

Honors Algebra II

Notes Section 7.3

Analyze Geometric Sequences and Series

Geometric Sequence: ratio for any term to the previous term is constant.

Common Ratio: constant ratio; r

Geometric Series: expression formed by adding the terms of a geometric sequences.

Rule for a Geometric Sequence: $a_n = a_1 r^{n-1}$

The Sum of a Finite Geometric Series: $S_n = a_1 \left(\frac{1 - r^n}{1 - r} \right)$

EXAMPLE 1 Tell whether the sequence is geometric.

a) 4, 10, 18, 28, 40, ...

b) 625, 125, 25, 5, 1, ...

EXAMPLE 4 Two terms of a geometric sequence are $a_3 = -48$ and $a_6 = 3072$.
Find a rule for the n th term.

STEP 1 Write a system of equations: $a_n = a_1 r^{n-1}$

STEP 2 Solve the system of equations for r and a_1

STEP 3 Find a rule for a_n by substituting in a_1 and r

EXAMPLE 5 Find the sum of the geometric series. $\sum_{i=1}^{16} 4(3)^{i-1}$

STEP 1 Identify the 1st term: a_1 **STEP 2** Identify the common ratio: r

STEP 3 Write a rule for S_{16}

$$S_n = a_1 \left(\frac{1 - r^n}{1 - r} \right)$$

EXAMPLE 6 In 1990, the total box office revenue at US movie theaters was about \$5.02 billion. From 1990 through 2003, the total box office revenue increased by about 5.9% per year.

- a) Write a rule for the total box office revenue a_n (in billions) in terms of the year. Let $n=1$ represent 1990.

$$r = 1 + \underline{\hspace{2cm}} = \underline{\hspace{2cm}}$$

- b) What was the total box office revenue at US movie theaters for the entire period 1990-2003?