Math 3 **1.5 Geometric Sequences and Series** Unit 1 Day 5

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| **Geometric Sequence**an= arn-1an = nth term a = 1st term r = common ratio |

**Geometric Sequence:** Sequences of numbers that follow a pattern of multiplying a fixed number from one term to the next.

**Example 1:** Find the next four terms in the following geometric sequences.

1. 2, 6, 18, 54, …
2. 27, 9, 3, 1, …
3. 16, -8, 4, -2, 1, …

**Example 2:** Find the general equation of each geometric sequence.

1. 1, 2, 4, 8, 16, 32, …
2. 24, 12, 6, 3, 1.5, 0.75, …
3. 0.5, -1, 2, -4, 8, …

**Sum of Finite Geometric Series:** The sum Sn of a finite geometric series a1 + a1r + a1r2 + … a1rn-1, r≠1 is:

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| **Finite Geometric Series Sum** $S\_{n}=\frac{a\_{1}(1-r^{n})}{1-r}$a1 = the 1st term r = the common ratio n = number of terms |

**Example 1:** Find the first five terms of the sequence -6 + 18 – 54 + …

**Example 2:** Find the sum of the geometric sequence 5 + 10 + 20 + 40 + … + 2560

**You Try!** Find the sums of the following sequences.

1. First 20 terms of 2 + 4 + 6 + ….
2. 3 - 6 + 12 - .... – 96
3. First 15 terms of 
4. 1 + 1/3 + 1/9 + .... + 3 (1/3)12

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| **Infinite Geometric Series Sum** $S\_{n}=\frac{a\_{1}}{1-r}$a1 = the 1st term r = the common ratio |

**Infinite Geometric Series:** If an = arn-1 is a geometric sequence and  then the sum of the infinite sequence is:

\*Note: An infinite geometric series with |r|≥1 does not have a finite sum.

**Example 1:** Find the following sum. – 2 + 4 – 8 + 16 + …

**Example 2:** 24 + 12 + 6 + 3 + 1.5 + 0.75 + …

**Application:** How much is going to taxes? Suppose that we track a tax refund of $100. Each time an amount of money is spent, 8% goes towards taxes and the rest gets spent again. How much of the original $100 will go back to taxes?

**You Try!** Suppose a ball is dropped from one meter and rebounds to 95% of the height of the previous bounce. What is the total distance traveled by the ball when it comes to rest?