# Unpacked South Dakota State Mathematics Standards

***Purpose:*** *In order for students to have the best chance of success, standards, assessment, curriculum resources, and instruction must be aligned in focus, coherence, and rigor. Unpacked standards documents are intended to help align instruction to the focus, coherence, and rigor of the South Dakota State Mathematics Standards. The standards have been organized in clusters as they are not so much built from topics, but rather woven out of progressions. Not all content in a given grade is emphasized equally in the mathematics standards. Some clusters require greater emphasis than others based on the depth of the ideas, the time that they take to master, and/or their importance to future mathematics or the demands of college and career readiness. To say that some things have greater emphasis is not to say that anything in the standards can safely be neglected in instruction. Neglecting standards will leave gaps in student skill and understanding and may leave students unprepared for the challenges of a later grade.*

| **Domain: Precalculus** | | **Grade Level: 4th Year** |
|---|---|---|
| **HS4.PC.S.A Cluster: Define sequences.**<br>Students will work with both arithmetic and geometric sequences and series. | | |
| **This is a MAJOR cluster.** *Students should spend the large majority of their time (65-85%) on the major work of the grade. Supporting work and, where appropriate, additional work should be connected to and engage students in the major work of the grade.*<br><br>**PC.S.1** Define arithmetic and geometric sequences and series. Model and solve word problems involving applications of sequences and series, interpret the solutions and determine whether the solutions are reasonable. | | |
| **Aspects of Rigor of Student Learning:** (Conceptual, Procedural, and/or Application) | | |
| **PC.S.1** Define arithmetic and geometric sequences and series. Model and solve word problems involving applications of sequences and series, interpret the solutions and determine whether the solutions are reasonable. | | |
| ***Conceptual Understanding*** | ***Procedural Fluency*** | ***Application*** |
| Students should be able to derive the formula for the nth term of an arithmetic sequence and the sum of a finite arithmetic series using vocabulary such as initial term and common difference.<br><br>Students should be able to derive the formula for the nth term of a geometric sequence and the sum of a finite geometric series using vocabulary such as initial term and common ratio. | Students recognize, write, and find nth terms of arithmetic and geometric sequences.<br><br>Students find sums of finite arithmetic and geometric sequences | Students use arithmetic and geometric sequences to model real-life problems such as figuring out the best salary option when given a choice. |
| **Enacting the Mathematical Practices - Evidence of Students Engaging in the Practices** | | |

1. **Make sense of problems and persevere in solving them.**
   - Students will persevere to find a generalization for a pattern of both arithmetic and geometric sequences.
2. **Reason abstractly and quantitatively.**
   - Students will find a general expression to describe the pattern for an arithmetic or geometric series.
3. **Construct viable arguments and critique the reasoning of others.**
4. **Model with mathematics.**
5. **Use appropriate tools strategically.**
6. **Attend to precision.**
7. **Look for and make use of structure.**

8. **Look for and express regularity in repeated reasoning.**

**Vertical and Horizontal Coherence and Learning Progressions**

| ***Previous Learning Connections*** | ***Current Learning Connections*** | ***Future Learning Connections*** |
|---|---|---|
| In Algebra I, students have written arithmetic and geometric sequences both recursively and explicitly. Students have also used arithmetic and geometric sequences to model situations. | Students will work with both arithmetic and geometric sequences and series. | This is an important concept for Calculus when learning about Riemann sums, series, and sequences. |

***Vocabulary (key terms and definitions)***

- Arithmetic Sequence
- Initial Term
- Common Difference
- Geometric Sequence
- Common Ratio
- Series

***Relevance, Explanations, and Examples:***

Example:
You have been offered two jobs. Job A has a beginning salary of $41,000 with an annual increase of $1100. Job B has a beginning salary of $39,500 with a 3.5% increase in pay each year. How much would you be making in both jobs in the 7th year of employment? If you are able to save all of your money each year, how many years would you have to work in order to accumulate the same amount of money?