Algebra 1 3.5
Recognize arithmetic sequences
Relate arithmetic sequences to linear functions

sequence
term
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

$d = -4$

KeyConcept *n*th 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.

first term

n= term

d=common diff

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$d = -13$

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

Consider the arithmetic sequence 3, −10, −23, −36, … a_1

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

3A. Write an equation for the nth term of the sequence.

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

$a_n = 3 + 14(-13)$

$= 3 + -182$

$a_{15} = -179$

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

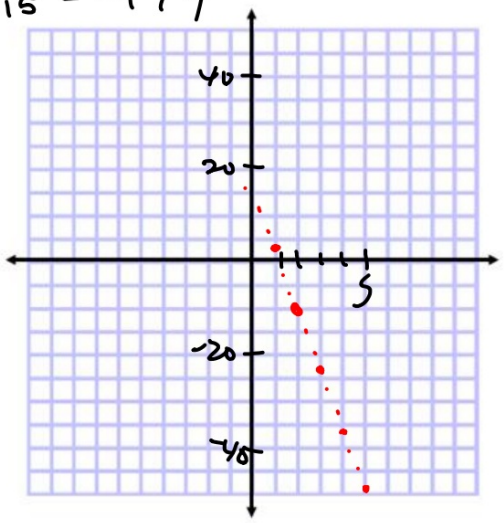
3D. Which term of the sequence is −114?

1	3
2	−10
3	−23
4	−36
5	−49

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

$= 3 + -13n + 13$

$= -13n + 16$



Note: optional to use distributive property to simplify

$$\underset{1}{-2} \quad \underset{2}{3} \quad \underset{3}{8} \quad \underset{4}{13} \quad \underset{5}{18}$$

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

$d = 5$

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

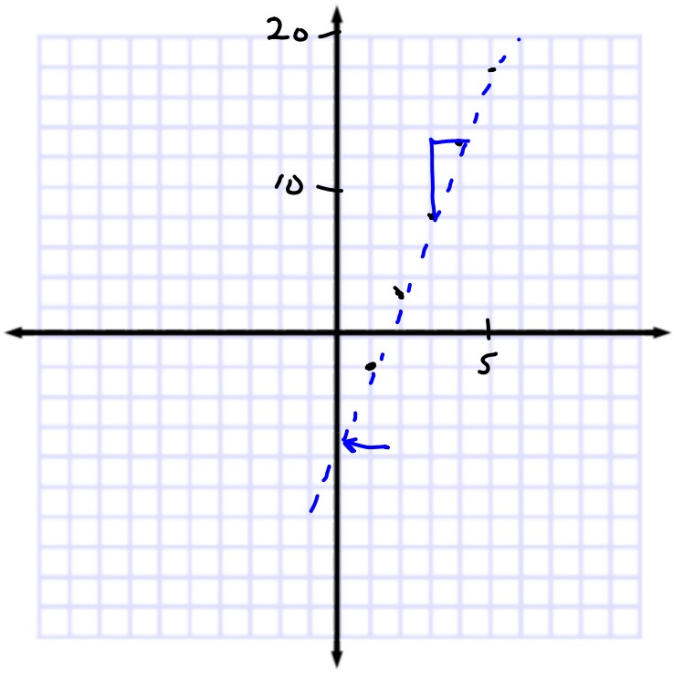
1	−2
2	3
3	8
4	13
5	18

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

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

$= -2 + 5n + -5$

$= 5n + -7$



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, …

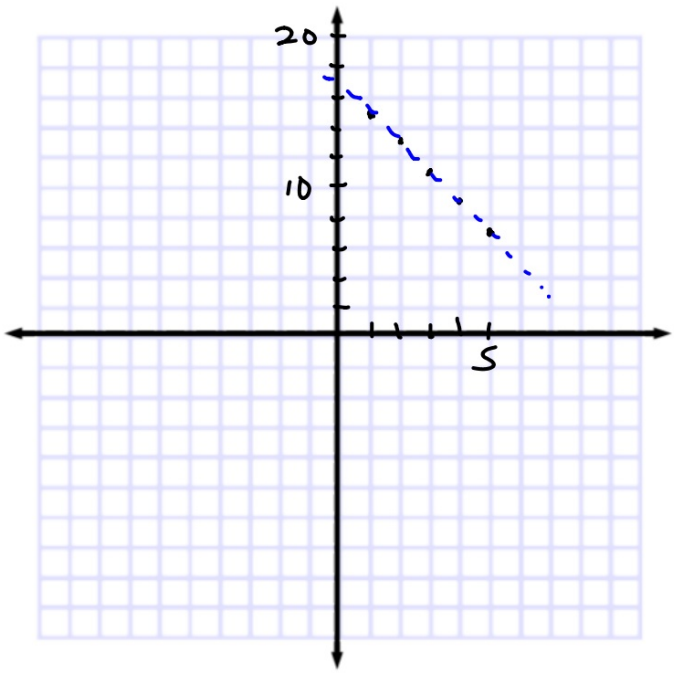
6. −1, −0.5, 0, 0.5, …

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

1	15
2	13
3	11
4	9
5	7

$a_n = 15 + -2n + 2$

$a_n = -2n + 17$



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

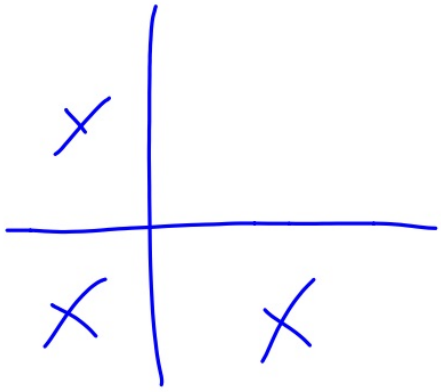
Real-World Example 4 Arithmetic Sequences as Functions

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

a. Write a function to represent this sequence.

$C = 0.42x$

1	.42
2	.84
3	1.26
4	1.68



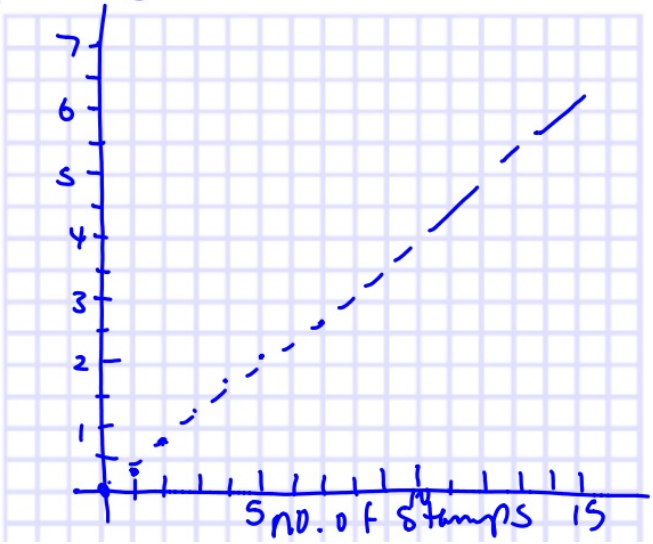
b. Graph the function and determine the domain.

15 6.30

What is legal input for x?

0, 1, 2, 3, …

Whole number



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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.