

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: 6
6.SP.A Cluster: Develop understanding of statistical variability.		
Students will develop an understanding of statistical thinking. They will learn how to write statistical questions used to survey and collect data. They will study measures of center and variability with newly learned knowledge of mean, median, mode, and range. Students will discover that different ways to measure center produce different values and that interpreting measures of center for the same data develops the understanding of how each measure can change how the data gets interpreted.		
<p>**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.</p> <p>6.SP.1 Recognize a statistical question as one that anticipates variability in the data related to the question and accounts for it in the answers.</p> <p>6.SP.2 Understand that a set of data collected to answer a statistical question has a distribution which can be described by its center, spread, and overall shape.</p> <p>6.SP.3 Recognize that a measure of center (mean and/or median) for a numerical data set summarizes all of its values with a single number, while a measure of variation (such as mean absolute deviation and/or range) summarizes data points' distances from the mean or each other.</p>		
Aspects of Rigor for Student Learning: (Conceptual, Procedural, and/or Application)		
Conceptual Understanding	Procedural Fluency	Application
Understand the difference between a statistical and a non-statistical question where a statistical question would be one that you would have in a survey and have a variety of answers. Example: How many people are in your family? vs. How many inches in a foot? (6.SP.1)		
Understand that data can be interpreted using three different measures of center: mean, median, mode. (6.SP.2) Understand that data can be summarized by talking about spread (range) or overall shape. (6.SP.2)	Calculate the mean, median, mode and range of a set of data. (6.SP.2)	

Understand that data distribution is described using peaks, clusters, gaps, outliers, symmetry and skews. (6.SP.2)		
Understand that the value of mean and/or median is a single quantity that describes the data set. (6.SP.3)		
Understand that range and mean absolute deviation are measures of variation. (6.SP.3)		

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

- 1. Make sense of problems and persevere in solving them.**
 - Make sense of practical problems by turning them into statistical investigations.
- 2. Reason abstractly and quantitatively.**
 - Examine patterns in data and draw conclusions from those patterns.
- 3. Construct viable arguments and critique the reasoning of others.**
 - Construct arguments using verbal or written explanations for models, graphs, tables and other data displays.
 - Students write and share their own statistical questions that can be used to survey and collect data from classmates. They explain their thinking to others and respond to others' thinking.
- 4. Model with mathematics.**
 - Use measures of center and variability and data displays to draw inferences about and make comparisons between data sets.
 - Students choose the most appropriate format for displaying data.
- 5. Use appropriate tools strategically.**
- 6. Attend to precision.**
 - Students communicate precisely with others and use clear mathematical language when describing and explaining the connections between different representations of data sets.
 - Students use mathematical language when summarizing, describing and reading data from graphs generated by students.
- 7. Look for and make use of structure.**
- 8. Look for and express regularity in repeated reasoning.**

Vertical and Horizontal Coherence and Learning Progressions

<i>Previous Learning Connections</i>	<i>Current Learning Connections</i>	<i>Future Learning Connections</i>
In Grade 5, learners made line plots to display a data set of measures in fractions of a unit.	<p>Mean, median, mode and range are new concepts to 6th grade students.</p> <p>Students will create dot plots, histograms and box plots. They will draw inferences and make comparisons between them.</p> <p>Mastery includes finding mean, median, mode and interquartile range.</p>	<p>In Grade 7, learners build on their understanding of interpreting information about a population by using population samples.</p> <p>In Grade 7, learners begin to look at two separate data sets to make comparisons.</p> <p>In high school, learners interpret differences in shape, center, and spread in the context of the data sets, accounting for possible effects of extreme data points (outliers).</p>

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

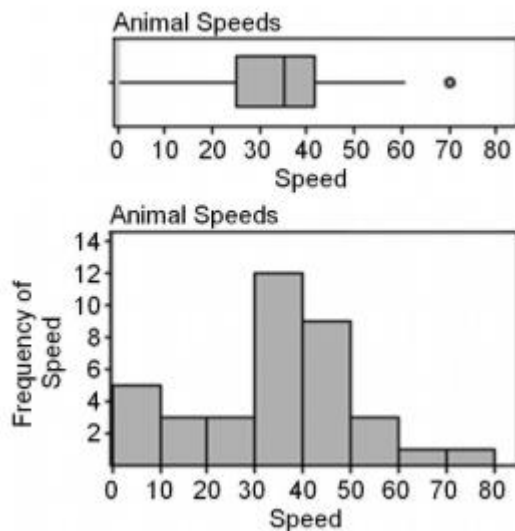
- Box Plot
- Categorical Data
- Data
- Dot Plot
- Histogram
- Interquartile Range
- Mean
- Mean Absolute Deviation
- Measures of Center
- Median
- Mode
- Range
- Sample
- Sample Space
- Statistics
- Statistical Question
- Variability

Relevance, Explanations, and Examples:

In Grade 6, a basis for statistics is built with the foundation of measures of center and measures of variability. Learners will represent data sets through different models such as box plots, histograms, and dot plots. Basic interpretation of the models is done in Grade 6. For the most part, these standards are not picked up again until high school mathematics.

Example of a box plot and a histogram with the same data set:

Box plot and histogram of 37 animal speeds



Achievement Level Descriptors

Cluster: Develop understanding of statistical variability.

Concepts and Procedures

Level 1: Students should be able to identify questions that lead to variable responses posed in familiar contexts and recognize that such questions are statistical questions.

Level 2: Students should be able to recognize that questions that lead to variable responses are statistical questions and vice versa, and they should relate the concept of varying responses to the notion of a range of possible responses. They should develop an understanding that the responses to a statistical question will have a representative center and a given set of numerical data. They should be able to identify a reasonable measure of central tendency with respect to a familiar context.

Threshold: The student who just enters Level 2 should be able to:

- Understand that questions that lead to variable responses are statistical questions and vice versa.
- Identify a reasonable measure of central tendency for a given set of numerical data.

- Find mean and median.

Level 3: Students should be able to pose statistical questions and understand that the responses to a statistical question have a distribution described by its center, spread, and overall shape. They should also understand that a measure of center summarizes all of its values with a single number, while a measure of variation describes how its values vary with a single number. They should be able to identify a reasonable center and spread with respect to a context.

Threshold: The student who just enters Level 3 should be able to:

- Identify a reasonable center and spread for a given context and understand how this relates to the overall shape of the data distribution.
- Understand that a measure of center summarizes all of its values with a single number.
- Summarize or display data in box plots.
- Find the interquartile range
- Use range and measures of center to describe the shape of the data distribution as it relates to a familiar context.
- Pose statistical questions

Level 4: Students should be able to justify the reasonableness of their identified center and spread with respect to an unfamiliar context. They should be able to create or complete a data set with given measures (e.g., mean, median, mode, interquartile range).

Threshold: The student who just enters Level 4 should be able to:

- Predict effects on mean and median given a change in data points.
- Complete a data set with given measures (e.g., mean, median, mode, interquartile range).