



Bridging for Math Strength Resources

Standards of Learning Curriculum Framework

Standard of Learning (SOL) 3.14 Investigate and describe the concept of probability as a measurement of chance and list possible outcomes for a single event.



Student Strengths	Bridging Concepts	Standard of Learning
Students have had informal activities, to introduce probability, such as dropping a two-colored counter, using a multicolored or numbered spinner, or rolling random number cubes. Results may have been recorded using tables, charts, and tally marks. Students also have practice predicting which of two events is more or less likely to occur if an experiment is repeated.	Students can predict, record, and reason about the outcomes of probability games and activities in which they participate.	Students can investigate and describe the concept of probability as a measurement of chance and list possible outcomes for a single event.

Understanding the Learning Trajectory

Big Ideas:

- A spirit of investigation and experimentation should permeate probability instruction, where students are actively engaged in explorations and have opportunities to use manipulatives. (VDOE Grade 3 Curriculum Framework)
- Chance has no memory. The outcome for one trial of a simple experiment has no impact on the outcome of future trials. (Van de Walle, 2018)
- When a probability experiment has very few trials, the results can be misleading. The more times an experiment is done, the closer the experimental probability comes to the theoretical probability (e.g., a coin lands heads up half of the time). (VDOE Grade 3 Curriculum Framework)
- The likelihood of a future event occurring can be determined along a continuum from impossible to certain. (Van de Walle, 2018)

Formative Assessment:

- VDOE Just in time Quick Check SOL 3.14 [PDF](#) / [Desmos](#)

Important Assessment Look Fors:

- The student is able to describe what makes an outcome unlikely but not impossible.
- The student is able to describe what makes an outcome impossible.
- The student demonstrates that they understand that the size of the sections dictate the likelihood that the arrow could land on a particular number.
- The student is able to accurately describe the probability of a particular outcome using the terms: impossible, unlikely, or certain.

Purposeful Questions:

- What is probability?
- How can we describe the degree of likelihood of an event occurring?
- What are some ways that we can organize all of the possible outcomes of an experiment?
- What are the possible outcomes of tossing a two-colored counter (or spinning a spinner or rolling a random number cube)?
- What is the probability of getting a certain color (or number)?
- What is likely to happen today? Certain? Impossible?
- How is tossing a coin similar to tossing a two-colored-counter? How are they different?
- How could you design an experiment and make a particular outcome certain (impossible, likely, unlikely, equally likely)?

Bridging Activity to Support Standard	Instructional Tips
Routine Would You Rather? Scoreboard Strategy	Would you Rather? is a routine that provides students with two situations to select from. There are no right or wrong answers as long as the students' reasoning is mathematically correct. Sample probability questions to ask: • What would be an impossible score for someone to get if they used the round target board? How do you know? • What would be an impossible score for someone to get if they used the square target board? How do you know? • Which board should you choose if you want to be certain to get a score over 100?
Rich Tasks What's in the Bag Henrico Public Schools	In the What's in the Bag task, students are given a series of clues to help them determine the number of each color cube that they should put into a bag to make each probability statement true. Students will explain their thinking using pictures, words and symbols. Manipulatives such snap cubes will help to support students' thinking as they work to complete this task. Encourage students to fully explain their thinking using manipulatives, symbols, pictures and words. Questions to ask during the task: • What is the total number of cubes in the bag? • How can we determine if a certain color is impossible? • How can we determine if a certain color is likely or unlikely? • How can we determine if a certain color is equally likely?
Likely and Unlikely Henrico Public Schools	In the Likely and Unlikely task, students are given a series of clues to create a spinner that matches several probability statements. Encourage students to fully explain their thinking

	using symbols, pictures and words. Questions to ask during the task: • How many spaces on the spinner would there need to be to make a certain number likely to spin? How do you know? • How many spaces on the spinner would there need to be to make a certain number unlikely to spin? How do you know?
Games Stop or Dare Tricky Track	Students take turns turning over cards and adding them up to reach a target number. Since some cards have students lose a turn, students benefit from implementing their knowledge of probability to strategize how to increase the chance of winning. In this game, students roll two dice and add the total. The row with the number for the total gets one counter. Students continue to see which row is filled up first (numbers 1-12) and are encouraged to use their knowledge of probability and addition to predict the winner.

Other Resources:

- VDOE Mathematics Instructional Plans (MIPS)
 - [3.14 - Two-Color-Counter Toss](#) (Word) / [PDF Version](#)
 - [3.14 - Probability Boxes](#) (Word) / [PDF Version](#)
- [VDOE Word Wall Cards: Grade 3](#) (Word) and [\(PDF\)](#)
- Virtual Manipulatives
 - [Marble Jar](#)
 - [Coin Flip](#)
 - [Dice](#)
 - [Adjustable spinner](#)
- Desmos activity
 - [3.14 Vocabulary Review](#)

Learning Trajectory Resources:

Charles, R. (2005). Big ideas and understandings as the foundation for elementary and middle school mathematics. *Journal of Mathematics Education Leadership*, 7(3), NCSM.

Clements, D. H., & Sarama, J. (2019). Learning and teaching with learning trajectories [LT]2. Marsico Institute, Morgridge College of Education, University of Denver. <https://www.learningtrajectories.org/>

Common Core Standards Writing Team. (2019). [Progressions for the Common Core State Standards for Mathematics](#). Tucson, AZ: Institute for Mathematics and Education, University of Arizona.

Richardson, K. (2012). How Children Learn Number Concepts: A Guide to Critical Learning Phases. Bellingham: Math Perspectives Teacher Development Center.

Van De Walle, J., Karp, K. S., & Bay-Williams, J. M. (2018). *Elementary and Middle School Mathematics: Teaching Developmentally*. (10th edition) New York: Pearson (2019:9780134802084)

VDOE Curriculum Framework for All Grades - [Standard of Learning Curriculum Framework \(SOL\)](#)