

Mathematics 11U

7.2 – Geometric Sequences

Mr. D. Hagen

Geometric Sequence:

- a sequence that has the same ratio between consecutive terms, known as the **common ratio**, or r

- ex: 2, 6, 18, 54

$\swarrow \quad \swarrow \quad \swarrow$
 $\times 3 \quad \times 3 \quad \times 3$

$$r = \frac{6}{2} = 3$$

General Term:

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

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

$$t_1 = 2(3)^{1-1}$$

$$t_1 = 2(3)^0$$

$$t_1 = 2$$

Example 1

Determine if the following sequence is geometric. If it is, state the General Term, then find the 9th term in the sequence.

$$\frac{-1}{8}, \frac{1}{2}, -2, \dots$$



$$\frac{\frac{1}{2}}{-\frac{1}{8}} = \frac{1}{2} \times -8 = -4 = r$$

$$t_n = -\frac{1}{8}(-4)^{n-1}$$

$$t_9 = -\frac{1}{8}(-4)^{9-1}$$

$$t_9 = -\frac{1}{8}(-4)^8$$

$$t_9 = -\frac{1}{8}(65536)$$

$$t_9 = -8192$$

Example 2

How many terms in the sequence:

52612659, 17537553, ..., 11

$$r = \frac{17537553}{52612659} = \frac{1}{3}$$

$$t_n = 52612659 \left(\frac{1}{3}\right)^{n-1}$$

Guess and check:

$$t_{10} = 52612659 \left(\frac{1}{3}\right)^{10-1}$$

$$t_{10} = 2673$$

$$t_{15} = 52612659 \left(\frac{1}{3}\right)^{15-1}$$

$$t_{15} = 11$$

$\therefore$ 15 terms in the sequence.