

Geometric Sequences (Lesson Notes).notebook

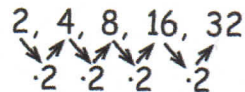
WARM-UP - Page. 344

11. **Stadium seating** In one section of a stadium, there are 30 seats in the first row, 32 in the second row, 34 in the third row, and so on. There are 60 rows.
- Write the first 5 terms of the sequence.
 - Write the general term that determines the sequence.
 - How many seats are there in the 60th row?

UNIT #7: Sequences and Series Geometric Sequences

Learning Goal:

I will learn how to determine the formula for the general term of a geometric sequence.



Lesson: Geometric Sequences

Geometric Sequence:

A geometric sequence is one where each term in the sequence is found by *multiplying* the previous term by a number. The general geometric series is

$$a, ar, ar^2, ar^3, \dots$$

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

$$\begin{aligned} t_1 &= a \\ t_2 &= ar \\ t_3 &= ar^2 \\ t_n &= ar^{n-1} \end{aligned}$$

Find common base:

Example 1: Finding the number of terms:

For the sequence where $a = 5$, $r = 2$ and $t_n = 2560$, how many terms are in the sequence? Find n .

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

$$2560 = 5(2)^{n-1}$$

$$\frac{2560}{5} = \frac{5(2)^{n-1}}{5}$$

$$512 = 2^{n-1}$$

$$2^8 = 2^{n-1}$$

$$8 = n-1$$

$$\boxed{9 = n}$$

\therefore there are 9 terms in this sequence.

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UNIT 7: Sequences and Series

Geometric Sequences

Example 2: Finding t_n given two terms:

$$t_5 = 80 \quad t_7 = 320$$

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

Method:

- Use two equations. Solve for r . Note: solution may have two answers (+/-).
- Solve back into one equation to solve for a . (Remember - two solutions).
- Find the two cases of t_n .

$$\text{Eq. (1)} \quad t_5 = 80$$

$$\text{Eq. (2)} \quad t_7 = 320$$

$$80 = ar^{5-1}$$

$$320 = ar^{7-1}$$

$$\textcircled{1} \quad 80 = ar^4$$

$$\textcircled{2} \quad 320 = ar^6$$

Divide $\textcircled{2}$
by $\textcircled{1}$
to find r :

$$\begin{array}{r} 320 = ar^6 \\ \div 80 = ar^4 \\ \hline 4 = r^2 \end{array}$$

2 values
for r

$$\begin{array}{l} \pm\sqrt{4} = r \\ \boxed{\pm 2 = r} \end{array}$$

Sol. #1 $r =$
Sub 2 into $\textcircled{1}$
to find a

$$80 = a(2)^4$$

$$\frac{80}{16} = \frac{a}{16}$$

$$\boxed{5 = a}$$

$$\therefore \boxed{t_n = 5(2)^{n-1}} \quad \text{OR}$$

↑
Sol'tn #1

Solution
#2.
Sub. $r = -2$
into $\textcircled{1}$

$$80 = a(-2)^4$$

$$\frac{80}{16} = \frac{a}{16}$$

$$\boxed{5 = a}$$

$$\boxed{t_n = 5(-2)^{n-1}}$$

↑
Sol'tn #2

Practice Work

p. 453 #5 - 7, 9, 18

Arithmetic and Geometric
Sequences Handout