Name: **Key**　　　　　　　　　　　　　　　　Date: _____

Arithmetic Sequences

A **Sequence** is a function whose domain is a set of <u>consecutive whole numbers</u>. This makes the domain for EVERY sequence {1, 2, 3, 4, ...}. The range would be the **terms of the sequence** (the numbers in the list). The sequence can be specified by an <u>equation</u> or a <u>rule</u>.

An **arithmetic** sequence is a sequence of terms that have a common **difference** between them.

Explicit Formula: (used to find a specific term in the sequence) Make sure you **SIMPLIFY!**

Before: $\boxed{a_n = a_1 + d(n-1)}$ After: $\boxed{a_n = dn + a_0}$

$a_n =$ the nth term

$d =$ the common difference
　　right - left

$a_1 =$ the first term

$n =$ which term you want
　　　to find

Determine if the sequence is arithmetic:
　　　　2, 5, 8, 11, ...

$5 - 2 = 3$
$8 - 5 = 3$ Yes
$11 - 8 = 3$

Find the explicit equation:
　　　　2, 5, 8, 11, ...

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

$a_n = 2 + 3(n-1)$ $a_n = 3n - 1$

$a_n = 2 + 3n - 3$

$a_1 = 3(1) - 1 = 3 - 1 = 2$ ✓

Determine if the sequence is arithmetic:
　　　¼, ½, 1, 2, ...

$\frac{1}{2} - \frac{1}{4} = \frac{1}{4}$ No.

$1 - \frac{1}{2} = \frac{1}{2}$

Determine if the sequence is arithmetic:
　　　7, 3, -1, -5, ...

$3 - 7 = -4$
$-1 - 3 = -4$ Yes
$-5 - (-1) = -4$

Find the explicit equation:
　　　7, 3, -1, -5, ...

$a_n = 7 + (-4)(n-1)$ $a_1 = -4(1) + 11$
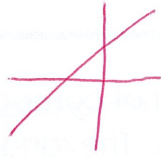
$a_n = 7 - 4n + 4$ $= -4 + 11$

$a_n = -4n + 11$ $= 7$ ✓

How else can we represent it?

$$a_n = dn + a_0$$
$$y = mx + b$$

Find the common difference, the explicit formula, and the tenth term.

$3, 9, 15, 21, \ldots$

$d = 9 - 3 = 6$

$a_1 = 3$

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

$a_n = 3 + 6(n-1)$

$a_n = 3 + 6n - 6$

$a_n = 6n - 3$

$a_1 = 6(1) - 3$

$a_1 = 6 - 3$

$a_1 = 3$ ✓

Graphing arithmetic sequences:

The key is realizing that the explicit formula simplified is the same as ___$y = mx + b$___.

Graph: $a_n = -2n + 4$

Slope $= \dfrac{-2}{1}$

y-int $= 4$

You try: $a_n = -\dfrac{2}{3}n - 4$

Slope $= \dfrac{-2}{3}$

y-int $= -4$