

*CC Algebra 2 - Regents Review*

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# Unit #5: Sequences and Series: Video 1/2

Video by Mr. Williamson  
Newfield Senior High School

Based on Kirk Weiler's  
emathinstruction lessons

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# Unit 5 Video Overview

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## Video 1:

- Video Overview
- Unit 5 Lesson Overview
- CCLS Associated with Unit 5
- Formulas
- Explicit vs Recursive Formulas
- Arithmetic vs Geometric Series
- Formulas for Arithmetic Sequences
- Formulas for Geometric Sequences
- Finding the  $n$ th Term

## Video 2:

- Finding Equations of Sequences Given Non-Consecutive Terms
- Summation Notation
- Arithmetic Series
- Geometric Series
- Defining a Series Using Summation Notation
- Mortgage Payments
- Summary

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# Unit 5: Lesson Overview

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- 5.1 Sequences
- 5.2 Arithmetic and Geometric Sequences
- 5.3 Summation Notation
- 5.4 Arithmetic Series
- 5.5 Geometric Series
- 5.6 Mortgage Payments

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# CCLS Associated with Unit 5

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- ❖ F.IF.3 - Recognize that sequences are functions, sometimes defined recursively, whose domain is a subset of the integers.
- ❖ 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.LE.2 - Construct linear and exponential functions, including arithmetic and geometric sequences, given a graph, a description of a relationship, or two input-output pairs (include reading these from a table). Tasks will involve solving multi-step problems by constructing linear and exponential functions.
- ❖ 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.*

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# Formulas

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- ❖ Arithmetic Sequence
- ❖ Arithmetic Series
- ❖ Geometric Sequence
- ❖ Geometric Series

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# Explicit vs Recursive Formulas

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- ❖ Domains for Sequences
- ❖ **Explicit Formula** - Provides a quick way to determine the  $n$ th term of a sequence of numbers.
- ❖ **Recursive Formula** - Formula that produces a sequence of numbers, based on previous term(s)

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# Arithmetic vs Geometric Sequences

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- ❖ **Arithmetic Sequence** - A sequence of numbers formed by adding the same value to each term to produce the next term.
  - ❖ Common Difference:
- ❖ **Geometric Sequence** - A sequence of numbers formed by multiplying the same value to each term to produce the next term.
  - ❖ Common Ratio:

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# Formulas for Arithmetic Sequences

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- ❖ Explicit Formulas - Linear Functions!

- ❖ Recursive Formulas



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# Formulas for Geometric Sequences

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- ❖ Explicit Formulas - Exponential Functions!
- ❖ Recursive Formulas

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# Finding the $n$ th Term

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- ❖ Arithmetic Sequence

- ❖ Find the 50th term of the arithmetic sequence 3, 9, 15, 21, ...

- ❖ Geometric Sequence

- ❖ Find the 8th term of the geometric sequence 64, 96, 144, ...

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# End of Video 1

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- ❖ In the second review video, I will go over:
  - Finding Equations of Sequences Given Non-Consecutive Terms
  - Summation Notation
  - Arithmetic Series
  - Geometric Series
  - Defining a Series Using Summation Notation
  - Mortgage Payments
  - Summary

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# Unit #5: Sequences and Series: Video 2/2

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# Review from Video 1

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- ❖ Just a quick recall of what we reviewed in the first video:
  - Video Overview
  - Unit 5 Lesson Overview
  - CCLS Associated with Unit 5
  - Formulas
  - Explicit vs Recursive Formulas
  - Arithmetic vs Geometric Series
  - Formulas for Arithmetic Sequences
  - Formulas for Geometric Sequences
  - Finding the  $n$ th Term

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# Review Material in This Video

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- ❖ In this video review, I will go over:
  - Finding Equations of Sequences Given Non-Consecutive Terms
  - Summation Notation
  - Arithmetic Series
  - Geometric Series
  - Defining a Series Using Summation Notation
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# Finding Equations of Sequences Given Non-Consecutive Terms

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## ❖ Arithmetic Sequence

- ❖ The 6th term is 22 and the 10th term is 38.

## ❖ Geometric Sequence

- ❖ The 3rd term is 1600 and the 7th term is 655.36.

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# Summation Notation

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$$\sum_{k=-2}^3 \frac{4}{k^2 + 1}$$



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# Arithmetic Series

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- ❖ **Series** - The sum of a sequence of numbers.
- ❖ Formula for finding the sum of an Arithmetic Sequence:
  - ❖ Find the sum of the first 20 terms of the sequence  $-7, -5, -3, \dots$

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# Geometric Series

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- ❖ Formula for finding the sum of a Geometric Sequence:
- ❖ Find the sum of the first 7 terms of the sequence  $16/2500, 2/125, 1/25, 1/10, \dots$

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# Defining a Series Using Summation Notation

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- ❖ Arithmetic Series

- ❖  $-5 - 2 + 1 + 4 + \dots + 43$

- ❖ Geometric Series

- ❖  $3 + 6 + 12 + 24 + \dots + 768$

- ❖ \*Patterned Sequence\*

- ❖  $2 + 5 + 10 + 17 + \dots + 101$

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# Mortgage Payments

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- ❖ The formula you need to use will most likely be given to you within the problem.
  - ❖ Formula learned in class to calculate the amount owed on a mortgage:
  - ❖ Formula used to calculate the monthly payment:
  - ❖ Formula used to calculate the number of payments:

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# Summary of Most Important Information

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- ❖ Students should be able to:
  - ❖ Understand the difference between an arithmetic and a geometric sequence.
  - ❖ Apply, create, and interpret the formula for a sequence.
  - ❖ Understand and create an explicit formula or a recursive formula for an arithmetic or geometric sequence.
  - ❖ Find the sum of a sequence of numbers given the sum written in summation notation.
  - ❖ Calculate an arithmetic series or a geometric series.
  - ❖ Apply a given formula to find the amount owed on a mortgage, including the monthly minimum payment or the number of payments needed.