

Tiles in a Bag

Math Concepts

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

Materials

- TI-15 Explorer™
- **Tiles in a Bag** recording sheets
- tiles in two different colors
- small lunch bags
- pencils

Overview

Students will explore probability and patterns in fractions, decimals, and percents by drawing tiles out of a bag and recording and analyzing the results.

Introduction

1. Prepare a “mystery bag” containing ten tiles of two different colors; for example, six red and four blue. Ask students to guess how many tiles of each of the two colors are in the bag. Have students draw out one tile, record its color, and replace it in the bag. After ten such trials, ask students if they wish to change their guesses.
2. Discuss with students how to record the fractions that represent the draws for each color.

Example:

From ten draws, 3 tiles are blue (3/10), and 7 tiles are red (7/10). Show students how to use $\boxed{F \leftrightarrow D}$ on the calculator to change each fraction to a decimal. Use $\boxed{\%}$ \boxed{ENTER} to change the result to a percent.

Colors	<u>red</u>	<u>blue</u>
Tally of Results	<u>7</u>	<u>3</u>
Fractions	<u>7/10</u>	<u>3/10</u>
Decimals	<u>0.7</u>	<u>0.3</u>
Percents	<u>70%</u>	<u>30%</u>
After 10 draws we think there are:	<u>7</u> out of 10	<u>3</u> out of 10

3. Have a student draw 10 more times from the bag just as before, recording in fraction and decimal form the number of tiles drawn of each color. Give students another chance to change their predictions on the basis of the new information.

Note: This time the denominator of the fraction will be 20.

4. Have students go through the same process two more times until a total of 40 trials have been made.
5. Then ask students to make final predictions about the tiles in the bag.

Tiles in a Bag *(continued)*

Introduction (continued)

- After each group of ten draws, have students analyze the patterns in the fractions and decimals that they recorded as their results.
- Give each group of students a new bag with a different combination of tiles in two colors. Have them repeat the process with their new bags and write about their discoveries.

Collecting and Organizing Data


While students are collecting data and recording the fractions and decimals, ask questions such as:


- What information are you using to make your predictions each time?
- Have your results changed or remained the same after every ten draws? What do you think affects your results?
- How are you deciding which fraction to use to describe each color?
- What is the “whole” to which the fractions and decimals are referring?
- Do you see any patterns in the fractions and decimals that you are recording?


Analyzing Data and Drawing Conclusions


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


- What information did you use to predict which combination of colored tiles is in the bag?
- Is each of the colors equally likely to occur each time you draw a tile? Why or why not?
- Look at each set of ten draws. Is any set exactly the same as what you discovered was actually in the bag? How many sets were not the same? How can you explain the differences?


 How are you using the calculator to help you?


 How can you use $\boxed{F \leftrightarrow D}$ to compare fractions and decimals?

 How can you use $\boxed{\div}$ to compare fractions and decimals?

 How can you use the $\boxed{\rightarrow \%}$ key to compare fractions, decimals, and percents?

 Would you want to use $\boxed{\text{Int} \div}$ to compare fractions and decimals? Why or why not?


 Did you use $\boxed{F \leftrightarrow D}$ to compare fractions, decimals, and percents? Why or why not?


 Did you use $\boxed{\rightarrow \%}$ to compare fractions, decimals, and percents? Why or why not?

Tiles in a Bag *(continued)*

Analyzing Data and Drawing Conclusions (continued)

- How could you describe the patterns in the fractions and decimals?
- What if you changed the number of tiles in the bag? How do you think your results would change?

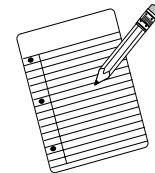
 Did you use $\frac{\square}{\square}$ to compare fractions and decimals? Why or why not?

 Did you use $\frac{\square}{\square}$ to compare fractions and decimals? Why or why not?

Continuing the Investigation

Have students:

- Change the combinations of tiles in their bags, predict how the likelihood of the outcomes will change, and collect data to compare with their predictions.
- Put together a combination of tiles that will produce a given set of results and collect data to compare with their predictions.



Name: _____



Tiles in a Bag Recording Sheet

Collecting and Organizing Data

Colors _____

Tally of Results

Fractions _____

Decimals _____

Percents _____

After 10 draws we think there are:

_____ out of 10 tiles in the bag

_____ out of 10 tiles in the bag

Tally of Results

Fractions _____

Decimals _____

Percents _____

After 20 draws we think there are:

_____ out of 10 tiles in the bag

_____ out of 10 tiles in the bag

Tally of Results

Fractions _____

Decimals _____

Percents _____

After 30 draws we think there are:

_____ out of 10 tiles in the bag

_____ out of 10 tiles in the bag

Tally of Results

Fractions _____

Decimals _____

Percents _____

After 40 draws we think there are:

_____ out of 10 tiles in the bag

_____ out of 10 tiles in the bag

Analyzing Data and Drawing Conclusions

On the back of this sheet, write about what your information shows you.