

Name: _____ Date: _____

13.4 NOTES: Explicit Formulas for Arithmetic Sequences Algebra 1

Warm-up:

1. Write the first 4 terms for each of the following sequences described.

a. $a_n = a_{n-1} + 3$
for $a_1 = 4$

b. $f(n) = 2f(n - 1)$
for $a_1 = -4$

c. $f(n + 1) = 2f(n) + 3$
for $a_1 = 0$

2. Consider the Fibonacci Sequence: 1, 1, 2, 3, 5, 8, 13, 21...

Do you see a pattern? _____ Describe it. _____

Is the Fibonacci sequence arithmetic? _____

What is the recursive formula that describes the sequence?

$f(n) =$ _____ where $f(1) = f(2) =$ _____ and $n \geq$ _____

Consider the arithmetic sequence: 8, 11, 14, 17...

If you are asked to find the 5th term, a_5 , or even the 8th term, a_8 , both are easy to find using the common difference, d .

$a_5 =$ _____ $a_8 =$ _____

On the other hand, it's *not* so easy if I ask you to find the 37th term of the sequence, a_{37} , or perhaps the 99th term.

$a_{37} =$ _____ $a_{99} =$ _____

The *recursive* formula doesn't help us get the answer quickly. There must be an easier way.....and there is.

We'll again use this example.

$$a_1, a_2, a_3, a_4, \dots$$

$$8, 11, 14, 17, \dots$$

$a_1 =$ _____
$d =$ _____

Each term in an arithmetic sequence can be expressed in terms of the first term, a_1 , and the common difference, d .

Term	Symbol	Numbers in Sequence	In terms of a_1 and d
first term	a_1	8	a_1
second term			
third term			
fourth term			
·	·	·	·
·	·	·	·
·	·	·	·
n^{th} term			

Now we can use the formula above to find the 37th term.

This is the

form of an arithmetic sequence.

Practice: Now, you find the 99th term using the *explicit* formula.

Locate the *explicit* formula for an *arithmetic sequence* on your REFERENCE SHEET. Write it below from the reference sheet.

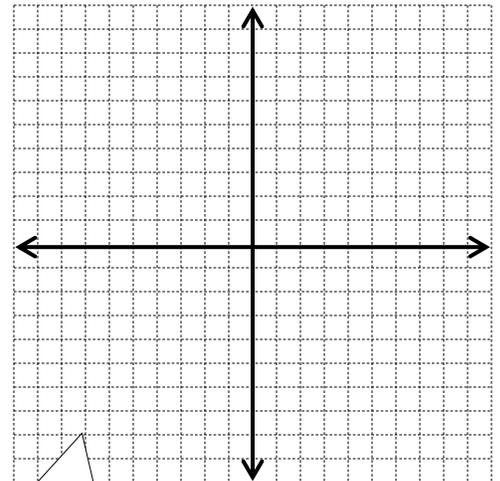
3. a. Write an *explicit* equation for the n^{th} term of the arithmetic sequence.

-12, -8, -4, 0, 4, . . .

b. Write the 9th term of the sequence.

c. Graph the first five terms of the sequence.

n	a_n	(n, a_n)

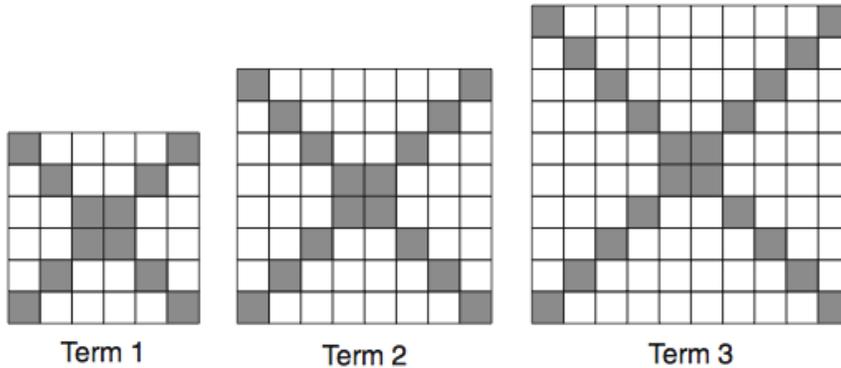


So, does an arithmetic sequence graph to be linear or exponential?
(circle one)

d. Which term of the sequence is 32?

Answer the following regents questions.

24 The diagrams below represent the first three terms of a sequence.



Assuming the pattern continues, which formula determines a_n , the number of shaded squares in the n th term?

- (1) $a_n = 4n + 12$ (3) $a_n = 4n + 4$ June '14
 (2) $a_n = 4n + 8$ (4) $a_n = 4n + 2$

16 The third term in an arithmetic sequence is 10 and the fifth term is 26. If the first term is a_1 , which is an equation for the n th term of this sequence?

- (1) $a_n = 8n + 10$ (3) $a_n = 16n + 10$ Aug. '14
 (2) $a_n = 8n - 14$ (4) $a_n = 16n - 38$

21 A sunflower is 3 inches tall at week 0 and grows 2 inches each week. Which function(s) shown below can be used to determine the height, $f(n)$, of the sunflower in n weeks?

- I. $f(n) = 2n + 3$
 II. $f(n) = 2n + 3(n - 1)$
 III. $f(n) = f(n - 1) + 2$ where $f(0) = 3$

- (1) I and II (3) III, only June '14
 (2) II, only (4) I and III