Odd or Even

7th Grade—Teacher Notes

Overview	
Students are asked to settle an argument between two people about the probability of either one winning a contest.	**Prerequisite Understandings** • Ability to calculate basic probabilities. • Definitions of even and odd numbers.

Curriculum Content	
CCSSM Content Standards	7.SP.6. Approximate the probability of a chance event by collecting data on the chance process that produces it and observing its long-run relative frequency, and predict the approximate relative frequency given the probability.
CCSSM Mathematical Practices	3. Construct viable arguments and critique the reasoning of others: Students explain who is correct and explain the results based on the mathematics. 4. Model with mathematics: Students use probability to simulate the situation.

Task	
Supplies • Spinners (manual and/or electronic)	**Core Activity** In pairs, students will explore the experimental probabilities and calculate the theoretical probabilities of even and odd sums of random numbers.
Launch Briefly review the definitions of even numbers and odd numbers and probability. Specifically discuss that 0 is an even number. Consider patterns from the number line and the definition of even.	**Extension(s)** Ask students to work in groups and create a "fair" game where each player would have an equal chance of winning. Make sure they can explain why it is fair.

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Launch

Spinner A will be the three-part spinner and Spinner B will be the four-part spinner. Spin both spinners, and record the results in the chart below. Create a fraction in the next column, writing the result as a rational number $\frac{A}{B}$. Then, in the remaining columns, simplify your fraction, if possible, and find the decimal and percent equivalents. Repeat this 5 times (or for 5 "trials").

Trial #	Spinner A	Spinner B	Fraction $\frac{A}{B}$	Simplified Fraction	Decimal	Percent
1						
2						
3						
4						
5						

In the following tables, list all possible outcomes of the rational number $\frac{A}{B}$. Then simplify and find their decimal and percent equivalents. (Hint: There are 12 possible outcomes.) (Hint #2: You already have some of these done in the first table!)

$\frac{A}{B}$	Simplified Fraction	Decimal	Percent

$\frac{A}{B}$	Simplified Fraction	Decimal	Percent

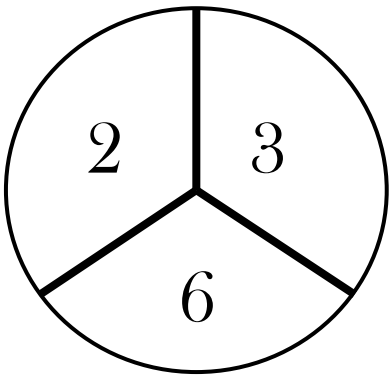
Organize your distinct **outcomes** $\frac{A}{B}$ (as simplified fractions) from least to greatest in the first column of the table shown to the right.

Find the **frequency** and the **probability** of each outcome and record each in the remaining columns.

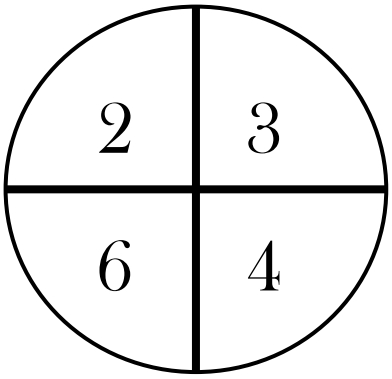
Outcomes	Frequency	Probability

If we were to play a game where Player 1 gets a point when the outcome is greater than or equal to 1 and Player 2 gets a point for an outcome less than 1, which player would you want to be and why?

Spinner A



Spinner B



Additional Resources

Appendices A & B contain instructions for **Generating Random Integers** on both the TI-Nspire™ handhelds and the TI-84 Plus graphing calculators.

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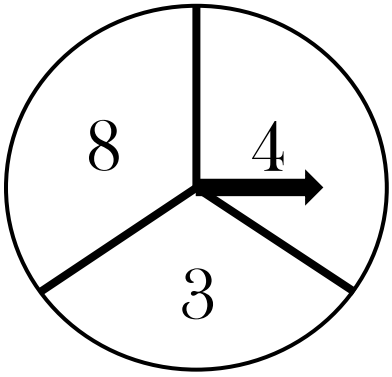
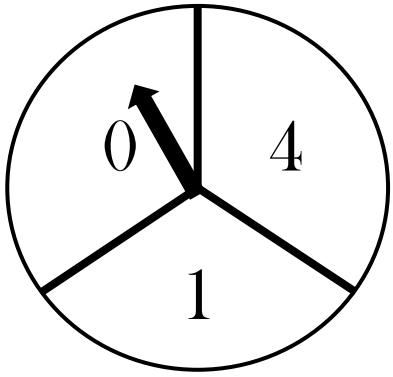
Activity

Leo and Tarra are playing a spinner game with the following rules:

> When it is a player's turn, the player spins both spinners. They then find the sum of the two numbers. If the sum is EVEN, player 1 wins (Leo). If the sum is ODD, player 2 wins (Tarra).

Leo takes a test spin first. Here is what he spins:





The sum from the first spin is EVEN because 4 + 0 is even. Leo wins. Leo says, "I like this game. I have a better chance to win it than you do."

Tarra says, "No, I have a better chance to win it than you do."

1. Use mathematics to decide which player is correct.

2. Write a note to the players explaining how you know who has the better chance of winning.

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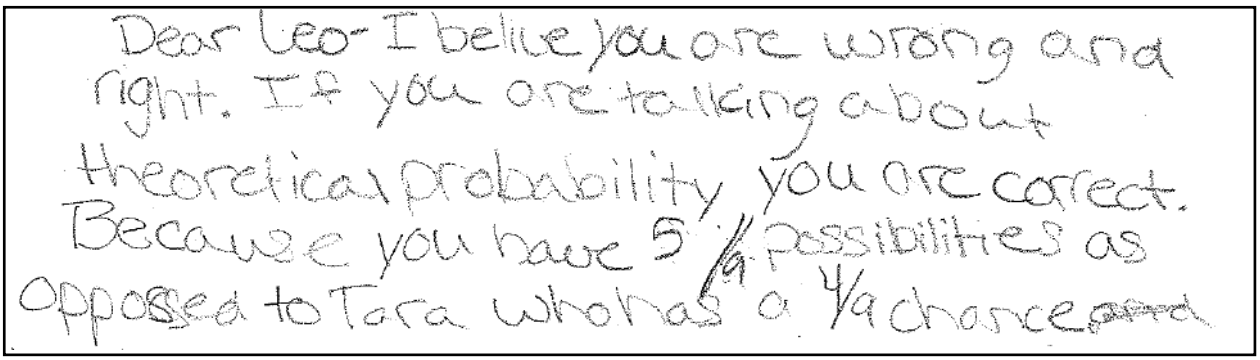
Results from the Classroom

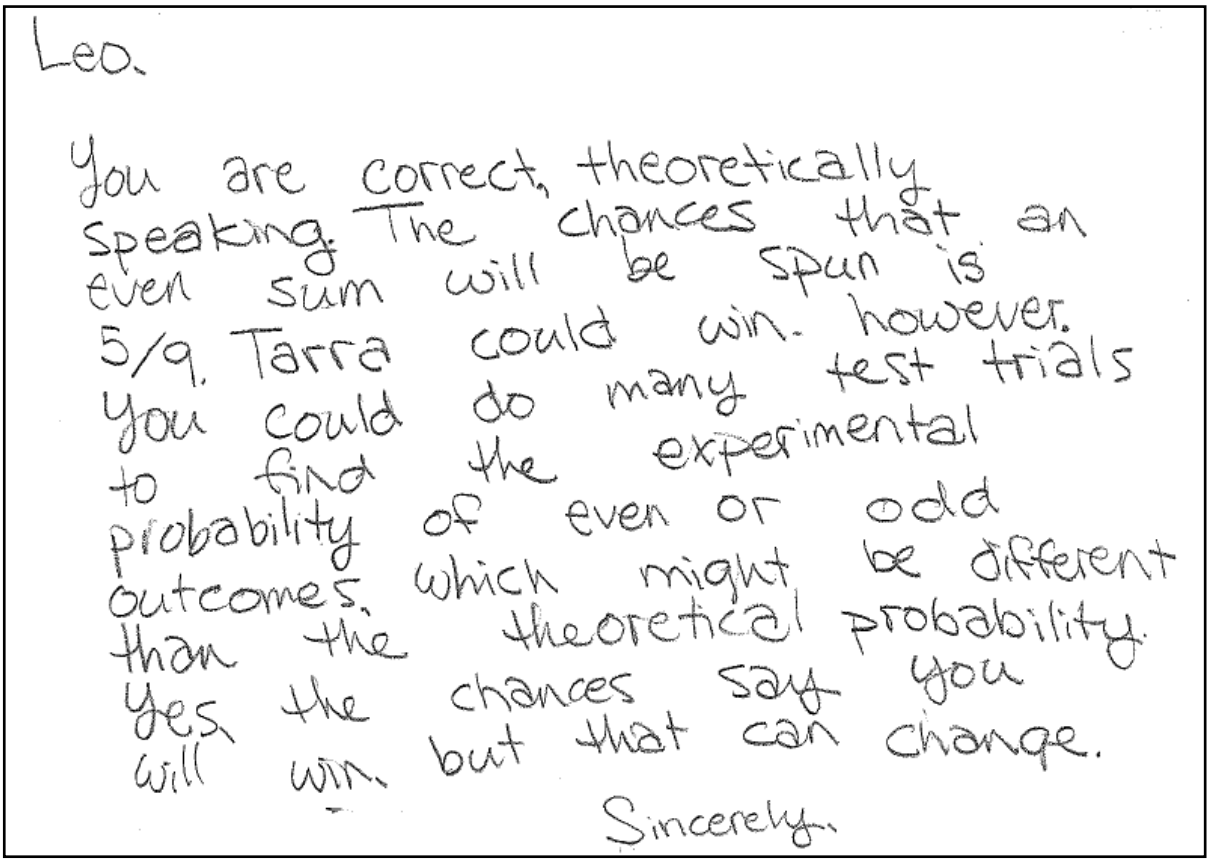
Olivia

Olivia understood and was careful not hurt Leo's feelings by saying he was partially right. She was able to answer the probabilities with precision.


Dear Leo- I belive you are wrong and right. If you are talking about theoretical probability you are correct. Because you have 5/9 possibilities as oppossed to Tara who has a 4/9 chance

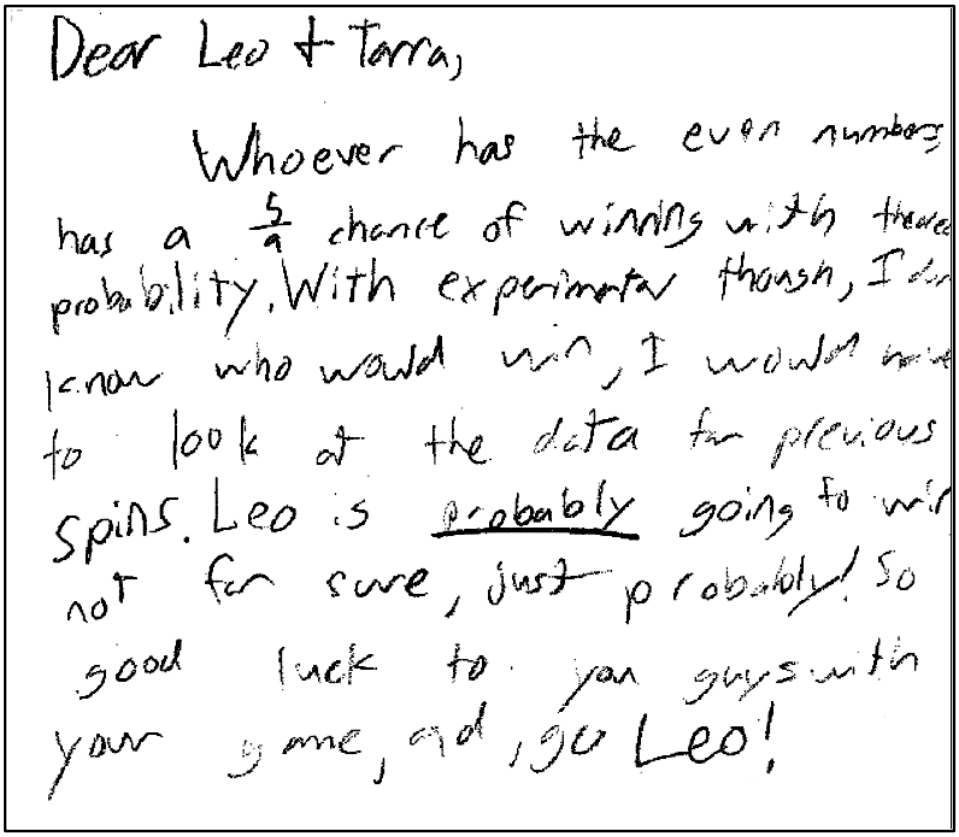
Latisha

Latisha has a clear and complete understanding of problem. Her explanation distinguishes between theoretical and experimental probabilities. Her argument is correct.


Leo.

You are correct, theoretically speaking. The chances that an even sum will be spun is 5/9. Tarra could win. however. you could do many test trials to find the experimental probability of even or odd outcomes. which might be different than the theoretical probability. Yes the chances say you will win. but that can change.

Sincerely.


Dear Leo + Tarra,

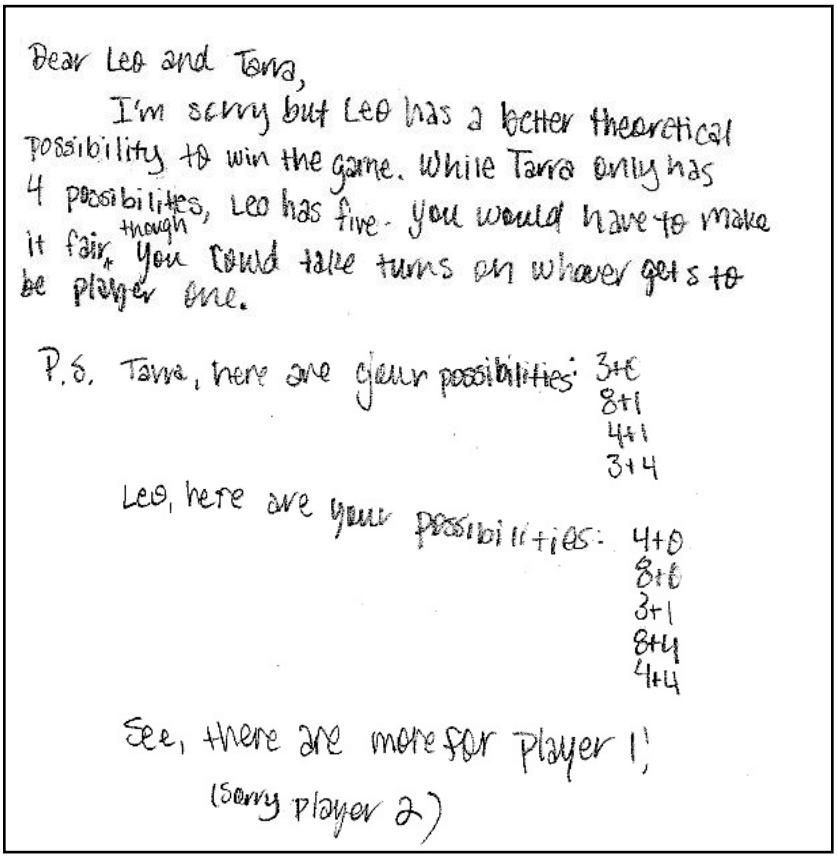
Whoever has the even numbers has a $\frac{5}{9}$ chance of winning with theoretical probability. With experimental though, I don't know who would win, I would have to look at the data for previous spins. Leo is probably going to win not for sure, just probably! So good luck to you guys with your game, and, go Leo!

Juan

Juan talks about looking at the data and uses the term probably to describe Leo's chance of winning. He is more specific by mentioning that the even-number player will win. All of the students have been motivated by the situation and have written specifically to the learners.

Isabella

Isabella is specific with her information and lists the possibilities for each person to win. She extends the information without being asked to explain how she thinks that the players could make it a fair game. She demonstrates both of the highlighted mathematical practices. She has modeled the situation with mathematics and was able to present a clear mathematical argument.


Dear Leo and Tarra,

I'm sorry but Leo has a better theoretical possibility to win the game. While Tarra only has 4 possibilites, Leo has five. You would have to make it fair, though. You could take turns on whoever gets to be player one.

P.S. Tarra, here are your possibilities: 3+6
8+1
4+1
3+4

Leo, here are your possibilities: 4+0
8+0
3+1
8+4
4+4

See, there are more for player 1!
(Sorry player 2)