Do Now

Write the equation represented by each table.

1)

x	1	2	3	4	5
y	2	4	6	8	10

Linear

$y = 2x$

2)

x	1	2	3	4	5
y	4	8	16	32	64

Exponential

$y = 2(2)^x$

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Introduction to Sequences: Arithmetic vs Geometric

A SEQUENCE is an ordered list

Sequence: **1, 5, 9, 13, 17, 21, ...** +4

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

The range of a sequence consists of the terms of the sequence

Subscript form of a sequence: $a_1, a_2, a_3, \ldots a_n, \ldots$

where a_1 is the first term, a_2 is the second term, etc.

Function form of a sequence: $f(1), f(2), f(3), \ldots, f(n), \ldots$

where $f(1)$ is the first term, $f(2)$ is the second term, etc.

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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*

x	1	2	3	4	5	6	...
y	1,	4,	7,	10,	13,	16,	...
		+3	+3	+3	+3	+3	

$d = 3$ ← common difference

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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*

5, 10, 20, 40, 80, ...
x2 x2 x2 x2

$r = 2$ → common ratio

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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

$a_n = 4n - 3$ 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

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

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1. What is the common difference in this arithmetic sequence?

Add to the next term

{16, 10, 4, -2, -8, ...}

a. 4 b. -4 c. 6 d. -6

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

a. {2, 4, 6, 8, 10, ...}
b. {2, 4, 8, 16, 32, ...}
c. {2, 4, 7, 11, 16, ...}
d. {2, 8, 14, 20, 26, ...}

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

{6, 9, ☐, 15, 18, ...}

d = 3

a. 10 b. 11 c. 12 d. 14

4. Find the fourth term of this geometric sequence.

{459, 153, 51, ...}

$r = \frac{1}{3}$

a 17

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

$a_n = n^2 + 1$

n = 1 n = 2 n = 3

6. What is the tenth term of this sequence?

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

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