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: Statistics and Probability		**Grade Level: Algebra 2**
A2.S.ID.A Cluster: Summarize, represent and interpret data on a single count or measurement variable. *This cluster emphasizes the use of the normal distribution to obtain the probability or likelihood of certain events.*		
****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.ID.A.4 Use the mean and standard deviation of a data set to fit it to a normal distribution and to estimate population percentages. Recognize that there are data sets for which such a procedure is not appropriate. Use calculators, spreadsheets, and tables to estimate areas under the normal curve.**		
Aspects of Rigor for Students: (Conceptual, Procedural, and/or Application)		
A2.S.ID.A.4 Use the mean and standard deviation of a data set to fit it to a normal distribution and to estimate population percentages. Recognize that there are data sets for which such a procedure is not appropriate. Use calculators, spreadsheets, and tables to estimate areas under the normal curve.		
Conceptual Understanding	***Procedural Fluency***	***Application***
Learners understand various data distributions: when the data is normal, mean and standard deviation are used to represent the data; when data is skewed, median and Interquartile Range (IQR) are used to represent the data. Learners understand that normal distribution can be used to estimate population percentages.	Learners will be able to: ● Estimate areas under a normal curve. ● Calculate mean, median (Q2), standard deviation, IQR (Q1 & Q3). ● Calculate z- score based on mean and standard deviation. ● Use the empirical rule to understand area under the distribution	Learners apply this knowledge to estimate population percentages. Learners use real world data to determine distributions.

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.**
   - Based on the structure of the data, students are able to express relationships between different measures by finding the measures of center and dispersion using quantitative reasoning.
3. **Construct viable arguments and critique the reasoning of others.**
   - Students are able to justify their reason for using a specific measure of center based on the data dispersion.
4. **Model with mathematics.**
5. **Use appropriate tools strategically.**

6. **Attend to precision.**
7. **Look for and make use of structure.**
    - Students will learn to see visually the relationship between probability of a population and a normal curve.
8. **Look for and express regularity in repeated reasoning.**
    - Students are able to determine the effects of skewed data sets and extreme values on their measures of center.

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 (ie - histograms, box plots, etc).*	*Students can use this information to make inferences and justify conclusions from sample survey, experiments and observational studies.*	*Students will build on this knowledge in subsequent statistics course (AP or college level).*
Vocabulary (key terms and definitions)		
• Empirical rule • Five number summary • Interquartile range • Mean • Median	• Normal distribution • Skewed distribution • Standard deviation • Z-score	
Relevance, Explanations, and Examples:		
Achievement Level Descriptors		
Cluster: Summarize, represent and interpret data on a single count or measurement variable.		
Concepts and Procedures	***Level 1:*** Students should be able to describe a data set in terms of center and spread and represent data graphically.	
	Level 2: Students should be able to describe and use appropriate statistics to interpret and explain differences in shape, center, and spread of two or more different data sets, including box plots, histograms, or dot plots, representing familiar contexts. They should be able to identify the mean and the median and select the appropriate one for representing the center of the data for data sets.	
	Level 3: Students should be able to use appropriate statistics to interpret, explain, and summarize differences in shape, center, and spread of two or more different data sets of varying complexity and levels of familiarity, including the effect of outliers. They should be able to select the appropriate choice of spread as interquartile range or standard deviation based on the selection of center and use the standard deviation of a data set to fit to a normal distribution.	
	Level 4: Students should be able to interpret data to explain why a data	

	value is an outlier and interpret and explain differences in the approximate areas under the normal curve of two or more data sets.