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Notes:

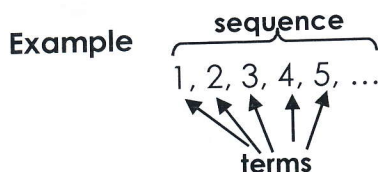
Arithmetic Sequence

Created for you by Ms. Nhotsoubanh

A **sequence** is an ordered list of numbers.

A sequence may be named or referred to as " a_n " or " a "

The numbers in the ordered list are called terms.



The two specific sequences we will study are arithmetic and geometric sequences.

Example

- Sequence 1: $2, 6, 10, 14, \dots$ ^{+4 +4 +4} arithmetic
- Sequence 2: $2, 6, 18, 54, \dots$ _{$\times 3 \times 3 \times 3$} geometric

Arithmetic Sequence - is a sequence of terms that have a common difference between them. The common difference is often written as "d."

Explicit formula is a formula that allows you direct computation of any term in an arithmetic sequence.

Explicit formula $\Rightarrow a_n = a_1 + (n - 1)d$

To find the common difference, (d) subtract
any term from the term
that follows it

Common differences can be negative.

Name: Key
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Directions: For the following arithmetic sequence, find 1st term (a) and the common difference (d) and state the explicit formula. Then find the 7th term and the 20th term.

1.) $-10, -4, 2, 8, 14, \dots$

$-2, -2, -2$
2.) $10, 8, 6, 4, \dots$

$a_1 = -10, d = 6$
 $a_n = a_1 + (n-1)d$
 $a_n = -10 + (n-1)6$
 $a_n = -10 + 6n - 6$
 $a_n = -16 + 6n$
 explicit formula

$a = 10, d = -2$
 $a_n = a_1 + (n-1)d$
 $a_n = 10 + (n-1)(-2)$
 $a_n = 10 - 2n + 2$
 $a_n = 12 - 2n$
 explicit formula

$a_7 = -16 + 6(7)$
 $a_7 = 26$
 $a_{20} = -16 + 6(20)$
 $a_{20} = 104$

$a_7 = 12 - 2(7)$
 $a_7 = -2$
 $a_{20} = 12 - 2(20)$
 $a_{20} = -28$

* input in 4, 8, 2

4	1	2	3	4	5
8	-10	-4	2	8	14

Given the explicit formula for an arithmetic sequence find the first five terms and the term named in the problem.

3) $a_n = -11 + 7n$

Substitute in "n" which is the term

Find a_{34}

$a_1 = -11 + 7(1) = -4$
 $a_2 = -11 + 7(2) = -3$
 $a_3 = -11 + 7(3) = 10$
 $a_4 = -11 + 7(4) = 17$
 $a_5 = -11 + 7(5) = 14$
 $a_{34} = -11 + 7(34) = 227$

from table

a_1	-4
a_2	3
a_3	10
a_4	17
a_5	24
a_{34}	227

Given the explicit formula for an arithmetic sequence find the first five terms and the term named in the problem.

4) $a_n = 65 - 100n$
 Find a_{39}

Substitute in "n" which is the term

$a_n = 65 - 100n$
 $a_1 = 65 - 100(1) = -35$
 $a_2 = 65 - 100(2) = -135$
 $a_3 = 65 - 100(3) = -235$
 $a_4 = 65 - 100(4) = -335$
 $a_5 = 65 - 100(5) = -435$
 $a_{39} = 65 - 100(39) = -3835$

from table

a_1	-35
a_2	-135
a_3	-235
a_4	-335
a_5	-435
a_{39}	-3835

Given the first term and the common difference of an arithmetic sequence find the first five terms and the explicit formula.

5) $a_1 = 28, d = 10$

$a_n = a_1 + (n-1)d$
 $a_n = 28 + (n-1)10$
 $a_n = 28 + 10n - 10$
 $a_n = 18 + 10n$
 explicit formula

$a_1 = 18 + 10(1) = 28$
 $a_2 = 18 + 10(2) = 38$
 $a_3 = 18 + 10(3) = 48$
 $a_4 = 18 + 10(4) = 58$
 $a_5 = 18 + 10(5) = 68$

6) $a_1 = -34, d = -10$

$a_n = a_1 + (n-1)d$
 $a_n = -34 + (n-1)(-10)$
 $a_n = -34 - 10n + 10$
 $a_n = -24 - 10n$
 explicit formula

$a_1 = -24 - 10(1) = -34$
 $a_2 = -24 - 10(2) = -44$
 $a_3 = -24 - 10(3) = -54$
 $a_4 = -24 - 10(4) = -64$
 $a_5 = -24 - 10(5) = -74$