Algebra 1 Notes 8.6

~~5.8~~ -> GEOMETRIC SEQUENCES

Geometric sequence: A number sequence formed by multiplying a term in a sequence by a fixed number to find the next term.

Ex: 2, 10, 50, 250 →
(×5, ×5, ×5)

AKA: The common ratio

*To find the common ratio, write each term over the term to its left and simplify.

1. Find the common ratio of each sequence:

a. $-3, -6, -12, -24, \ldots$ $\frac{-6}{-3} = 2$ (×2, ×2, ×2)

b. $3, -15, 75, -375, \ldots$ $\frac{-15}{3} = -5$ (×(−5), ×5, ×5)

c. $750, 150, 30, 6, \ldots$ $\frac{150}{750} = \frac{1}{5}$

d. $3, 3/2, \frac{3}{4}, 3/8, \ldots$ $\frac{\frac{3}{2}}{3} = \frac{1}{2}$

2. Find the next 3 terms of each sequence:

a. $1, 3, 9, 27, \ldots$ $81, 243, 729$
CR = 3

b. $120, -60, 30, -15, \ldots$ $7.5, -3.75, 1.875$
CR = $-\frac{1}{2}$

c. $5, -10, 20, -40, 80, -160$
CR = −2

3. Determine whether each sequence is arithmetic or geometric:

Arithmetic → Has a Common difference (+, −)

Geometric → Has a Common ratio (×, ÷)

a. 2, 4, 6, 8, ...
+2
Arithmetic

b. 2, 4, 8, 16, ...
(×2)
Geometric

c. 162, 54, 18, 6, ...
÷ 3
Geometric

d. 98, 101, 104, 107, ...
+3
Arithmetic

*You can use the Common ratio of a geometric sequence to write a function rule:

Geometric Sequence

$$A(n) = a \cdot r^{n-1}$$

- a → 1st Term
- r → Common Ratio (Pattern)
- $n-1$ → Term you Want

4. Finding Terms of a Sequence:

Find the first, sixth, and twelfth terms of each sequence

a. $A(n) = 4 \cdot 3^{n-1}$

$A(1) = 4$

$A(6) = 4 \cdot 3^{6-1}$

$= 4 \cdot 3^5$

$= 4 \cdot 243$

$= 972$

$A(12) = 4 \cdot 3^{12-1}$

$= 708,588$

b. $A(n) = -2 \cdot 5^{n-1}$

$A(1) = -2$

$A(6) = -2 \cdot 5^{6-1}$

$= -2 \cdot 5^5$

$= -6250$

$A(12) = -2 \cdot 5^{12-1}$

$= -97,656,250$

Find the first, fifth, and tenth terms of the sequence:

$A(n) = -3(2)^{n-1}$

$A(1) = -3$

$A(5) = -3(2)^{5-1}$

$= -3(2)^4$

$= -3(16)$

$= -48$

$A(10) = -3(2)^{10-1}$

$= -3(2)^9$

$= -1536$