Make predictions and conduct experiments with spinners.

Prerequisite Skills/Concepts
- Apply probability terms likely and unlikely to events.
- Explore through an experiment the likelihood that an event may occur.

Expectations
3m93 demonstrate an understanding of probability and demonstrate the ability to apply probability in familiar day-to-day situations
3m94 relate meaningful experiences about probability
3m103 conduct simple probability experiments and predict the results
3m104 apply the concept of likelihood to events in solving simple problems
3m105 predict the probability that an event will occur
3m106 use mathematical language in discussion to describe probability

Assessment for Feedback
<table>
<thead>
<tr>
<th>Students will</th>
<th>What You Will See Students Doing...</th>
<th>When Students Understand</th>
<th>If Students Misunderstand</th>
</tr>
</thead>
<tbody>
<tr>
<td>conduct a simple probability experiment using a spinner</td>
<td>• Students will correctly follow the steps of a simple experiment and record the results.</td>
<td>• Students may not follow the steps correctly of record each result. Have students count the tally marks to ensure 12 events are recorded.</td>
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<tr>
<td>make a prediction about the results of spinning a spinner</td>
<td>• Students use the spinner to make an informed prediction.</td>
<td>• Students may make a prediction that is not related to the spinner. Have students describe the spinner before predicting.</td>
<td></td>
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<tr>
<td>use accurate probability language</td>
<td>• Students use likely, unlikely, certain, and impossible accurately when describing probability events.</td>
<td>• Students may have difficulty differentiating between likely and unlikely, yet use impossible or certain correctly. Post a large line that shows a continuum from impossible to certain. Ask students to show where the event would be on the continuum. An explanation for each choice should always be given.</td>
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</tbody>
</table>

Preparation and Planning

Pacing
- 5–10 min Introduction
- 15–25 min Teaching and Learning
- 20–25 min Consolidation

Materials
- 1 paper clip/pair

Masters
- Mental Math p. 41
- Spinner with 3 Equal Sections p. 50
- Spinner with 4 Equal Sections p. 51
- Spinner with 6 Equal Sections p. 52
- (for Extra Support of Questions 4 & 5) Scaffolding p. 48

Workbook
- p. 98

Vocabulary/Symbols
- impossible, certain

Key Assessment of Learning Question
- Question 5, Problem Solving

Meeting Individual Needs

Extra Challenge
- Students can be challenged to design spinners that would help them make decisions during the day (for example, what to drink for lunch, what type of book to sign out from the library, or what homework to do first).

Extra Support
- Use four sorting boxes with the labels impossible, unlikely, likely, and certain. Have students work in pairs. Each student writes four different statements (e.g., Our principal will grow two metres taller tomorrow), and then exchanges them with a partner who sorts the statements into the correct box. Have students discuss the sorting.
- Provide students with a variety of spinners. For each spinner, ask students to write at least two true statements, using a probability word (e.g., It would be likely to land on red).
1. **Introduction (Whole Class/Pairs) ➤ 5–10 min**

Ask students to name board games that they like to play. Make a list of these games (Monopoly, Snakes and Ladders, Clue, etc.). Ask them to describe the pieces that come with the games and how a player knows how many spaces to move on the board (throwing a die or dice, picking a card, spinning a spinner, etc.).

**Sample Discourse**

“If the game you want to play is missing the die, you can draw a spinner to use instead. What should the spinner look like?”
- The spinner should have the numbers from 1 to 6.
- The spinner should be divided into 6 equal sections.

Demonstrate how a pencil and a paper clip can be used with a paper spinner. Distribute to pairs of students the spinner that will be used in Teaching and Learning, made from Spinner with 3 Equal Sections p. 50 with appropriate labels added, and let students practise spinning. Observe them and watch for students who might try to spin in a certain way, who might slant the desk to spin one colour more frequently, or who might not have the paper clip at the centre.

Tell students that today they will be using spinners to conduct probability experiments.

2. **Teaching and Learning (Pairs/Whole Class) ➤ 15–25 min**

Ask students to read the information about the snacks that Sharleen is allowed to take for lunch. Ask if Sharleen has represented her mother’s wishes correctly on her spinner, and have students explain their answers. (Yes, there are two sections for apples, compared to one for candy.)

Draw attention to the central question and Sharleen’s experiment. Discuss whether Sharleen has completed her experiment, and ask how they know. (No, there are 7 tallies, not 12.) Ask students if they think their results will be the same as Sharleen’s for the first seven spins. (No.)

Have students answer the central question by answering prompts A to D, using the spinners they received and practised with in the Introduction. Discuss their results before assigning the Reflecting questions.

**Reflecting**

Discuss the questions and encourage a variety of responses.

**Sample Discourse**

1. • There are more apples than candy on the spinner.
   • There are two apples and only one candy on the spinner.
   • There is more space for healthy snacks than unhealthy ones on the spinner.
   • The space for healthy snacks is twice as big as for unhealthy snacks on the spinner.

2. a) • There would be no separate sections. The whole spinner would be for healthy snacks.
   • The candy cane would be an apple.

   b) • There would be no separate sections. The whole spinner would be for unhealthy snacks.
   • The two apples would be candy canes.
Answers
A. Answers will vary.
B. Answer will vary, but there should be 12 tally marks.
C. Answers will vary, but the two numbers should add to 12.
D. Likely, because there are more healthy snacks than unhealthy snacks on the spinner. We can spin healthy snacks, and we probably will more often.
1. You would expect more healthy snacks because there are two apples on the spinner and only one candy cane.
2. a) There would have to be only pictures of healthy snacks.
   b) There would have to be only pictures of unhealthy snacks.
3. a) Answers will vary, but answers of 10, 11, 12, or 13 would be reasonable predictions.
   b) Answer will vary, but there should be 15 tally marks.
   c) Answers will vary, but typical results should be that spinning healthy food is likely, or spinning unhealthy food is unlikely.
4. a) 15
   b) All 15 tally marks will be in the healthy foods column.
   c) Certain, because there are only healthy foods on the spinner.
   d) Impossible, because there are only healthy foods on the spinner.

3. Checking (Whole Class)
For intervention strategies, refer to Meeting Individual Needs and the Assessment for Feedback chart.
Distribute the spinner for this question, made from Spinner with 4 Equal Sections p. 51 with appropriate labels added.
3. a) When predicting the number of times they will spin healthy foods out of 15 spins, remind students to consider if they will land on healthy foods less than half the time or more than half the time. Ask students what is about half of 15.
   c) Students may choose to describe the likely chance of spinning a healthy food or the unlikely chance of spinning an unhealthy food. Discuss each.

Practising (Pairs)
Distribute the spinners for these questions, made from Spinner with 4 Equal Sections p. 51 and Spinner with 6 Equal Sections p. 52 with appropriate labels added. If any students need Extra Support with Questions 4 and 5, provide them with copies of Scaffolding Master p. 48 and the same spinners as other students.
4. Have students describe the foods on the spinner and determine if each is healthy or unhealthy. Some students will realize that they do not have to complete part b) to know that the spinner will land on 15 healthy foods. If students can explain this, they do not have to complete the experiment in part b).
5. c) Provide students with a blank Spinner with 4 Equal Sections p. 51 and/or a blank Spinner with 6 Equal Sections p. 52.

Closing (Whole Class)
Provide students with a spinner, made from Spinner with 6 Equal Sections p. 52, in which four sections show a hot dog and two sections show a pizza slice. Ask students to do the following:
“Predict how many times you will spin a pizza slice in 15 spins of this spinner.”
• I predict I will spin a pizza slice 4 times.
“Spin 15 times and keep a tally.”
• pizza slice hot dog
1 1 1 1 1
“Describe spinning a pizza slice with a probability word.”
• Spinning a pizza slice is unlikely.
5. a) Answers will vary, but answers of 11, 12, 13, or 14 would be reasonable predictions because five of six sections are balls.
b) Answer will vary, but there should be 15 tally marks.
Spinning a ball is likely and spinning a board game is unlikely because there are five balls and only one board game.
c) The spinner should be more than half board games.
**Assessment of Learning—What to Look for in Student Work…**

**Assessment Strategy:** skills demonstration, written question

**Problem Solving**

**Question 5**

- Vasco and his friends made this spinner to help them decide what game to play.
  
  a) Predict the number of times Vasco will spin a ball game in 15 spins. Explain your prediction.
  
  b) Spin 15 times. Keep a tally chart. Explain your results using probability words.
  
  c) Make a new spinner so that it is likely to spin a board game. Experiment with your spinner.

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<thead>
<tr>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
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<tbody>
<tr>
<td><strong>Carry Out the Plan</strong></td>
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<td><strong>Carry Out the Plan</strong></td>
<td><strong>Carry Out the Plan</strong></td>
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<tr>
<td>• spinning and tallying results include major errors and/or omissions</td>
<td>• spinning and tallying results include several errors and/or omissions</td>
<td>• spinning and tallying results are mostly correct, but there may be a few minor errors and/or omissions</td>
<td>• spinning and tallying results include almost no errors or omissions</td>
</tr>
<tr>
<td><strong>Make a Plan</strong></td>
<td><strong>Make a Plan</strong></td>
<td><strong>Make a Plan</strong></td>
<td><strong>Make a Plan</strong></td>
</tr>
<tr>
<td>• little or no evidence of a plan to create a new spinner</td>
<td>• evidence of a partial plan to create a new spinner</td>
<td>• evidence of an appropriate plan to create a new spinner</td>
<td>• evidence of a thorough plan to create a new spinner</td>
</tr>
<tr>
<td><strong>Carry Out the Plan</strong></td>
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</tr>
<tr>
<td>• uses a strategy, but is unable to create a new spinner</td>
<td>• carries out the plan to some extent using a strategy, and creates a partial and/or incorrect spinner</td>
<td>• carries out the plan effectively by using an appropriate strategy to create a new spinner that is likely to spin a board game</td>
<td>• shows flexibility and insight by trying and adapting one or more strategies to create a new spinner that is likely to spin a board game</td>
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<tr>
<td><strong>Communicate</strong></td>
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<tr>
<td>• provides incomplete explanations that lack clarity</td>
<td>• provides partial explanations that show some clarity</td>
<td>• provides complete and clear explanations of the prediction in part a) and the results of the spinning in part b)</td>
<td>• provides thorough, clear, and insightful explanations of the prediction in part a) and the results of the spinning in part b)</td>
</tr>
<tr>
<td>• uses very little mathematical language correctly</td>
<td>• uses some mathematical language correctly</td>
<td>• uses mathematical language correctly</td>
<td>• uses precise mathematical language</td>
</tr>
</tbody>
</table>

**Extra Practice and Extension**

- You might assign any of the questions related to this lesson, which are cross-referenced in the chart below.

**At Home**

- Students can look through their family’s board games for any that use a spinner, and then play the game(s).

**Extra Support: Scaffolding p. 48**

**Math Background**

Sample space is fundamental in probability. Spinning a spinner that is divided into two equal sections, one yellow and one red, is an example of a sample space with equally likely outcomes. If the red section is larger than the yellow section, it would be a sample space with outcomes that are not equally likely. A sample space might also have a certain outcome or an impossible outcome. An event is one spin of the spinner. In the primary grades, it is not important for students to know it is called a sample space.

Most students in the primary grades have a good understanding of impossible and certain, and can usually give appropriate examples based on their life experiences. Likely and unlikely are less familiar terms to students, and more time will be needed before they become part of their everyday language.