Bridging for Math Strength Resources
[Standards of Learning Curriculum Framework](#)

Standard of Learning (SOL) 4.13

The student will

a) determine the likelihood of an outcome of a simple event;

b) represent probability as a number between 0 and 1, inclusive; and

c) create a model or practical problem to represent a given probability.

Student Strengths	Bridging Concepts	Standard of Learning
Students can investigate and describe the concept of probability as a measurement of chance and list possible outcomes for a single event.	Students can connect fraction knowledge (specifically, the relationship between the numerator and denominator) to help determine the probability of an event occurring. Students also connect the idea of probability as a number between 0 and 1 to representing fractions on a linear model, such as a number line.	Students can a) determine the likelihood of an outcome of a simple event; b) represent probability as a number between 0 and 1, inclusive; and c) create a model or practical problem to represent a given probability.

Understanding the Learning Trajectory

Big Ideas:
- Students should have opportunities to explore activities that will lead to conceptual understanding of probability rather than focusing on computation and formulas. (Van de Walle et al., 2018)
- Probability is quantified as a number between 0 and 1, where an event is "impossible" if it has a probability of 0 and an event is "certain" if it has a probability of 1. (VDOE Curriculum Framework Grade 4)
- Probability of an event can be expressed as a fraction, where the numerator represents the number of favorable outcomes and the denominator represents the total number of outcomes. (VDOE Curriculum Framework Grade 4)

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Formative Assessment:

- VDOE Just in time Quick Check SOL 4.13a PDF / Desmos

- VDOE Just in time Quick Check SOL 4.13b PDF / Desmos

- VDOE Just in time Quick Check SOL 4.13c PDF / Desmos

Important Assessment Look Fors:

- Students can create a model to represent a given probability.
- Students can write the probability of a given event as a fraction.
- Students are able to use a variety of manipulatives such as a spinner, number cube, or coins to determine all possible outcomes.
- Students are able to determine the likelihood of an event occurring using the terms *certain, likely, equally likely, unlikely,* and *impossible.*
- Students are able to identify the probability of the event occurring as a number between 0 and 1 on a number line.
- Students are able to identify when the probability of events occurring is equally likely. For example, it is equally likely to select a green marble as it is to select a red marble because the probability of each of the events is the same.

Purposeful Questions:

- Can you create a model where the probability of events occurring are equally likely?
- Where on the number line would you represent the probability of the event occurring as a number between 0 and 1? For example: rolling a number cube with sections labeled 1-6 and landing on a number greater than 4.
- Can you determine all of the possible outcomes using the given manipulatives (spinner, number cubes, counters…)?
- Can you create a model to represent the given probability? Can you create more than one model? For example, create a bag of marbles where the probability of selecting a green marble is 2/8.
- Explain why the probability of an event occurring compared to the results of the experiment may differ? Will this always happen?

Bridging Activity to Support Standard	Instructional Tips
Routine Which One Doesn't Belong?	In the routine, Which One Doesn't Below, students are shown a set of four things to compare and contrast. Students consider different ways to exclude one of the objects based on the characteristics shared by the other three. In the routine shown below, students have the opportunity to explore probability using spinners exploring terms and/or the quantified number between 0 and 1.

Rich Tasks Spinner Task Henrico County Public Schools	Students use clues to create a spinner to represent the given probability. **Spinner Task** Draw a spinner to match these clues: ● There are three numbers on the spinner. 4 is the largest number. ● One of the numbers on the spinner comes up about half of the time. ● The number 2 comes up about a quarter of the time. ● The most likely number to come up on this spinner is 1. ● If you add the three numbers on the spinner you get seven. ● If you spin the spinner twice and add the numbers, it's possible to get eight, but never seven. Explain your thinking in pictures, numbers and words.
Games/Tech Desmos 4.13abc Chance Experiments Love Maths Games	This activity introduces students to probability through a spinner game. Which result is more likely—red or blue? Students answer this question by gathering and analyzing class data and then apply what they've learned to consider the likelihood of other chance experiments Love Maths website has several different math games related to the concept of probability. Each game includes a video to explain the rules, list of materials, and questions to ask throughout the game. Love Maths Probability Games: 4 Corners, 100 or Bust, Greedy Pig, Home Sweet Home

Other Resources:
- VDOE Mathematics Instructional Plans (MIPS)
  - 4.13ab - Probability: How Certain Are You? (Word) / PDF Version
  - 4.13ab - Probability: Spinning Color (Word) / PDF Version
  - 4.13abc - Probability: Sweet as Candy (Word) / PDF Version
- VDOE Word Wall Cards: Grade 4 (Word) | (PDF)
  - Probability Number Line
  - Certain
  - Likely
  - Unlikely
  - Equally Likely
  - Impossible

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)