6.3 - Geometric Sequences

A sequence where there is a common ratio, r, between consecutive terms. A new term is generated by multiplying/dividing each term by the same number.

eg. 5, 15, 45, 135, ... r =

40, 20, 10, 5, 5/2, ... r =

3, -6, 12, -24, 48, ... r =

Geometric Sequence Formula

$$t_n = ar^{n-1}$$

where a is the first term, and r is the common ratio.

Ex. 1 Find t_7 for each sequence.

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

b) $t_n = 100\left(\frac{1}{4}\right)^{n-1}$

Ex. 2 Simplify the powers.

a) $3^{x-1} \bullet 3^{x+5}$

b) $32^{x+2} \cdot 8^{6}$

Ex. 3 Find t_n for each sequence.

This means find the general formula which works to find any term in the sequence.
Must be simplified.

a) 5, 10, 20, 40, ...

b) 2, 6, 18, 54,.....

c) 6561, 2187, 729, 243, ...

d) 3, -12, 48, -192, ...

e) 8, 32, 128, 512,.....

f) 1024, -256, 64, -16, ...

Ex. 4 Determine the number of terms in each sequence.

a) 5, 20, 80, ... , 81920

b) -19683, 6561, -2187, ... , -3

Ex. 5 Determine a, r, and t_n for the geometric sequence that has:

a) $t_5 = 324$ and $t_9 = 26244$

b) $t_4 = -8$ and $t_7 = 1$

Ex. 6 Determine the value of x that makes each sequence:

a) geometric
   2, 6, 5x - 2

b) arithmetic
   x - 4, 6, x

Be careful of the wording in application problems:

Now -> t_1
First year -> t_2