Probability: Spinning Color

Strand: Probability and Statistics

Topic: Determining and representing outcomes in a simple event.

Primary SOL: 4.13 The student will
a) determine the likelihood of an outcome of a simple event; and
b) represent probability as a number between 0 and 1, inclusive.

Materials

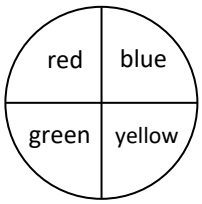
- Spinners (attached)
- Spinning Colors activity sheet (attached)
- Blank spinners
- Large paper clips
- Pencils

Vocabulary

certain, determine, equally likely, event, experiment, fraction, impossible, least likely, likely, measure of likelihood, most likely, possible outcome, probability, unlikely

Student/Teacher Actions: What should students be doing? What should teachers be doing?

1. Explain to the class that they are going to use a spinner in an experiment to model and determine all possible outcomes. Have students work with a partner for this activity. Distribute to each team the Spinning Colors activity sheet, a large paper clip, a pencil, and a spinner with four equal sections containing the color words red, blue, green, and yellow. Demonstrate how to use the pencil and paper clip to simulate a spinner. Instruct each team to take turns spinning the spinner for two minutes while the partner records the results of each spin with a tally mark on the handout in the appropriate row based on the color. Make sure each team carefully records each spin with a tally mark and that each color is tallied separately. Let them know you will give further directions about column 3 later.



2. Call time and have the students write a fraction for each color row that represents $\frac{\text{the number of talley marks for the color}}{\text{the total number of spins for the entire experiment}}$ and record their fractions in the third column. Emphasize to students that the measure of probability is a fraction between 0 and 1.
3. Next, have teams figure out their responses to following questions based on the data collected and displayed in their tally chart. Record the questions on the board or share with a document camera.
    a. How many times did your team spin the spinner?

   b. What do you notice or wonder about the data you collected?
   c. Were you surprised by any of the results in the experiment?
   d. Did the team spin one color more than another color? If so, which?
   e. What color do you think the team would spin next? Why?

4. As a class, have the students share their results and facilitate a discussion about the results. Did they spin one color more than another color? Was the total number of spins about the same? Did anyone land on each color an equal amount of times? Is there a color that no team landed on? This conversation will prepare students for thinking about spinners where an outcome is not equally likely.
5. Next, let students know that *probability* is the *chance* or *measure of likelihood* that something will happen. Then use a number line to model for the students how to represent probability as a measure using a number between zero and 1, where zero represents that it is *impossible* for something will happen and 1 represents that it is *certain* something will happen. Then lead the students in representing the theoretical probability (what should happen) of spinning each color as a number between zero and 1. That is, because the spinner has four sections of equal size and the same number of sections for each of the colors, then it is *equally likely* the paper clip will land on a red, blue, green, or yellow, and because there four *equally likely possible outcomes* in the *sample space,* the theoretical probability in a given *event* or spin of landing on 1 of the colors is $\frac{1}{4}$. There is much specific vocabulary associated with probability, and it will be helpful for class discussions and for students developing an understanding of the terms to create a word wall or anchor chart with the term and definition as each new term is introduced.
6. Distribute another copy of the Spinning Colors activity sheet to the teams. Have them repeat the trial, but this time, have each team spin the spinner 20 times. Once again, have the teams record the spins with tally marks. Finally, have them compare their results with those of the first trial.
7. Facilitate a class discussion comparing the actual results to the probability of spinning each color. Ask: *"Because it was equally likely to spin each color, were the results for the colors similar or different? Why?" "How did your result differ from the first trial to the second?" "If you did this trial a third time, would your results be the same or different? Why?"*
8. Tell students they are going to do another trial with a different spinner. Distribute another copy of the Spinning Colors activity sheet to each team. Have student teams repeat the activity but with a different spinner. Give each team the not equally likely four-section spinner (attached). Have each team look at the spinner and discuss the similarities and differences from the previous spinner. Ask: *"Which color do you think you will spin the most? Why?" "What do you notice about the colors blue and yellow?" "What is the probability of landing on a blue or yellow?" "What would you estimate the probability for red? Green?" "Do you think your results will be similar from the previous two trials? Why, or why not?"*

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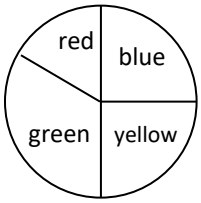

9. Give the teams two minutes to spin and collect data for the equally unlikely spinner and record the results on their handouts. Once the class has finished the experiment and completed column 3, facilitate a class discussion on the results. Ask: *"Which color did your team spin the most?" "Were the outcomes equally likely? Why, or why not?" "If you were playing a game, which spinner would you prefer to use? Explain your answer."*

Assessment

- **Questions**
  - How was the first trial different from the second trial? Why was it different or the same? Compare those two trials to the third trial. What did you notice in the last trial?
  - How is representing probability as number between zero and 1 useful?
  - Explain why the results from the experiments may differ from the determined probability.
- **Journal/writing prompts**
  - Create a spinner of colors where the probability of landing on red is $\frac{3}{8}$. Identify the probability of landing on the other colors included in your spinner.
  - Create your own spinner with each section *equally likely* to be landed on as the other sections. What does your spinner look like, how is it different and/or the same as spinners with sections that are not equally likely?
  - Can you create a spinner with equal section but not equally likely to land on each color? Explain your spinner.
- **Other Assessments**
  - Give students different types of spinners, and determine the probability of landing on each space.
  - Give each student a blank spinner. Tell students they need to create a spinner with shapes to match the following descriptions:
    - The probability of landing on a star is $\frac{3}{8}$.
    - The probability of landing on a circle is $\frac{2}{8}$
    - The probability of landing on a square is equally likely to selecting a star.
  - What is the measure of probability for landing on each color of the spinner and explain your answers?

Extensions and Connections (for all students)

- Have the students create a spinner that would model the probability of rolling a number cube or flipping a coin.

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- Look at different types of spinners and determine the probability of landing on each space. Is the spinner a "fair" spinner? How do you know?

Strategies for Differentiation

- Provide students with real spinners.
- Provide a number line with the points labeled 0, $\frac{1}{2}$, and 1 and then label 0 as impossible, 1 as certain, and $\frac{1}{2}$ as equally likely.

Note: The following pages are intended for classroom use for students as a visual aid to learning.

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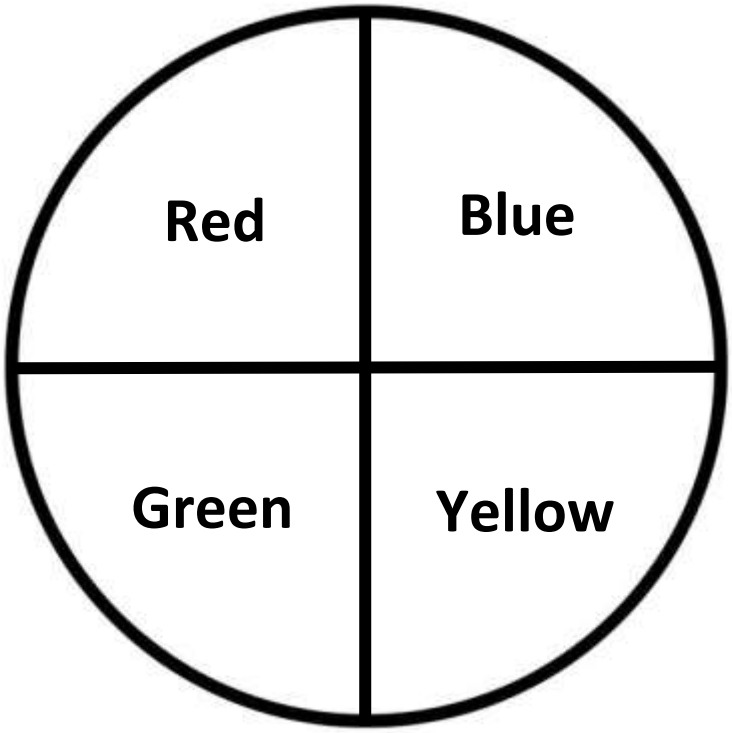
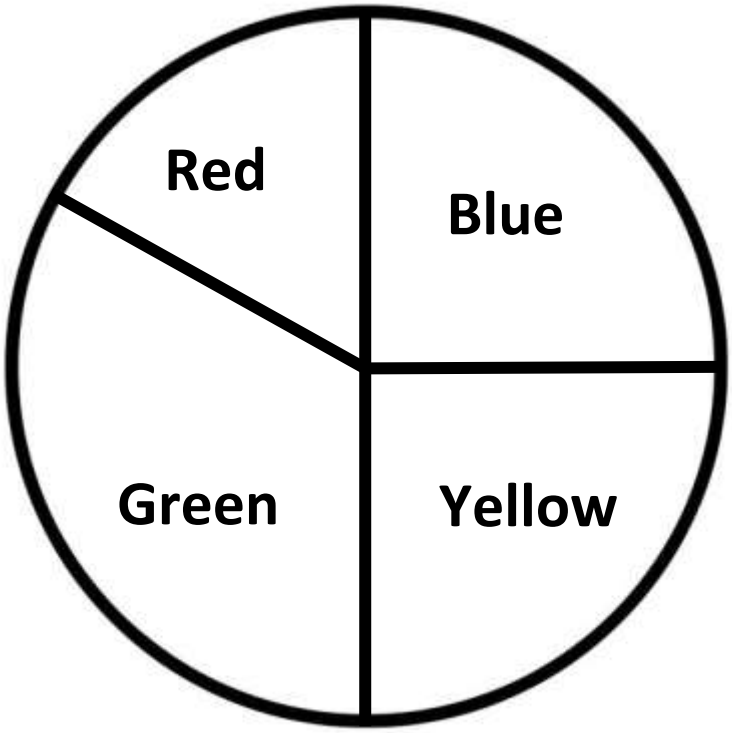
Spinners





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Spinning Colors
Name _____ **Date** _____

Directions: Use tally marks to record each spin.

Color	Tally Mark Count	Represent probability as a number between 0 and 1
Red		
Yellow		
Green		
Blue		

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