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: Operations and Algebraic Thinking	**Grade Level: 5**

5.OA.B Cluster: Analyze patterns and relationships.

Students extend pattern work to form ordered pairs, graph the corresponding pairs in quadrant one of the coordinate plane, and interpret the visual patterns on the graph.

****This is an ADDITIONAL 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.*

5.OA.3 Generate two numerical patterns using two given rules. Form ordered pairs consisting of corresponding terms from the two patterns, and graph the ordered pairs on a coordinate plane. Identify the relationship between the two patterns. For example, given the rule "Add 3" and the starting number 0, and given the rule "Add 6" and the starting number 0, generate terms in the resulting sequences, and observe that the terms in one sequence are twice the corresponding terms in the other sequence. Explain informally why this is so.

Aspects of Rigor for Student Learning: (Conceptual, Procedural, and/or Application)

Conceptual Understanding	***Procedural Fluency***	***Application***
Identify the relationship between two patterns.	Given a starting point, apply two math rules to that number. Graph data on a coordinate plane (positive numbers only).	

Enacting the Mathematical Practices - Evidence of Students Engaging in the Practices

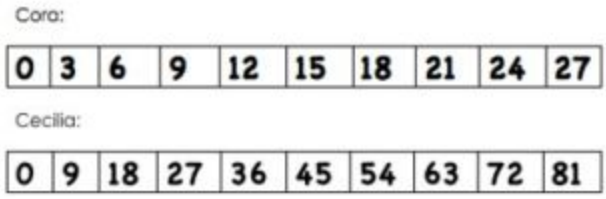
1. **Make sense of problems and persevere in solving them.**
   - Student use an *add x rule* as a context for finding and extending patterns [1]
2. **Reason abstractly and quantitatively.**
   - Students reason to find similarities and determine rules to identify numerical and geometric patterns and describe patterns they find in problems and in numbers and in geometric figures.
3. **Construct viable arguments and critique the reasoning of others.**
   - Students compare descriptions and look for counterexamples, ordered pairs that do not fit the rule.
4. **Model with mathematics.**
   - Students use graph models to help extend and describe shape patterns.
5. **Use appropriate tools strategically.**
   - Students use tools (grid paper, T chart) to help extend and describe shape patterns.
6. **Attend to precision.**
   - When given a rule, students develop lists of numbers and describe any patterns in the list using appropriate vocabulary.
7. **Look for and make use of structure.**
   - When finding patterns, students are developing a deeper understanding of all 4 operations and beginning to make generalizations by constructing rules for their patterns.
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***
Students will extend their 4th grade pattern work where they followed one rule and then determined what happened in that pattern. **(4.OA.5)**	Students will graph points on a coordinate plane. **(5.G.1, 5.G.2)**	Students apply the use of variables to represent two quantities in real world problems. Students will write equations to represent the dependent and independent variables. **(6.EE.9)** Students will describe the relationship in ratio rates to solve real world problems. **(6.RP.2, 6.RP.3)**

Vocabulary *(Key Terms Used by Teachers and Students in this Cluster):*

ordered pair
coordinate plane
X-axis
Y-axis
graph (verb - to graph data as opposed to reading a bar graph)

Relevance, Explanations, and Examples:



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(3,9)
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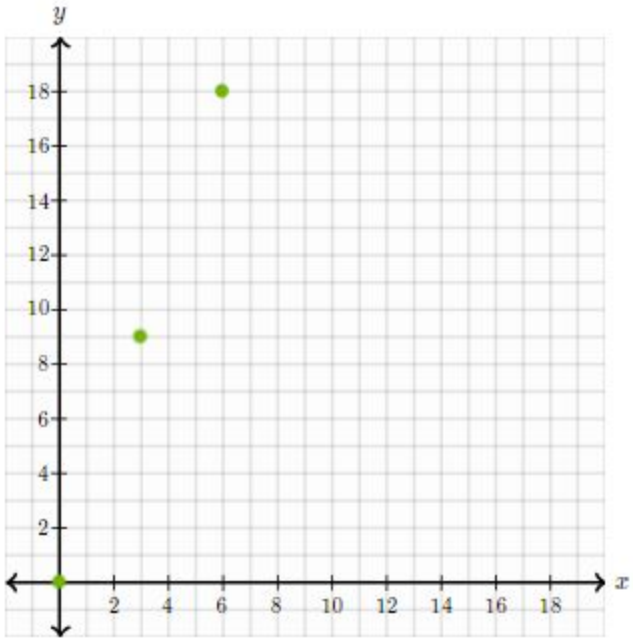

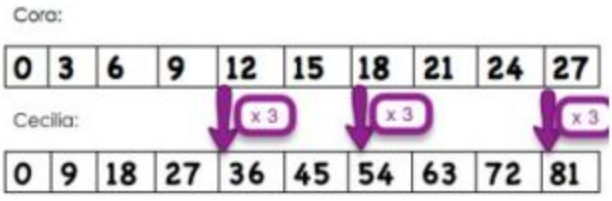

https://achievethecore.org/coherence-map/5/24/248/248

Achievement Level Descriptors	
Cluster: Analyze patterns and relationships.	
Concepts and Procedures	***Level 1:***. Students should be able to generate two numerical patterns using two given rules involving addition, subtraction, or multiplication.
	Level 2: Students should be able to generate two numerical patterns using two given rules involving all operations. When working with two whole number numerical patterns, they should be able to graph the corresponding whole number ordered pairs on the coordinate plane.
	Level 3: Students should be able to compare and analyze two related numerical patterns and explain the relationship within sequences of ordered pairs, and they should be able to graph the ordered pairs on the coordinate plane.
	Level 4: Students should be able to compare two related numerical patterns and explain the relationship within sequences of ordered pairs that are rational numbers.