

Algebra 1 3.5

Recognize arithmetic sequences

Relate arithmetic sequences to linear functions

sequence

term

arithmetic sequence *+ rule*

common difference (d) *=*

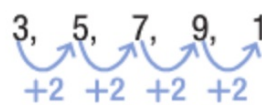
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KeyConcept Arithmetic Sequence

Words

An arithmetic sequence is a numerical pattern that increases or decreases at a constant rate called the *common difference*.

Examples

3, 5, 7, 9, 11, ...

 $d = 2$

33, 29, 25, 21, 17, ...

 $d = -4$

$$\begin{aligned} \rightarrow a_n &= 3 + (n-1) \cdot 2 \\ &= 3 + 2n - 2 \\ &\rightarrow y = 1 + 2n \end{aligned}$$

$$\begin{aligned} y &= 33 + (n-1) \cdot (-4) \\ y &= 33 + (n-1) \cdot (-4) \\ a_n &= \end{aligned}$$

KeyConcept n th Term of an Arithmetic Sequence

The n th term of an arithmetic sequence with first term a_1 and common difference d is given by $a_n = a_1 + (n - 1)d$, where n is a positive integer.

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Guided Practice

$$a_n = 3 + (n-1) \cdot -13$$

$$-114 =$$

Consider the arithmetic sequence 3, -10, -23, -36, ...

3A. Write an equation for the n th term of the sequence.

3B. Find the 15th term in the sequence.

$$a_{15} = 3 + (14) \cdot -13$$

$$= -179$$

3C. Graph the first five terms of the sequence.

3D. Which term of the sequence is -114?

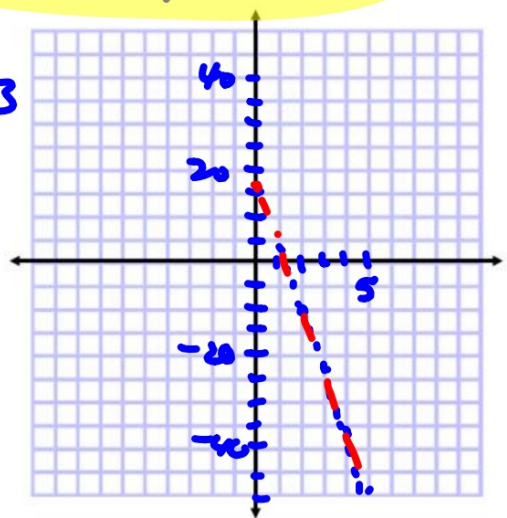
n term #	term
1	3
2	-10
3	-23
4	-36
5	-49

$$a_n = 3 + -13n + 13$$

$$a_n = 16 + -13n$$

$$-13n + 16$$

$$y = -13x + 16$$



Note: optional to use distributive property to simplify

$$a_n = 3 + (n-1) \cdot -13$$

$$-114 = 3 + (n-1) \cdot -13$$

$$-114 = 3 + -13n + 13$$

$$\begin{array}{rcl} -114 & = & 16 + -13n \\ -16 & & -16 \end{array}$$

$$\frac{-130}{-13} = \frac{-13n}{-13} \quad n = 10$$

$$3 + 9 \cdot -13$$

$$3 + -117$$

$$-114 \quad \text{☺}$$

$$a_n = a_1 + (n-1)d$$

1	-2
2	3
3	8
4	13
5	18

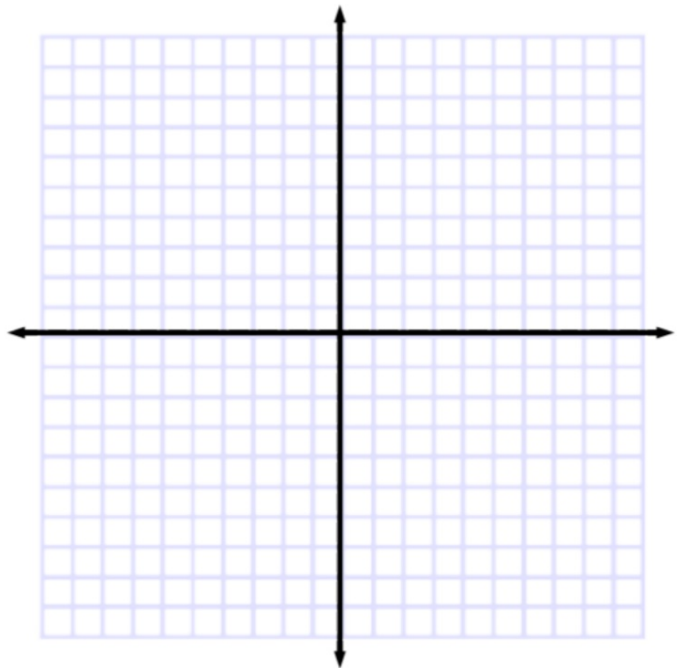
Write an equation for the n th term of each arithmetic sequence. Then graph the first five terms of the sequence.

19. $-2, 3, 8, 13, \dots$

$$\rightarrow a_n = -2 + (n-1) \cdot 5$$

$$= -2 + 5n - 5$$

$$\rightarrow y = 5n - 7$$



Write an equation for the n th term of each arithmetic sequence. Then graph the first five terms of the sequence.

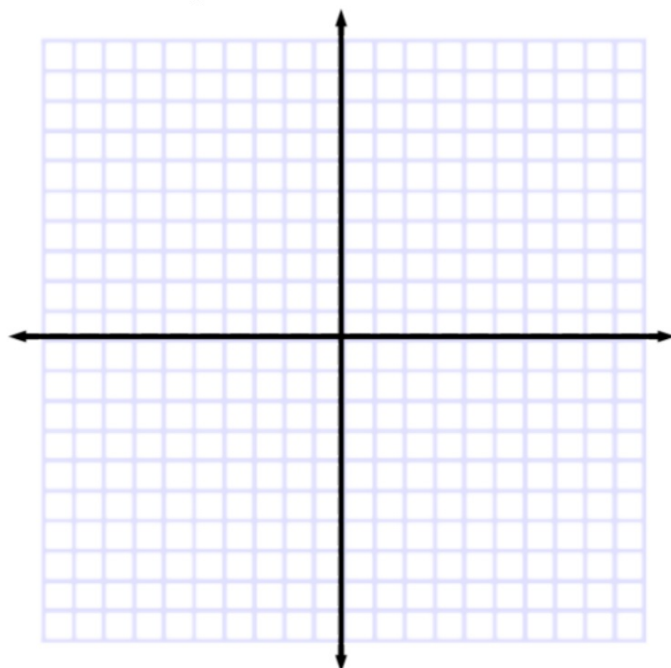
5. 15, 13, 11, 9, ...
8+4?

$$a_n = 15 + (7)(-2)$$

$$a_n = 15 + (n-1)(-2)$$

6. -1, -0.5, 0, 0.5, ...

WB 3.5 pre
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Can you buy $\frac{1}{2}$ of a stamp? (discrete)
Can you buy a negative number of stamps?

 Real-World Example 4 Arithmetic Sequences as Functions



INVITATIONS Marisol is mailing invitations to her quinceañera. The arithmetic sequence \$0.42, \$0.84, \$1.26, \$1.68, ... represents the cost of postage.

a. Write a function to represent this sequence.

b. Graph the function and determine the domain.



GuidedPractice

4. **TRACK** The chart below shows the length of Martin's long jumps.

Jump	1	2	3	4
Length (ft)	8	9.5	11	12.5

- A. Write a function to represent this arithmetic sequence.
- B. Then graph the function.

