

Notes: **Arithmetic Recursive Sequence**
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Definitions:

A **recursive formula** is one where each term in the sequence depends on a term or terms that came before it.

Recursive formula $\Rightarrow a_n = a_{n-1} + d$

A recursive formula always has 2 parts

- Find a common difference
- $a_n = a_{n-1} + d$

Examples:

1) Write a recursive equation for the arithmetic sequence.

1st term $\rightarrow 6, 10, 14, 18, \dots$
 or $+4 +4$
 a_1

$a_n = a_{n-1} + d$
 $a_n = a_{n-1} + 4$

$d = 4$

1st term 6
2nd term 10

check
 $a_2 = a_1 + 4$
 $10 = 6 + 4$
 $10 = 10 \checkmark$

2) Write a recursive equation for the arithmetic sequence.

12, 7, 2, -3, ...
 $-5 -5$

$a_n = a_{n-1} + d$
 $a_n = a_{n-1} - 5$

$d = -5$

3rd term 2
2nd term 7

check
 $a_3 = a_2 - 5$
 $2 = 7 - 5$
 $2 = 2 \checkmark$

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Alg. 1 H - Date: May 15

Glue on page 53

Given the first term and the common difference of an arithmetic sequence, find the recursive formula. Then use the recursive formula to find the next three terms in the sequence.

3) $a_1 = -26, d = 200$

$$a_n = a_{n-1} + 200$$

$$a_2 = a_1 + 200$$

$$a_2 = -26 + 200$$

$$a_2 = 174$$

$$a_3 = 174 + 200$$

$$a_3 = 374$$

$$a_4 = 374 + 200$$

$$a_4 = 574$$

4) $a_1 = -44, d = -2$

$$a_n = a_{n-1} - 2$$

$$a_2 = a_1 - 2$$

$$a_2 = -44 - 2$$

$$a_2 = -46$$

$$a_3 = -46 - 2$$

$$a_3 = -48$$

$$a_4 = -48 - 2$$

$$a_4 = -50$$

Write an explicit and recursive formula for the following sequences.

5) 19, 13, 7, 1, ... $d = -6$

recursive:

$$a_n = a_{n-1} + d$$

$$a_n = a_{n-1} - 6$$

explicit:

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

$$a_n = 19 + (n-1)(-6)$$

$$a_n = 19 - 6n + 6$$

$$a_n = 25 - 6n$$

6) -4, -6, -8, -10, ... $d = -2$

recursive:

$$a_n = a_{n-1} - 2$$

explicit:

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

$$a_n = -4 + (n-1)(-2)$$

$$a_n = -4 - 2n + 2$$

$$a_n = -2 - 2n$$

7) Hannah opened a bank account with an initial \$500. She is depositing \$45.20 per week into her bank account.

Assuming she continues to deposit \$45.20 per week. Write an equation for the arithmetic sequence (Hint: find a_1 and d first.)

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

$$a_n = 500 + (n-1)45.20$$

$$a_n = 500 + 45.20n - 45.20$$

$$a_n = 454.80 + 45.20n$$

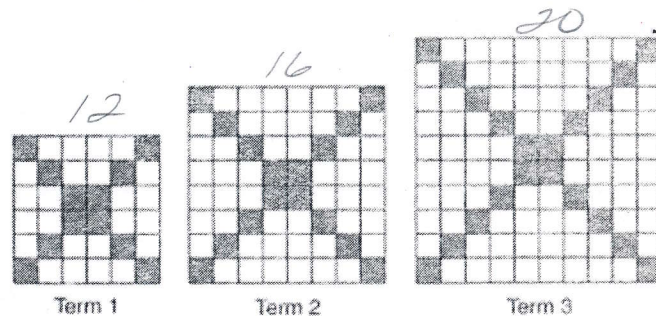
How much money will she have in her bank account after 15 weeks?

$$a_n = 454.80 + 45.20(15)$$

$$a_n = 1,132.80$$

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

$$d = 4$$



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

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

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

$$a_n = 12 + 4n - 4$$

$$a_n = 8 + 4n$$

$$a_n = a_{n-1} + d$$

$$a_n = a_{n-1} + 4$$