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.*

<table>
<tr><td colspan="2">Domain: Functions</td><td>Grade Level: 4th Year</td></tr>
<tr><td colspan="3">HS4.F.BF.A Cluster: Build a function that models a relationship between two quantities.
Students learn more about functions, relationships between functions, domain, range, and building new functions using composition.</td></tr>
<tr><td colspan="3">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.

F.BF.1 Write a function that describes a relationship between two quantities.
c. Compose functions in context.</td></tr>
<tr><td colspan="3">Aspects of Rigor of Student Learning: (Conceptual, Procedural, and/or Application)</td></tr>
<tr><td colspan="3">F.BF.1 Write a function that describes a relationship between two quantities.
c. Compose functions in context..</td></tr>
<tr><td>Conceptual Understanding</td><td>Procedural Fluency</td><td>Application</td></tr>
<tr><td>Students should be able to explain the meaning of f(g(x)). This includes defining the input/output and domain/range of the composite function.</td><td></td><td>Students should use composition to model contexts in which one function that depends on another function is used to build a new function.</td></tr>
<tr><td colspan="3">Enacting the Mathematical Practices - Evidence of Students Engaging in the Practices</td></tr>
<tr><td colspan="3">1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of others.
4. Model with mathematics.
● Students will use the composition of functions to model real world situations.
5. Use appropriate tools strategically.
6. Attend to precision.
7. Look for and make use of structure.
● Students might notice the connection between composite functions and transformation of functions.
8. Look for and express regularity in repeated reasoning.
● Students use the concept of repeated reasoning when evaluating the composition of functions.</td></tr>
<tr><td colspan="3">Vertical and Horizontal Coherence and Learning Progressions</td></tr>
<tr><td>Previous Learning Connections</td><td>Current Learning Connections</td><td>Future Learning Connections</td></tr>
</table>

In prior Algebra courses, students have learned the definition of a function and the correct application of function notation.	Students continue to learn more about functions, relationships between functions, domain, range, and building new functions using various tools, such as composition, inverses, reciprocals, etc.	In Calculus, students will use the composition of functions to explore transformations, to verify inverses, and to build more complex functions.
Vocabulary (key terms and definitions)		
● Composite Function		
Relevance, Explanations, and Examples:		
If T(y) is the temperature in the atmosphere as a function of height, and h(t) is the height of a weather balloon as a function of time, then T(h(t)) is the temperature at the location of the weather balloon as a function of time. (Example taken from Common Core Math Standards.)		