Algebra 1   3.5   *adding rule*
Recognize arithmetic sequences
Relate arithmetic sequences to linear functions

sequence
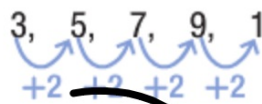term a_1 a_2 a_3 a_n
arithmetic sequence
common difference (d)
whiteboards

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, . . . +2 +2 +2 +2 $d = 2$ 33, 29, 25, 21, 17, . . . −4 −4 −4 −4 $d = -4$

$*$

$$a_n = 3 + (n-1)(2)$$
$$a_{50} = 3 + (49)(2)$$
$$= 3 + 98$$
$$101$$

$$a_n = 33 + (n-1)(-4)$$
$$a_{95} = 33 + (94)(-4)$$
$$= 33 + -376$$
$$= -343$$

Example 2 Find the Next Term

Find the next three terms of the arithmetic sequence 15, 9, 3, −3, … .

$$-9, -15, -21$$

b) $a_n = 15 + (n-1)\cdot(-6)$

KeyConcept nth Term of an Arithmetic Sequence

The nth 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.

Example 3 Find the *n*th Term

a. Write an equation for the *n*th term of the arithmetic sequence
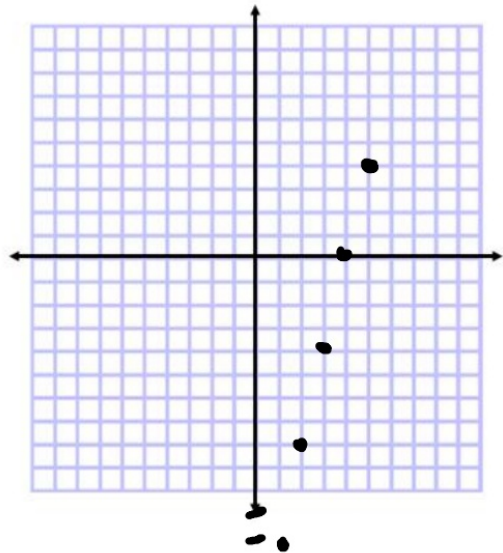$-12, -8, -4, 0, \ldots$.

$$d = 4 \qquad a_n = -12 + (n-1) \cdot 4$$

b. Find the 9th term of the sequence.

$$a_n = -12 + 8 \cdot 4$$
$$= -12 + 32$$

c. Graph the first five terms of the sequence. $= 20$

1	-12
2	-8
3	-4
4	0
5	4

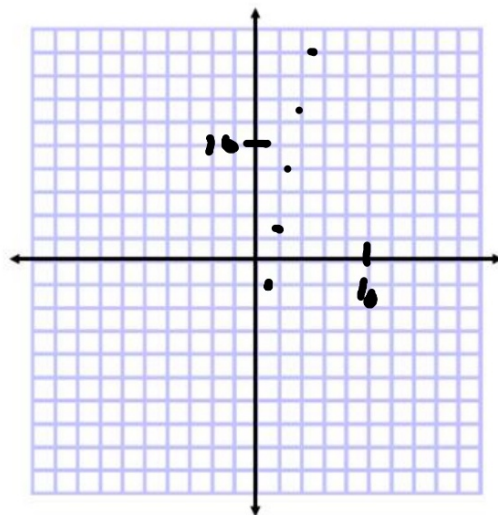$$a_n = -2 + (n-1)(5)$$

Write an equation for the nth term of each arithmetic sequence. Then graph the first five terms of the sequence.
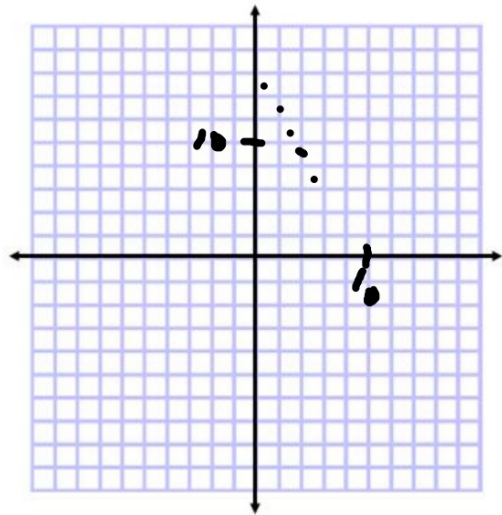
19. $-2, 3, 8, 13, \ldots$

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.

5. 15, 13, 11, 9, … $a_n = 15 + (n-1)(-2)$

1	15
2	13
3	11
4	9
5	7

8, 9.5, 11, 12.5

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

$y =$

$a_n = 8 + (n-1)(1.5)$

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.
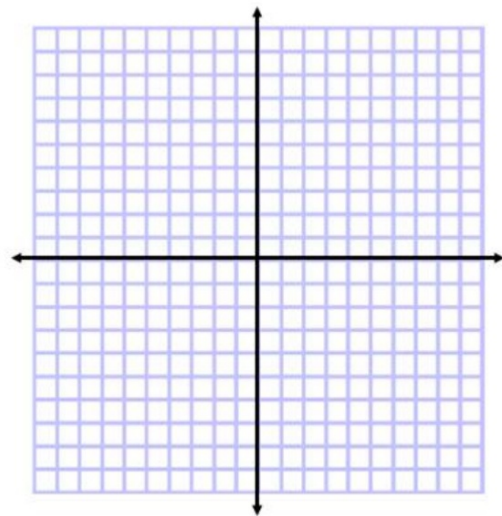
Can you buy 1/2 of a stamp? (discrete)
Can you buy a negative number of stamps?

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.

$$1 \quad 2 \quad 3 \quad 4$$

a. Write a function to represent this sequence.

$$a_n = 0.42 + (n-1)(.42)$$
$$y =$$

b. Graph the function and determine the domain.