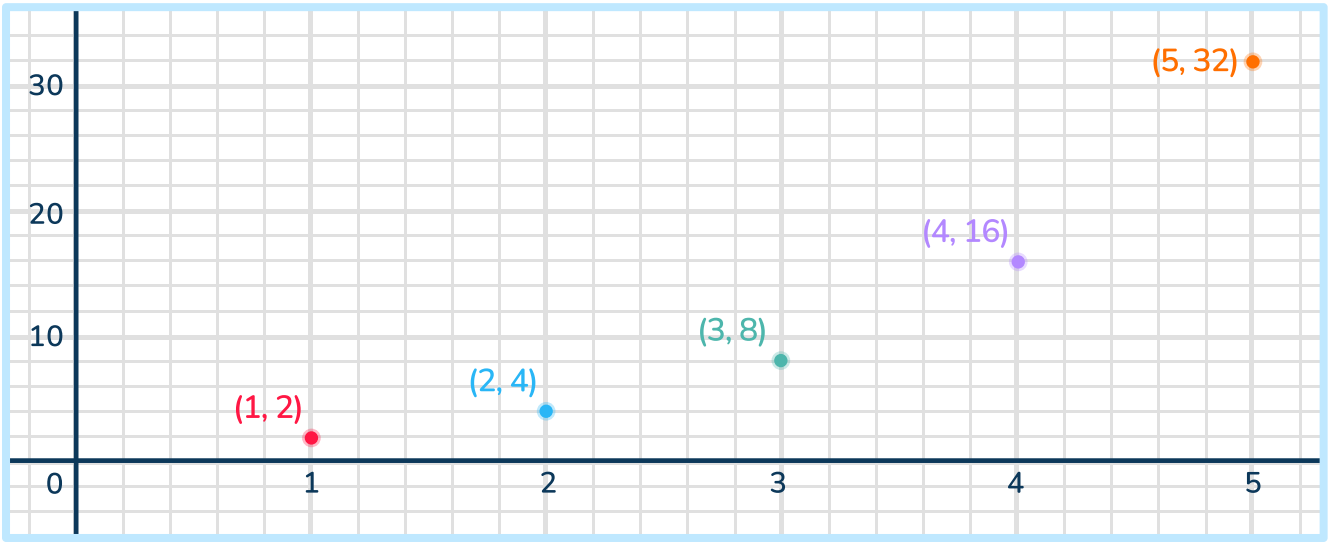
Grades 9 to 12

Skill Questions

Name: .....

Date: .....

1 Calculate the next three terms for the geometric sequence shown in the graph below.



Answer

2 Calculate the next three y terms for the sequence in the table below.

x	y
1	-11
2	-33
3	-99
4	-297

Answer

3 The recursive formula for a geometric sequence is $a_{n+1} = 5a_n$ and $a_1 = 2$.
What are the first three terms in the sequence?

Answer

4 The explicit formula for a geometric sequence is $a_n = 6(2.5)^{n-1}$
What are the first three terms in the sequence?

Answer

5 Write the recursive formula for the sequence below.
200, 20, 2, 0.2, 0.02, ...

Answer

6 Write the explicit formula for the sequence below.
30, 10, $3\frac{1}{3}$, $1\frac{1}{9}$, $\frac{10}{27}$ ...

Answer

7 Write the recursive formula for the sequence below.
-2, 12,-72, 432,-2,592 , ...

Answer

8 Write the explicit formula for the sequence below.
7, 1.4, 0.28, 0.056, 0.0112, ...

Answer

9 The recursive formula for a geometric sequence is $a_{n+1} = -3a_n$ and $a_1 = \frac{1}{3}$. What is the explicit formula for the sequence?

Answer

10 The explicit formula for a geometric sequence is $a_n = -2(0.25)^{n-1}$. What is the recursive formula for the sequence?

Answer

Applied Questions

11 Josiah came up with an equation for the pattern in the table. His work is shown below.

	x	y	
+1	1	-5	× 5
+1	2	-25	× 5
+1	3	-125	× 5
	4	-625	

Equation:

$a_{n+1} = 5a_n$ and $a_1 = 1$.

Describe how Josiah solved it, including any mistakes he made.

_____

_____

_____

12 Points are earned in a video game by collecting stars. The first star is worth 5 points. Then each additional star triples the current point value. Write the explicit and recursive formula to represent the total points after a given number of stars are collected, n.

Answer

13 How would you update the equations from Question 2, if the game automatically started with 10 points and then each star earned tripled the current point value? Explain.

_____

_____

_____

14 A substance has a half life of 1 year. That means it decreases by half each year. If the starting value was k grams, write the explicit and recursive formula to represent how much of the substance is left after a given number of years, n.

Answer

15 Sequence A: $a_{n+1} = 6 \cdot a_n$ and $a_0 = 2$
Sequence B: $a_n = 6 \cdot a_{n-1}$ and $a_1 = 12$

Sequence C: $a_n = \frac{1}{6} \cdot a_{n+1}$ and $a_1 = 12$

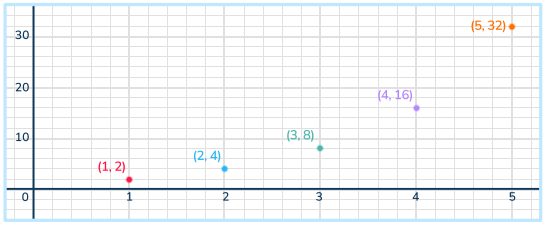
Compare the first five terms of the sequences above.

_____

_____

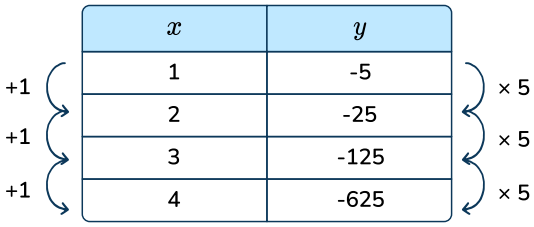
_____

Answers

Question number	Question	Answers	Standard
1	Calculate the next three terms for the geometric sequence shown in the graph below. 	(6, 64); (7, 128); (8, 256)	HSF.BF.A.2
2	Calculate the next three y terms for the sequence in the table below. x | y 1 | -11 2 | -33 3 | -99 4 | -297	–891, –2,673, –8,019	HSF.BF.A.2
3	The recursive formula for a geometric sequence is $a_{n+1} = 5a_n$ and $a_1 = 2$ What are the first three terms in the sequence?	2, 10, 50	HSF.BF.A.2
4	The explicit formula for a geometric sequence is $a_n = 6(2.5)^{n-1}$ What are the first three terms in the sequence?	6, 15, 37.5	HSF.BF.A.2

Geometric Sequence Formula Worksheet | Grades 9 to 12 | Answers

Question number	Question	Answers	Standard
5	Write the recursive formula for the sequence below. 200, 20, 2, 0.2, 0.02, ...	$a_{n+1} = 0.1a_n$ $a_1 = 200$	HSF.LE.A.2
6	Write the explicit formula for the sequence below. 30, 10, $3\frac{1}{3}$, $1\frac{1}{9}$, $\frac{10}{27}$...	$a_n = 30(\frac{1}{3})^{n-1}$	HSF.LE.A.2
7	Write the recursive formula for the sequence below. -2, 12,-72, 432,-2,592 , ...	$a_{n+1} = -6a_n$ $a_1 = -2$	HSF.LE.A.2
8	Write the explicit formula for the sequence below. 7, 1.4, 0.28, 0.056, 0.0112, ...	$a_n = 7(0.2)^{n-1}$	HSF.LE.A.2
9	The recursive formula for a geometric sequence is $a_{n+1} = -3a_n$ and $a_1 = \frac{1}{3}$. What is the explicit formula for the sequence?	$a_n = \frac{1}{3}(-3)^{n-1}$	HSF.LE.A.2
10	The explicit formula for a geometric sequence is $a_n = -2(0.25)^{n-1}$. What is the recursive formula for the sequence?	$a_{n+1} = 0.25a_n$ $a_1 = -2$	HSF.LE.A.2

Question number	Question	Answers	Standard
11	Josiah came up with an equation for the pattern in the table. His work is shown below.  Equation: $a_{n+1} = 5a_n$ and $a_1 = 1$. Describe how Josiah solved it, including any mistakes he made.	*Explanations will vary.* Example answer: Josiah looked at the patterns in the x (input) column and the y (output) column. Since with each increase in x, the y is multiplied by 5, this makes a geometric sequence. Josiah used the recursive formula, but he needs to update the starting value, a_1, to be –5. 1 is the position, not the actual value.	HSF.BF.A.2
12	Points are earned in a video game by collecting stars. The first star is worth 5 points. Then each additional star triples the current point value. Write the explicit and recursive formula to represent the total points after a given number of stars are collected, n.	$a_{n+1} = 3 \cdot a_n$ $a_1 = 5$ AND $a_1 = 5(3)^{n-1}$	HSF.BF.A.2

Question number	Question	Answers	Standard
13	How would you update the equations from Question 2, if the game automatically started with 10 points and then each star earned tripled the current point value? Explain.	Explanations will vary. Example answer: The recursive formula would need to have a starting value of 10 instead of 5. This value would become a_0 because the first value needs to be multiplied by 10. So the new formula is $a_{n+1} = 3 \cdot a_n$ and $a_0 = 10$. This changes the explicit formula to be $a_n = 30(3)^{n-1}$, since $a_1 = 30$	HSF.BF.A.2
14	A substance has a half life of 1 year. That means it decreases by half each year. If the starting value was k grams, write the explicit and recursive formula to represent how much of the substance is left after a given number of years, n.	$a_{n+1} = \frac{1}{2} \cdot a_n$ $a_1 = k$ AND $a_n = k(\frac{1}{2})^{n-1}$	HSF.BF.A.2

Question number	Question	Answers	Standard
15	Sequence A: $a_{n+1} = 6 \cdot a_n$ and $a_0 = 2$ Sequence B: $a_n = 6 \cdot a_{n-1}$ and $a_1 = 12$ Sequence C: $a_n = \frac{1}{6} \cdot a_{n+1}$ and $a_1 = 12$ Compare the first five terms of the sequences above.	*Explanations will vary.* Example answer: Sequence A begins with 2, but then it becomes the same terms as Sequence B and C. It is just 1 behind, since it has one term before 12. Sequence B and C have the same terms. Sequence B is 6 times the previous term and Sequence C is $\frac{1}{6}$ of the next term, which are equivalent operations.	HSF.BF.A.2

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