**Math 20-1 Chapter 1 Arithmetic and Geometric Sequences and Series Review**

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| **Key Ideas** | **Description or Example** |
| Sequences | * An ordered list of numbers where a mathematical pattern can be used to determine the next terms. * Example: 1, 5, 9, 13, 17... or 1000, 100, 10, 1... * *n* is the term position or the number of terms, *n* must be a natural number |
| Series | * The sum of all the terms of a finite sequence * Example: 5 + 10 + 15 + 20  1 + 0.5 + 0.25 + 0.125... |
| Arithmetic  Sequence | * A sequence that has a common difference, * Example: 2, 4, 6, 8, 10, 12, 14,... where d = 2 |
| Graph of an Arithmetic Sequence | * Always discrete since the *n* values or the term position must be natural numbers.     n  tn   * Related to a linear function *y* = m*x* + b where m = d and . * The slope of the graph represents the common difference of the general term of the sequence. * t1 = b + m , add the y-intercept to the slope to get the value of the first term of the sequence. |
| Arithmetic  Series | * The sum of an arithmetic sequence.   Use when you know the first term, last term, and the number of terms.  Use when you know the first term, the common difference, and the number of terms.  You may need to determine the number of terms by using . |
| Geometric  Sequence | * A sequence that has a common ratio. * Example: 3, 9, 27, 82, 243, 729, 2187... where *r* = 3     Graph is discrete, not continuous, and not linear. |
| Problem |  |
| Finite Geometric Series | A finite geometric series is the expression for the sum of the terms of a finite geometric sequence.  The **General formula** for the Sum of the first *n* terms  Known Values are: Known Values are:  t1, r and n t1, r and tn |
| Problem |  |
| Infinite Geometric Series | A geometric series that does not end or have a final term.  It may be **convergent** (sum approaches a value, there is a formula for this) or **divergent** (sum gets infinitely larger).  The series is convergent if the absolute value of r is a fraction or decimal less than one: |r|<1 , **-1 < r < 1**  The series is divergent if the absolute value of r is greater than one |r|>1, **-1 > r > 1** |
| Sum of an Infinite Geometric Series, only if it converges | You must know the value of the first term and the common ratio. |
| General or explicit formula | * The unique parameters are substituted into the formula. * The parameters are  and *r* for a geometric sequence or *d* for arithmetic sequence. * Example:  or |

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| **Vocabulary** | **Definition** |
| Common Difference  occurs in an arithmetic  sequence or series | * The difference between successive terms in an arithmetic sequence, which may be positive or negative. * Formula: |
| Common Ratio occurs in a geometric sequence or series | * The ratio of successive terms in a geometric sequence, which may be positive or negative. * Formula: |
| Finite Sequence | * A sequence that ends and has a final term. |
| Divergent | * Where the sum of the infinite geometric series continues to grow and not approach a finite number. There is no sum. * When |r|>1, |
| Convergent | * Where the sum of the infinite geometric series approaches a finite number. There is a sum. * When |r|<1, |

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| **Common Errors** | **Description** |
| Formulas | * Using the wrong formula such as using the general term formula instead of the sum formula for a series. |
| Sequences and Series | * Confusing sequences with series. Sequences are the list of all the terms where series are the sum of all the terms. |
| Divergent or Convergent | * Must know the difference |
| Discrete or Continuous | The *n* value refers to the number of terms or a specific term. The value of *n* must be a natural number making the graph of the sequence discrete. |