

## Algebra 1: 6.7 Geometric Sequences

A Geometric Sequence is a sequence where you multiply by the same number (could be a negative number) every time to get the next term.

Ex: 1, 5, 25, 125, 625

Pattern: multiplying by 5.

The # you multiply by to get the next terms is called the common Ratio. Abbreviated as "r"

Is the following sequence geometric? If so, what is the common ratio?

80, 40, 20, 10, ...

yes

$r = \frac{1}{2}$

because  $80 \cdot \frac{1}{2} = 40$        $20 \cdot \frac{1}{2} = 10$

$40 \cdot \frac{1}{2} = 20$

Ex: Find the **common ratio** of the following geometric sequence:

$$6, 2, \frac{2}{3}, \frac{2}{9}, \frac{2}{27}$$

1st term                      2nd term.

$$6 \cdot r = 2$$

common ratio

so solve  $\frac{6r}{6} = \frac{2}{6}$

$$r = \frac{2}{6} = \frac{1}{3}$$

Shortcut method to find the common ratio:

take any term and divide by the previous term.

Ex: Write the first 5 terms of a sequence that has a first term of -2 and a common ratio of -3.

so you start at -2.

# you multiply by to get the next term.

-2, 6, -18, 54, -162



multiply  
by -3

Explicit Formula for Geometric Sequences  
 (aka general rule or nth term rule or "equation"):

$$a_n = a_1 r^{n-1}$$

The only part you have to change is  $a_1$  and  $r$ . The rest stays the same for every general rule.

Ex: Write the general rule for the geometric sequence with a first term of -4 and a common ratio of -2. Then find the 8th term.

General Rule :  $a_n = -4(-2)^{n-1}$

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To find the 8th term, replace  $n$  with 8.

$$a_8 = -4(-2)^{8-1}$$

$$a_8 = 512$$

Homework

Pg 330

3-5, 19-20 (do not "graph"), 25-28