

Arithmetic and Geometric Sequences

- In order to create a formula for a sequence you first need to determine the pattern is through **addition** (arithmetic) or through **multiplication** (geometric)

Arithmetic Sequence	Geometric Sequence
$3, 5, 7, 9, \dots$ PATTERN IS $\text{ADD } 2$	$3, 6, 12, 24, \dots$ PATTERN IS $\text{MULTIPLY } 2$

THIS IS EXACTLY WHAT THE FORMULA LOOKS LIKE ON THE EDC SHEET

Writing a formula for arithmetic and geometric sequences

Arithmetic Sequence	Geometric Sequence
$a_n = a_1 + (n - 1)d$ $3, 5, 7, 9, \dots$	$a_n = a_1 \cdot r^{n-1}$ $3, 6, 12, 24, \dots$

- n is the same as x (so it stays a variable)
- a_n is the same as y (so it stays a variable)
- a_1 is the first term so change it the number of the first term
- d and r are what the pattern changes by, make them be the number of the pattern

Ex 1: Arithmetic

- Write a model for the sequence
- Determine a_{27}

$-7, -4, -1, 2, 5, \dots$ UNSIMPLIFIED

PATTERN IS $\text{ADD } 3$

$$a_n = -7 + (n-1)3$$

IN ARITHMETIC YOU MUST DISTRIBUTE AND SIMPLIFY!

$$a_n = -7 + 3n - 3$$

a) $a_n = 3n - 10$ SIMPLIFIED

b) $a_{27} = 3(27) - 10$

$$a_{27} = 62$$

Ex 2: Arithmetic

- Write a model for the sequence
- Determine a_{31}

$10, 6, 2, -2, -6, \dots$

PATTERN IS -4

SINCE THE PATTERN IS SUBTRACTING USE NEGATIVE 4

$$a_n = 10 + (n-1)(-4)$$

$$a_n = 10 - 4n + 4$$

$$a_n = -4n + 14$$

← DISTRIBUTE THE -4 TO $(n-1)$. COMBINE LIKE TERMS. PUT 'n' TERM IN FRONT.

b) $a_{31} = -4(31) + 14$

$$a_{31} = -110$$

Ex 3: Geometric

- Write a model for the sequence
- Determine a_{13}

$1, 3, 9, 27, \dots$

PATTERN IS MULTIPLY 3

$$a_n = 1 \cdot 3^{n-1} \text{ OR JUST } a_n = 3^{n-1}$$

b) $a_{13} = 3^{13-1}$

$$a_{13} = 531,441$$