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: Statistics and Probability</td><td>Grade Level: Algebra 2</td></tr>
<tr><td colspan="3">A2.S.IC.A Cluster: Understand and evaluate random processes underlying statistical experiments.

Learners use data from a random sample to draw inferences about a phenomena or population.</td></tr>
<tr><td colspan="3">**This is a SUPPORTING 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.

A2.S.IC.A.1 Understand statistics as a process for making inferences about population parameters based on a random sample from that population.

A2.S.IC.A.2 Determine whether a specified model is consistent with results from a given data-generating process.</td></tr>
<tr><td colspan="3">Aspects of Rigor for Students: (Conceptual, Procedural, and/or Application)</td></tr>
<tr><td colspan="3">A2.S.IC.A.1 Understand statistics as a process for making inferences about population parameters based on a random sample from that population.</td></tr>
<tr><td>Conceptual Understanding</td><td>Procedural Fluency</td><td>Application</td></tr>
<tr><td>Learners understand the difference between bias and unbiased sampling.

Learners understand that the statistical measures of a random sample should be roughly the same as the statistical measures of the population.</td><td></td><td>Learners make inferences about the population based on a random sample.</td></tr>
<tr><td colspan="3">A2.S.IC.A.2 Determine whether a specified model is consistent with results from a given data-generating process.</td></tr>
<tr><td>Conceptual Understanding</td><td>Procedural Fluency</td><td>Application</td></tr>
<tr><td>Learners should be able to understand the difference between a rare event and an ordinary event.</td><td>Learners use tools to generate data.

Examples: spinner, die, coin, cards, computer simulation, etc.</td><td>Learners make inferences about experiments using the data.</td></tr>
</table>

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

1. **Make sense of problems and persevere in solving them.**
2. **Reason abstractly and quantitatively.**
   - Students will be able to propose sampling techniques and explore their nature to produce bias and unbiased results.
3. **Construct viable arguments and critique the reasoning of others.**
   - Students will be able to defend their inferences made from given data.
4. **Model with mathematics.**
   - Students will be able to explore natural variability in different contexts using models to describe the data generating process.
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.**
   - Students will be able to determine if events are consistent or inconsistent through simulation.

Vertical and Horizontal Coherence and Learning Progressions

Previous Learning Connections	***Current Learning Connections***	***Future Learning Connections***
In previous math courses: *Students have learned to determine mean, median, mode, range, IQR, minimum, maximum.* *Students have learned how to graph data distributions (i.e. histograms, box plots, etc.).*	*Students are able to interpret and make inferences about populations based upon sample quantitative data.*	*Students will build on this knowledge in subsequent statistics course (AP or college level).*

Vocabulary (key terms and definitions)

- Bias
- Event (rare v. ordinary)
- Population
- Population parameter
- Random sample
- Unbiased
- Variability

Relevance, Explanations, and Examples:

- Teachers may need to review how to represent data distributions (either by hand or with technology)

Achievement Level Descriptors

Cluster: Understand and evaluate random processes underlying statistical experiments.

Concepts and Procedures	***Level 1:*** Students should be able to apply mathematics to solve familiar problems arising in everyday life, society, and the workplace by identifying important quantities and by beginning to develop a model.
	Level 2: Students should be able to apply mathematics to propose solutions by identifying important quantities, locating missing information from relevant external resources, beginning to construct chains of reasoning to connect with a model, producing partial justification and interpretations, and beginning to

	state logical assumptions.
	Level 3: Students should be able to apply mathematics to solve unfamiliar problems arising in everyday life, society, and the workplace by identifying important quantities and mapping, displaying, explaining, or applying their relationship and by locating missing information from relevant external resources. They should be able to construct chains of reasoning to justify a model used, produce justification of interpretations, state logical assumptions, and compare and contrast multiple plausible solutions
	Level 4: Students should be able to apply mathematics to solve unfamiliar problems by constructing chains of reasoning to analyze a model, producing and analyzing justification of interpretations, stating logical assumptions, and constructing and comparing/contrasting multiple plausible solutions and approaches.