Do Now

Write the equation represented by each table.

Exponential
$$x$$
 $y = 2(2)$

Feb 13-7:47 AM

Introduction to Sequences: Arithmetic vs Geometric

A **SEQUENCE** is an ordered list

Sequence: 1, 5, 9, 13, 17, 21, ...

The domain (n) of a sequence consists of the natural (counting) numbers 1, 2, 3, 4, ... which represents the <u>position</u> in the list The range of a sequence consists of the terms of the sequence

Subscript form of a sequence: $a_1, a_2, a_3, ... a_n, ...$ where a_1 is the first term, a_2 is the second term, etc.

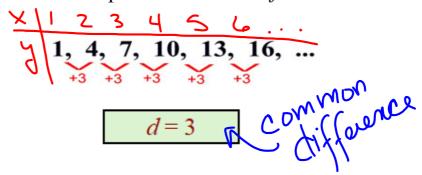
Function form of a sequence: f(1), f(2), f(3), ..., f(n),... where f(1) is the first term, f(2) is the second term, etc.

Arithmetic Sequences

Add (or subtract) the *same value* to get from one term to the next.

The number added to each term is called the **common difference**, *d*

Arithmetic sequences are linear functions



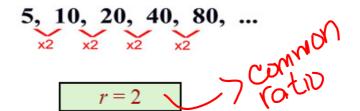
Feb 13-7:47 AM

Geometric Sequences

You multiply (or divide) the same value to get from one term to the next

The number multiplied by each term is called the **common ratio**, *r*

Geometric sequences are exponential functions



Ways of Expressing Sequences

List (finite or infinite)

Ex: {1, 5, 9, 13, 17} and {1, 5, 9, 13, 17, 21, ...}

Explicit formula

Uses the n^{th} term of the sequence, a_n , as an expression of n (where n = the term's location).

Ex: {1, 5, 9, 13, 17, 21, ...} can be written

$$a_n = 4n - 3$$

$$a_n = 4n - 3$$
 or $f(n) = 4n - 3$

Recursive formula

Uses the starting term, a_1 , and the n^{th} term of the sequence, a_n , as an expression containing the previous term (the term before it), a_{n-1} .

Ex: {1, 5, 9, 13, 17, 21, ...} can be written

$$a_1 = 1$$
; $a_n = a_{n-1} + 4$

$$a_1 = 1$$
; $a_n = a_{n-1} + 4$ or $f(1) = 1$; $f(n) = f(n-1) + 4$

Feb 13-7:47 AM

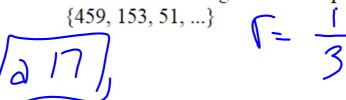
1. What is the common difference in this arithmetic 6, 10, 4, -2, -8, ...} sequence?

a. 4 b. -4 c. 6

2. Which of the following sequences is a geometric sequence?

3. The sequence shown below is an arithmetic sequence. What is the value of the missing term?

- a. 10
- b. 11
- c. 12
- d. 14
- 4. Find the fourth term of this geometric sequence.



Feb 13-7:47 AM

5. What are the first three terms of this sequence?

$$a_n = n^2 + 1$$

$$n = 3$$

6. What is the tenth term of this sequence?

$$a_n = (-1)^{n-1} \cdot n^2$$