

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: 4th Year
HS4.S.CP.A Cluster: Use the rules of probability to compute probabilities of compound events in a uniform probability model. Use permutations and combinations to compute probabilities of compound events and solve problems.		
This is a MAJOR cluster for a Probability and Statistics. <i>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.</i>		
S.CP.9. Use permutations and combinations to compute probabilities of compound events and solve problems.		
Aspects of Rigor for Student Learning: (Conceptual, Procedural, and/or Application)		
S.CP.9 Use permutations and combinations to compute probabilities of compound events and solve problems.		
Conceptual Understanding	Procedural Fluency	Application
Students identify if a problem can be approached using a permutation or a combination. Students understand that order of items matter in permutations, and that in combinations groups of items are represented, and order of items doesn't matter.	Students use permutations and combinations to solve counting problems.	Students apply permutation or combination techniques to real-world problems.
Enacting the Mathematical Practices - Evidence of Students Engaging in the Practices		
<ol style="list-style-type: none"> 1. Make sense of problems and persevere in solving them. 2. Reason abstractly and quantitatively. <ul style="list-style-type: none"> • Students determine whether order is important or not. 3. Construct viable arguments and critique the reasoning of others. 4. Model with mathematics. <ul style="list-style-type: none"> • Students will model real-life situations using tree diagrams and other tools. 5. Use appropriate tools strategically. 6. Attend to precision. <ul style="list-style-type: none"> • Students check answers to make sure solutions make sense. 7. Look for and make use of structure. 8. Look for and express regularity in repeated reasoning. <ul style="list-style-type: none"> • Students using permutations and combinations to solve problems will have the chance to look for and express regularity in repeated reasoning by using the Fundamental Counting Principle to generalize patterns for sample spaces. 		

Vertical and Horizontal Coherence and Learning Progressions		
<i>Previous Learning Connections</i>	<i>Current Learning Connections</i>	<i>Future Learning Connections</i>
In seventh grade, students use the idea of the Fundamental Counting Principle to find the total number of outcomes for an event. They also find the probability of an event occurring.	<p>Students will connect the use of permutations and combinations to compound events, expected values and evaluating the outcomes of decisions.</p> <p>Students can connect finding the coefficients for the Binomial Theorem with combinations.</p>	A solid statistical foundation including the concepts of permutations and combinations will allow students to be successful in a statistics class or graduate work in college.
<i>Vocabulary (key terms and definitions)</i>		
<ul style="list-style-type: none"> ● Permutation ● Combination ● Fundamental Counting Principle ● Binomial Theorem 		
<i>Relevance, Explanations, and Examples:</i>		
<p>There are 12 people on the standards committee. Three people need to be chosen as officers, president, vice-president, and treasurer. How many different ways can these offices be filled? How would that answer change if the three people are on a leadership committee without rank or titles?</p>		