Smato

Algebra 1 3.5

12, 9, 6, 3...

Recognize arithmetic sequences

Relate arithmetic sequences to linear functions...tricky

sequence ordered list

term

arithmetic sequence (adj) + rule (smato)

common difference (d) 2

whiteboards

and so on...

2, 4, 6, 8...

1st

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

$d = -4$

Example 1 **Determine whether each sequence is an arithmetic sequence. Write *yes* or *no*. Explain.**

8. $-3, 1, 5, 9, \ldots$ yes, rule: +4

13, 17, 21

What's the rule?

What's the rule? What comes next?

Example 2 Find the Next Term

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

$d = -6$

$-9, -15, -21$

What's the rule? What comes next?

Find the next three terms of each arithmetic sequence.

12. 0.02, 1.08, 2.14, 3.2, …

1.08 − 0.02 = 1.06

3.2 4.26, 5.32, 6.38

13. 6, 12, 18, 24, … 30, 36, 42

d = +6

24 − 18

18 − 12

12 − 6

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2. Find the next four terms of the arithmetic sequence 9.5, 11.0, 12.5, 14.0, ….

15.5, 17, 18.5, 20
17.0

First term is 8, and common difference is 3...

$a_1 = 8$

$a_2 = 8 + 3 = 11$ ($8 + 1 \cdot 3$)

$a_3 = 8 + 3 + 3 = 14$ ($8 + 2 \cdot 3$)

$a_4 = 8 + 3 + 3 + 3 = 17$ ($8 + 3 \cdot 3$)

$a_5 = 8 + 3 + 3 + 3 + 3 = 20$ ($8 + 4 \cdot 3$)

$a_6 = 8 + 3 + 3 + 3 + 3 + 3 = 23$ ($8 + 5 \cdot 3$)

$a_7 = 8 + 3 + 3 + 3 + 3 + 3 + 3 = 26$

$8 + 6 \cdot 3$

$a_3 = 14$

Term	Symbol	In Terms of a_1 and d	Numbers
first term	a_1	$= 8 \quad a_1$	8
	a_2	$= 8 + 3$	11
	a_3	$= 8 + 3 + 3$	14
	a_4	$= 8 + 3 + 3 + 3$	17
	a_5	$= 8 + 4 \cdot 3$	20
	a_6	$= 8 + 5 \cdot 3$	23
	a_7	$= 8 + 6 \cdot 3$	26
	a_8	$= 8 + 7 \cdot 3$	29
	a_{12}	$= 8 + 11 \cdot 3 = 41$	
	a_{20}	$= 8 + 19 \cdot 3 = 65$	
	a_{99}	$= 8 + 98 \cdot 3 = 302$	

$8 + (x-1) \cdot 3$

$a_1 + (n-1)d$

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.

Why is it one less????

Recursive equation...explicit equation

Example 3 Find the *n*th Term

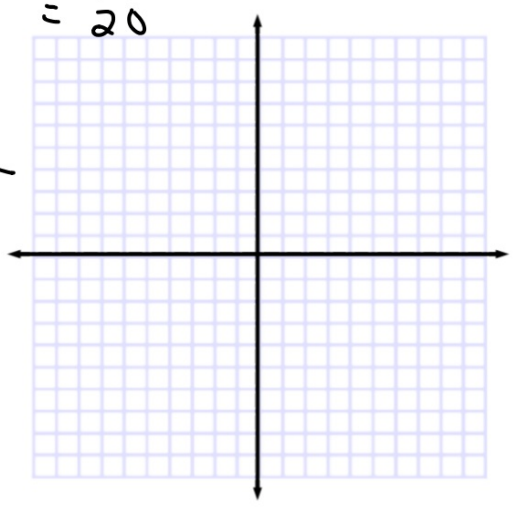
a. Write an equation for the *n*th term of the ~~arithmetic~~ sequence
$-12, -8, -4, 0, 4, 8, 12, 16, 20$

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

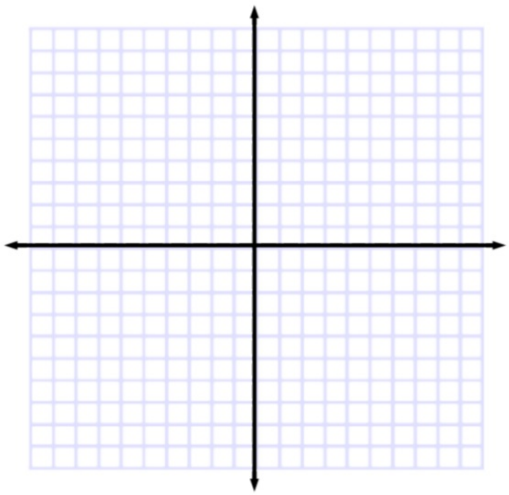
b. Find the 9th term of the sequence.

$a_9 = -12 + 8 \cdot 4$
$= -12 + 32$
$= 20$

~~**c.** Graph the first five terms of the sequence.~~

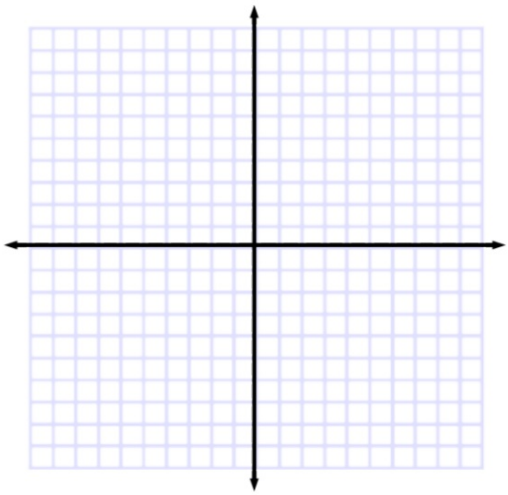


Think of them like ordered pairs...
(because they are)



c. Graph the first five terms of the sequence.

n	$4n - 16$	a_n	(n, a_n)



d. Which term of the sequence is 32?

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

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

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

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

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

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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.