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| **Subject: Algebra II Unit: Four** | |
| **Unit Topic and Length:**  **SEQUENCES AND SERIES**  **(Three weeks)** | |
| **Common Core Learning Standards:**  **F-BF.2** Write arithmetic and geometric sequences both recursively and with an explicit formula, use them to model situations, and translate between the two forms  **F-IF.3** Recognize that sequences are functions, sometimes defined recursively, whose domain is a subset of the integers. For example, the Fibonacci sequence is defined recursively by f(0) = f(1) = 1, f(n+1) = f(n) + f(n-1) for n ≥ 1.  **F-BF.1** Write a function that describes a relationship between two quantities.  a. Determine an explicit expression, a recursive process, or steps for calculation from a context.  b. Combine standard function types using arithmetic operations. For example, build a function that models the temperature of a cooling body by adding a constant function to a decaying exponential, and relate these functions to the model  **A-SSE.4** Derive the formula for the sum of a finite geometric series (when the common ratio is not 1), and use the formula to solve problems. For example, calculate mortgage payments | |
| **Big Ideas/Enduring Understandings:**  Sequences and series can model many mathematical ideas and realistic situations.  Sequences help us to recognize and apply patterns to familiar and unfamiliar situations (predictions).  When does a pattern exists.  How we can see patterns in life, application of patterns beyond geometric/arithmetic sequences and series.  How we can determine the pattern and identify relevant elements of geometric/arithmetic sequences and series. | **Essential Questions:**  How do you tell the difference between an arithmetic and geometric?  How can different calculations with an arithmetic or geometric sequence be used in the real world?  Why do we write a recursive and explicit formulas for sequences?  Why would we need to find the sum of an infinite series? |

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| **Content:**  **Build a function that models a relationship between two quantities**  **Understand the concept of a function and use function notation**  **Write expressions in equivalent forms to solve problems** | Know and apply sigma notation.  **A2.N10**  Identify an arithmetic or geometric sequence and find the formula for its nth term.  **A2.A29**  Determine the common difference in an arithmetic sequence.  **A2.A30**  Determine the common ratio in a geometric sequence.  **A2.A31**  Determine a specified tem of an arithmetic or geometric sequence.  **A2.A32**  Specify terms of a sequence, given its recursive definition.  **A2.A33**  Represent the sum of a series, using sigma notation.  **A2.A34**  Determine the sum of the first n terms of an arithmetic or geometric series. Observe and explain patterns to formulate generalizations and conjectures.  **A2.A35**  Apply inductive reasoning in making and supporting mathematical conjectures. | **Days:**  **1**  **2**  **1**  **1**  **1**  **1**  **1**  **2**  **2** |
| **Assessment Evidence and Activities:**  Pre and Post Tests (formative assessment and assessments for evidence of growth)  Problem Solving Tasks and Activities  Quizzes  Questioning and Observations  Do Nows and Exit Slips  Class work and Homework | | |
| **Possible Support Strategies:**  Use of manipulatives  Word Walls and Individual Glossaries  Journals  Back Tracking Technique demonstrated for solving equations | | |
| **Formative Assessment:**  The assessments listed above will be used to identify students’ strengths and weaknesses.  There will be constant adjustments and fine tuning of the curriculum delivery based on this analysis. Sharing student work, sharing best practice and planning next steps will be an integral part of common planning meetings. | | |
| **Final Performance Based Task: See Attached** | | |
| **Extension:**  Differentiated column sheets for order of operations and evaluating like terms.  Table logic for adding and subtracting integers and polynomial expressions.  Differentiated column sheets for solving equations. | | |
| **Learning Plan & Activities:**  The learning plan will incorporate work shop style lessons which will allow for student centered learning. Group work will be incorporated into various concepts with a focus on students learning collaboratively. There will be an emphasis on technique to enable students to solve skills based questions. This will be supported with problem solving exercises for all content to give students a conceptual understanding of the material. | | |
| **Resources:**  Text book : Meaningful Math Algebra I Prentice Hall Mathematics Algebra I  Graphing calculators  Geometric Manipulatives, Sketchpad  Smart Board Demonstrations  Problem solving materials created by teachers | | |

Task One

1. Mr. Dogs wants the number of seats in the arena to be between 18 000 and 22 500. One ring of seats all the way around the rink is considered a row, and row 1 is considered to be the row closest to the ice. He wants the number of seats in each row to form an arithmetic sequence, increasing by the same number in each subsequent row. Your task is to decide on the total number of seats in the arena by designing a seating arrangement that has a reasonable number of rows by determining:
   1. The number of seats in the first row.
   2. The number of rows required.
   3. The number of seats by which each row increases.
   4. The number of seats in the last row.
   5. The total number of seats in the arena.
2. In his current arena, Mr. Dogs charges $6000 per season for seats in rows 1-10, $4000 for season seats in rows 11-20, $3000 for season seats in rows 21-30, and $2000 for season seats in rows 31-40. He thinks that a more fair way to decide on season ticket prices is to use a geometric sequence, and decrease the price in each subsequent row by the same factor based on the price of the row in front of it. For your proposal
   1. Determine a reasonable price per game for each seat in the first row.
   2. Determine the factor by which the cost of each seat per game will decrease in each subsequent row from row 1.
   3. Determine the price per game of each seat in the last row.

Main Performance Based Assessment

Name : \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Date : \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**THE STAIRCASE PROBLEM**

Our challenge is to find out how many ways you can climb a staircase with *n* number of stairs.

You have fairly long legs, which allow you option of taking the steps either one or two at a time. You can also use any combination of one and two steps for longer staircases.

Let’s get started. For a staircase with only one step there is only one way of climbing it. You take one step to the top. If there were two steps you could take one step at a time or you could take both steps in one stride.

Now let’s consider different length staircases. Can you fill in the table below with the number of possible ways of climbing each staircase and come up with a formula for a staircase of any length?

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| **Number of Steps** | **1** | **2** | **3** | **4** | **5** | **10** | ***N*** |
| **Number of Ways** |  |  |  |  |  |  |  |

Explain your sequence in words.

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