Analyzing Number Cube Sums

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Math Concepts

- whole numbers
- sample space
- fractions
- probability
- decimals
- percents

Materials

- TI-15 Explorer™
- **Analyzing Number Cube Sums** recording sheets
- small group and class results from **Number Cube Sums**
- number cubes
- pencils

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Overview

Students will extend their understanding of theoretical probability and patterns. Using number cubes, they will build awareness that a fraction and its decimal and percent representation on the calculator are "close," but not necessarily equal.

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Introduction

> The **Number Cube Sums** activity on page 115 should be completed before beginning this activity.

1. Have students refer to their fraction, decimal, and percent representations from **Number Cube Sums**. Ask students to summarize why they think the experimental probabilities came out the way they did.

2. Ask students to record all the ways of rolling two number cubes to get each possible sum of 2 through 12.

   Note: If students use number cubes of two different colors, it will become clear that a sum of 3 can be rolled in two different ways: $1 + 2$ and $2 + 1$.

3. Have students record the theoretical probability of each sum in fraction, decimal, and percent forms.

   Example:
   The probability of rolling a sum of 6 is 5/36, which is approximately 0.1388888889 or about 13.88888889%.

4. Have students investigate the sum of all the fractional probabilities, the sum of all the decimal representations, and the sum of all the percents found with the calculator.

5. Ask students to write about their observations and discoveries.

Analyzing Number Cube Sums *(continued)*

Collecting and Organizing Data

While students are recording the fractions and decimals for the probability of each sum, ask questions such as:

- Why are you using this fraction to describe the probability of rolling a _____?

- What is the "whole" to which the fractions, decimals, and percents are referring?

- What do you notice about the denominator of each of your fractions? What does the denominator represent? What does the numerator represent?

- Do you notice any patterns developing in your table? How could you describe them?

- What do you notice about the sum of the fractions?

- What do you notice about the sum of the decimals?

- What do you notice about the sum of the percents?

How are you using the calculator to help you?

How can you use the ⌐ key and F↔D to compare fractions and decimals?

How can you use ÷ to compare fractions and decimals?

Would you want to use Int÷ to compare fractions and decimals? Why or why not?

How can you use ▶% to compare fractions, decimals, and percents?

## Analyzing Data and Drawing Conclusions

After students have collected their data, have them discuss the results as a whole group. Ask questions such as:

- How did using number cubes of two different colors help you verify what you were recording in your table?

- How does the information in your table compare with the results in **Number Cube Sums**?

- What was the sum of your fractional probabilities? What sums did other groups get? How can you explain this?

- What was the sum of your probabilities as the calculator showed them in decimal form? How do you explain the difference?

- What was the sum of the probabilities shown as percents? How do you explain this?

- Report your observations. How can you explain what you observed?

How can you explain what the calculator appears to be doing as it changes fractions to decimals? Fractions to percents? Decimals to percents?

Continuing the Investigation

Have students use other polyhedral dice and predict each outcome in the sample space. Have them perform a similar investigation with the fraction and decimal representations of the probability of each possible sum.
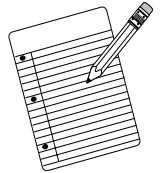
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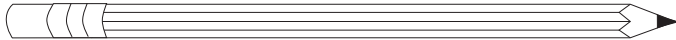
Analyzing Number Cube Sums
Recording Sheet

Collecting and Organizing Data

Ways to Get Each Sum	Possible Sums	Fraction	Decimal	Percent
_____	2	_____		
_____	3	_____		
_____	4	_____		
_____	5	_____		
_____	6	_____		
_____	7	_____		
_____	8	_____		
_____	9	_____		
_____	10	_____		
_____	11	_____		
_____	12	_____		

Analyzing Data and Drawing Conclusions

Write about what your information shows.