

Experimental and Theoretical Probability

STRAND: Probability and Statistics

STRAND CONCEPT: Outcomes and Probability

SOL 7.8a,b

Remediation Plan Summary

Students discover the difference between experimental probability and theoretical probability by comparing the theoretical probability of the results of an event with the actual results achieved when performing a series of trials of that event. Specifically, students compare the theoretical probability of the results of spinning a spinner a predetermined number of times with the actual results achieved when making the trials. Data from all students is used to make the sample

Common Misconceptions

Some students struggle to create the sample space for the event.
Converting fractions to decimals and percents is a struggle for some students.
Once a probability is found, some students struggle to simplify the fraction.

Materials

Paper clip, pencil, attached handouts, calculator

Introductory Activity

Give each student a copy of the introductory activity and have them plot the two questions on their own. Once students have finished, have them pair up and compare their number lines. Have a whole class discussion on the how the students determined where to plot their points and why the number line contained percents.

Plan for Instruction

1. Introduce the lesson by asking students how they know that something is fair. Give an example, such as, “How do you know that flipping a coin is a fair way to decide who gets to play a game first?” Lead the students to realize that some events have a mathematical outcome that is fair because every participant has the same chance of winning. Tell the class that this lesson will focus on how to find out if an event is fair by comparing its theoretical probability with its experimental probability. Review the definitions of theoretical probability and experimental probability.
2. Distribute copies of “The Spinner Game” worksheet, and do the first task together as a class. If you perceive that the students need another example, use the probability of rolling a 1 on one roll of a number cube numbered 1–6. Then, have students work with a partner to complete the second and third tasks on the sheet. Move among the groups and monitor the activity to ensure understanding of the tasks.
3. Discuss the results of tasks two and three after all groups have completed them. Focus on the similarities and differences between the theoretical probability and the experimental probability.
4. Read the directions for task four together as a class. Allow students time to exchange their data with each other. Monitor student work to ensure understanding. Then, encourage students to use complete sentences to do task five.
5. After each group finishes their writing, have them transfer their responses to chart paper or to the board, and use these to prompt a closing class discussion. Ensure that everyone can express the difference between theoretical probability and experimental probability.

Pulling It All Together (Reflection).

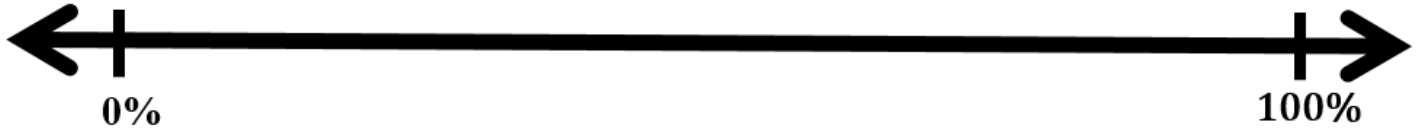
Have students complete “Theoretical Probability and Experimental Probability Reflection” worksheet. Collect it from students before they leave class, and use it to evaluate student understanding.

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

Virginia Department of Education 2018

Introductory Activity

1. On the number line, plot the likelihood (probability) of a two sided coin landing heads up.



2. On the number line, plot the likelihood (probability) of rolling a 1 on a fair six sided number cube with number 1 – 6.



Introductory Activity

1. On the number line, plot the likelihood (probability) of a two sided coin landing heads up.



2. On the number line, plot the likelihood (probability) of rolling a 1 on a fair six sided number cube with number 1 – 6.



Name: _____

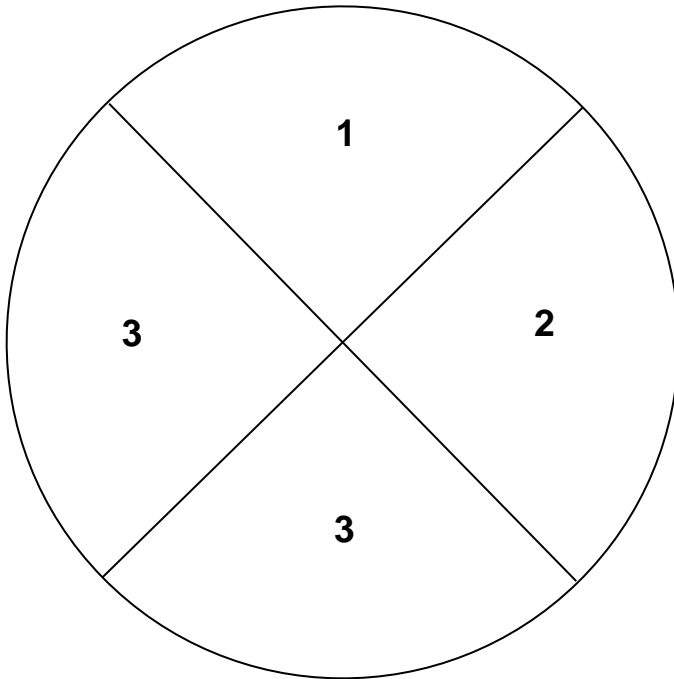
The Spinner Game

A spinner divided into four congruent parts is used in this game. (See the spinner below.) When the paperclip pointer lands on 3, the player earns a point.

1. What is the *theoretical probability* of spinning a 3?

Theoretical Probability (3) = _____

2. What is the *experimental probability* of spinning a 3? To find the answer, the game must be played and the results of the spins recorded. Using the spinner below and the recording chart, play the game 20 times and record the results of each trial.



Directions for Making the Pointer

Place a paper clip and the point of a pencil on the center of the circle so that the point of the pencil is inside the paperclip's loop. Hold the pencil straight up in that position.

Spin the paperclip around the center of the circle (the pencil point) by flicking it with a finger.

Recording Chart

Number	Tally Marks	Total
1		
2		
3		

AR Remediation Plan – Outcomes and Probability

3. Find the Experimental Probability of spinning a three.

Experimental Probability (3) = _____

4. The more times an experimental probability activity is done, the closer its results will be to the predicted theoretical probability results. Gather results from the other groups that performed the spinner experiment, and record their results in the table below.

Group	Number of Times 3 Was Spun (Out of 20 Spins)
A (Your Group)	
B	
C	
D	
E	
TOTAL	

Experimental Probability (3) = _____

5. Compare and contrast the Experimental Probability found for spinning a 3 with the Theoretical Probability for spinning a 3.

Name: _____

Theoretical Probability and Experimental Probability Reflection

In the blank next to each situation listed below, place a *T* if the situation refers to theoretical probability or an *E* if it refers to experimental probability.

1. ____ Tomas has five cards that are numbered 1, 2, 3, 4, and 5. He turns them face down and says, “I have a 1 in 5, or 20%, chance of drawing a 5.”
2. ____ Tomas asks a friend to draw a card from his stack of five cards. The friend draws a 3. Tomas has him draw four more times and records the results.
3. ____ Three friends are playing a board game. In order to decide who will go first, they decide to roll a six-sided number cube to see who comes closest to rolling a 6, because they know that is a fair way to decide.
4. ____ Roseanne flips a coin four times in a row. She says, “If I flip it again, I have a 50% chance of it being heads.”
5. ____ Kim loves math. Whenever she has a free minute or two at the end of class, she rolls a six-sided number cube and records the results. She has recorded 500 results so far.