Sequence: a pattern of __numbers__   Ex: 5, 10, 15, 20, 25, ... $d = a_2 - a_1$

a_1 a_3 a_5

a_1 a_3 a_5

Arithmetic Sequences: A sequence of terms that have a common _difference_ between them.

Explicit Formula: $a_n = a_1 + d(n-1)$

where d is the __common__ __difference__
and a_1 is the __first__ __term__

Recursive Formula: $a_1 = $ ___ $a_n = a_{n-1} \pm d$

For each arithmetic sequence, find the common difference and the next three terms.

1.   6, 12, 18, 24, ... $d:$ __6__   Next three terms: __30, 36, 42__

2.   3, 8, 13, 18, ... $d:$ __5__   Next three terms: __23, 28, 33__

For the following arithmetic sequences, find a_0 and d and state recursive and explicit formula.

3.   -10, -4, 2, 8, 14, ... $a_1 = $ __-10__ $d = $ __6__
    Recursive: Explicit Formula: $a_n = -10 + 6(n-1)$

$$a_1 = -10$$
$$a_n = a_{n-1} + 6$$
$$a_n = -10 + 6n - 6$$
$$a_n = 6n - 16$$

4.   36, 31, 26, 21, ... $a_1 = $ __36__ $d = $ __-5__
    Recursive: Explicit Formula: $a_n = 36 - 5(n-1)$

$$a_1 = 36$$
$$a_n = a_{n-1} - 5$$

5.   4, -3, -10, -17, ... $a_1 = $ __4__ $d = $ __-7__
    Recursive: Explicit Formula: $a_n = 4 - 7(n-1)$

$$a_1 = 4$$
$$a_n = a_{n-1} - 7$$

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6. Write the explicit formula for the sequence, then find the 10th term.
   7, 10, 13, 16, ...
   $a_1 = $ __7__ $d = $ __3__   Explicit formula: $a_n = 7 + 3(n-1)$ $a_{10} = $ __34__

$$a_{10} = 7 + 3(10-1)$$

7. Write the explicit formula for the sequence, then find the 51st term.
   $a_1 = 7; d = -4.7$
   Explicit formula: $a_n = 7 - 4.7(n-1)$ $a_{51} = $ __-228__

$$a_{51} = 7 - 4.7(51-1)$$

Name: _____   Date: _____

Write the explicit formula and recursive formula for each arithmetic sequence:

1. 5, 7, 9, 11, 13, ...

$d =$ __2__

$a_1 =$ __5__

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

Recursive: $a_1 = 5$ $a_n = a_{n-1} + 2$

2. -4, -5, -6, -7, -8, ...

$d =$ __-1__

$a_1 =$ __-4__

Explicit: $a_n = -4 - 1(n-1)$

Recursive: $a_1 = -4$ $a_n = a_{n-1} - 1$

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3. 10, 15, 20, 25, ...

$d =$ __5__

$a_1 =$ __10__

Explicit: $a_n = 10 + 5(n-1)$

Recursive: $a_n = a_{n-1}$

4. -9, -2, 5, 12, 19, ...

$d =$ __7__

$a_1 =$ __-9__

Explicit: $a_n = -9 + 7(n-1)$

Recursive: $a_n = a_{n-1}$

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5. 23, 20, 17, 14, ...

$d =$ __-3__

$a_1 =$ __23__

Explicit: $a_n = 23 - 3(n-1)$

Recursive: $a_n = a_{n-1}$

6. 8, 6.5, 5, 3.5, 2, ...

$d =$ __-1.5__

$a_1 =$ __8__

Explicit: $a_n = 8 - 1.5(n-1)$

Recursive: $a_n = a_{n-1}$

Find the nth term for each arithmetic sequence (hint: write the explicit formula first!):

7. $a_1 = -5$, $d = 4$, $n = 9$

$a_n = -5 + 4(9-1)$

$a_9 = 27$

8. $a_1 = 300$, $d = -1/2$, $n = 15$

$a_n = 300 - 1/2(15-1)$

$a_{15} = 293$