THIRD SPACE LEARNING

Arithmetic Sequence Worksheet

Algebra

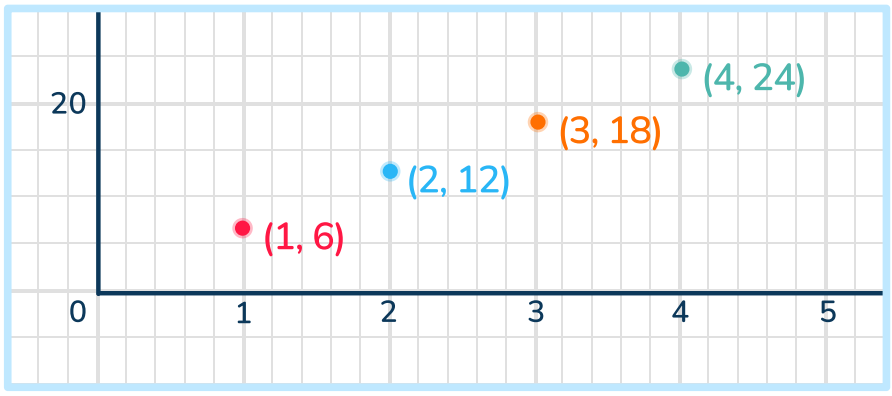
Grades 9 to 12

Skill Questions

Name: .....

Date: .....

1 Calculate the next three terms for the arithmetic 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	-17
3	-23
4	-29

Answer

3 The recursive formula for an arithmetic sequence is $a_{n+1} = a_n + 4.5$ and $a_1 = -37$. What are the first three terms in the sequence?

Answer

4 The explicit formula for an arithmetic sequence is $a_n = \frac{3}{4} + \frac{1}{2}(n-1)$.
What are the first three terms in the sequence?

Answer

5 Write the recursive formula for the sequence below.
0.3, 0.5, 0.7, 0.9, 0.11...

Answer

6 Write the explicit formula for the sequence below.
0.3, 0.5, 0.7, 0.9, 0.11...

Answer

7 Write the recursive formula for the sequence below.
$-\frac{1}{2}, -\frac{3}{4}, -1, -\frac{5}{4}, -\frac{3}{2}, \ldots$

Answer

8 Write the explicit formula for the sequence below.
$-\frac{1}{2}, -\frac{3}{4}, -1, -\frac{5}{4}, -\frac{3}{2}, \ldots$

Answer

9 The recursive formula for an arithmetic sequence is $a_{n+1} = a_n - 12.5$ and $a_1 = 9.1$. What is the explicit formula for the sequence?

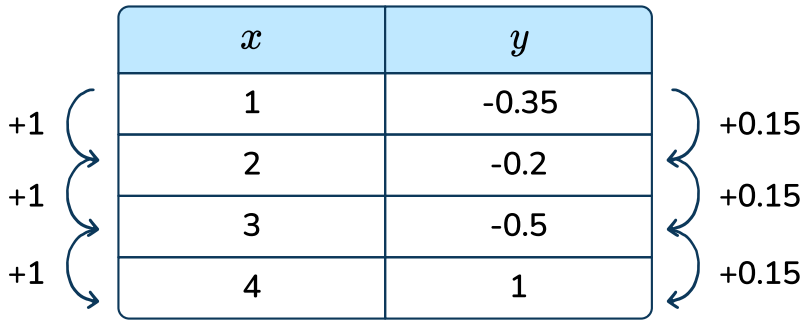
Answer

10 The explicit formula for an arithmetic sequence is $a_n = -9 + 8(n - 1)$. What is the recursive formula for the sequence?

Answer

Applied Questions

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



x	y
1	-0.35
2	-0.2
3	-0.5
4	1

Equation:

$a_n = -0.45 + 0.15n$ and $a_1 = -0.35$.

Describe how Keira solved it, including any mistakes that were made.

_____

_____

_____

12 Points are earned in a video game by collecting stars. The first star is worth 25 points. Then each additional star is worth 10 points. 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 30 points and then each star earned 10 points? Explain.

_____

_____

_____

14 Jeff and Ahmed are playing a card game. They are trying to decide how many points will be earned by the winner of each round. Jeff wants each round to be worth 10 points. Ahmed wants each round to be worth k points.

Write an explicit and recursive formula to represent the difference in total points awarded between Jeff and Ahmed's rule, given n number of rounds.

Answer

15 Sequence A: $a_{n+1} = a_n - 6$ and $a_1 = 0$
Sequence B: $a_n = a_{n+1} + 6$ and $a_1 = 0$
Sequence C: $a_{n+1} = 6(n - 1)$

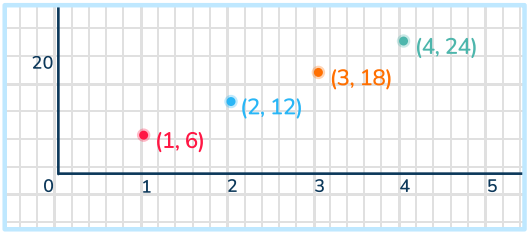
Are any of the sequences equivalent? Explain.

_____

_____

_____

Answers

Question number	Question	Answers	Standard
1	Calculate the next three terms for the arithmetic sequence shown in the graph below. 	(5, 30); (6, 36); (7, 42)	HSF.BF.A.2
2	Calculate the next three y terms for the sequence in the table below. x | y 1 | -11 2 | -17 3 | -23 4 | -29	–35, –41, –47	HSF.BF.A.2
3	The recursive formula for an arithmetic sequence is $a_{n+1} = a_n + 4.5$ and $a_1 = -37$. What are the first three terms in the sequence?	–37, –32.5, –28	HSF.BF.A.2
4	The explicit formula for an arithmetic sequence is $a_n = \frac{3}{4} + \frac{1}{2}(n-1)$ What are the first three terms in the sequence?	$\frac{3}{4}$, $1\frac{1}{4}$, $1\frac{3}{4}$	HSF.BF.A.2
5	Write the recursive formula for the sequence below. 0.3, 0.5, 0.7, 0.9, 0.11...	$a_{n+1} = a_n + 0.2$ $a_1 = 0.3$	HSF.BF.A.2

Question number	Question	Answers	Standard
6	Write the explicit formula for the sequence below. 0.3, 0.5, 0.7, 0.9, 0.11...	$a_n = 0.3 + 0.2(n-1)$ OR $a_n = 0.2n + 0.1$	HSF.BF.A.2
7	Write the recursive formula for the sequence below. $-\frac{1}{2}$, $-\frac{3}{4}$, -1, $-\frac{5}{4}$, $-\frac{3}{2}$, ...	$a_{n+1} = a_n - \frac{1}{4}$ $a_1 = -\frac{1}{2}$	HSF.BF.A.2
8	Write the explicit formula for the sequence below. $-\frac{1}{2}$, $-\frac{3}{4}$, -1, $-\frac{5}{4}$, $-\frac{3}{2}$, ...	$a_n = -\frac{1}{2} - \frac{1}{4}(n-1)$ OR $a_n = -\frac{1}{4}n - \frac{1}{4}$	HSF.BF.A.2
9	The recursive formula for an arithmetic sequence is $a_{n+1} = a_n - 12.5$ and $a_1 = 9.1$. What is the explicit formula for the sequence?	$a_n = 21.6 - 12.5n$	HSF.BF.A.2
10	The explicit formula for an arithmetic sequence is $a_n = -9 + 8(n-1)$. What is the recursive formula for the sequence?	$a_{n+1} = a_n + 8$ and $a_1 = -9$	HSF.BF.A.2

Question number	Question	Answers	Standard
11	Keira came up with an equation for the pattern in the table. The work is shown below.  Equation: $a_n = -0.45 + 0.15n$ and $a_1 = -0.35$. Describe how Keira solved it, including any mistakes that were made.	*Explanations will vary.* Example answer: Keira looked at the patterns in the x (input) column and the y (output) column. Since with each increase in x, the y increases by 0.15, this makes an arithmetic sequence. Keira used the explicit formula, $a_n = -0.35 + 0.15(n-1)$ and simplified it, but the constant should be -0.5. Also the starting value, a_1, doesn't need to be stated (though this isn't wrong either).	HSF.BF.A.2
12	Points are earned in a video game by collecting stars. The first star is worth 25 points. Then each additional star is worth 10 points. Write the explicit and recursive formula to represent the total points after a given number of stars are collected, n.	$a_{n+1} = a_n + 10$ $a_1 = 25$ *AND* $a_n = 25 + 10(n-1)$ *OR* $a_n = 15 + 10n$	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 30 points and then each star earned 10 points? Explain.	*Explanations will vary.* Example answer: The recursive formula would need to have a starting value of 30 instead of 25. This value would become a_0 because the first value needs to be the total with the first star, which is 40 points. So the new formula is $a_{n+1} = a_n + 10$ and $a_0 = 30$. This changes the explicit formula to be $a_n = 40 + 10(n-1)$ OR $a_n = 30 + 10n$	HSF.BF.A.2
14	Jeff and Ahmed are playing a card game. They are trying to decide how many points will be earned by the winner of each round. Jeff wants each round to be worth 10 points. Ahmed wants each round to be worth k points. Write an explicit and recursive formula to represent the difference in total points awarded between Jeff and Ahmed's rule, given n number of rounds.	$a_{n+1} = a_n + (10 - k)$ $a_1 = 10 - k$ AND $a_n = 10 - k + (10 - k)(n-1)$ OR $a_1 = 10n - kn$	HSF.BF.A.2

Question number	Question	Answers	Standard
15	Sequence A: $a_{n+1} = a_n - 6$ and $a_1 = 0$ Sequence B: $a_n = a_{n+1} + 6$ and $a_1 = 0$ Sequence C: $a_{n+1} = 6(n-1)$ Are any of the sequences equivalent? Explain.	*Explanations will vary.* Example answer: Sequence A and Sequence B are equivalent. They have the same starting term, 0, and each shows that the next term, a_{n+1}, is 6 less than the previous term. Sequence B shows this as the opposite - the previous term is 6 more than the next. Sequence C also starts with 0, but 6 is being added each time, so that is the only term it has in common with B and C.	HSF.BF.A.2

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