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.

a) Write the first 5 terms of the sequence.

b) Write the general term that determines the sequence.

c) 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.

2, 4, 8, 16, 32

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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

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

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

$t_1 = a$
$t_2 = ar$
$t_3 = ar^2$
$t_n = ar^{n-1}$

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.

$t_n = ar^{n-1}$

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

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

$512 = 2^{n-1}$

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

$8 = n-1$

$\boxed{9 = n}$

∴ there are 9 terms in this sequence.

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.

Success Criteria:

To be successful, I must be able to...

- find the formula for the *n*th term $t_n = ar^{n-1}$
- find the number of terms in a geometric sequence
- find t_n for the geometric sequence when given 2 terms

Practice Work
p. 453 #5 - 7, 9, 18
~~Arithmetic and Geometric Sequences Handout~~

Example 2: Finding t_n given two terms:

$t_5 = 80 \qquad t_7 = 320$

$t_n = ar^{n-1}$

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.

Eq. ① $t_5 = 80$ $\quad$ Eq. ② $t_7 = 320$

$80 = ar^{5-1}$ $\quad$ $320 = ar^{7-1}$

① $80 = ar^4$ $\quad$ ② $320 = ar^6$

Divide ② by ① to find r:

$$\frac{320 = ar^6}{\div\ 80 = ar^4}$$

$$4 = r^2$$

$$\pm\sqrt{4} = r$$

2 values for r → $\boxed{\pm 2 = r}$

Sol. #1 r = 2

Sub 2 into ① to find a

$80 = a(2)^4$

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

$\boxed{5 = a}$

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

Sol'tn #1

Solution #2.

Sub. r = -2 into ①

$80 = a(-2)^4$

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

$\boxed{5 = a}$

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

Sol'tn #2