## Overview

Students will use the calculator to connect concrete and symbolic representations of decimal quantities and to recognize patterns in the number symbols.

**Grade Levels: 3–5**

## Concepts

- Patterns
- Ordering decimals
- Decimals
- Place value
- Comparing decimals
- Addition

## Materials

- TI-10 or TI-15 Explorer™ calculators
- Student activity sheet
- Pencils

## Assessment

Throughout the activity, questions are included for formative assessment. Student work should be used as a check for understanding. Have the students use the TI-10 or TI-15 Explorer™ calculator to complete the activity.

*Modified from Patterns in Counting with Decimals, from Uncovering Math with Manipulatives, the TI-10, and TI-15 Explorer™*

## Introduction

1. Display a 10 x 10 grid. Ask students: *How many squares are there across? How many down? How many in all?*

2. Now ask students: *If the entire grid is worth one dollar, how much is each square worth?* Help students connect their understanding of one cent to $\frac{1}{100}$ of a dollar.

3. Have students work in pairs. Give each student an activity sheet. Have the first partner fill in the first blank after the single square with the fraction $\left(\frac{1}{100}\right)$ and the second blank with a decimal symbol (0.1) for one-hundredth.

4. Have students clear the constant stored in [Opl] by pressing [MODE] ⬅ ⬅ [ENTER] [CLEAR].

5. Have the first partner use the calculator to count by hundredths in decimal form by entering [Opl] [+] [·] **01** [Opl] [Opl] [Opl] [Opl] and then label the squares on the 10 x 10 grid with decimals. Have the second partner count by hundredths in fraction form by entering [Opl] [+] **1** [◻] **100** [Opl] **0** [Opl] [Opl] [Opl] and then label the squares in another grid with fractions.

6. Challenge the students to find as many patterns as they can in each of the labeled grids and record the patterns on their activity sheets.

7. Also challenge the students to record any connections they see between the two labeled grids.

> 🖩 **Using the Calculator**
>
> - *How do your results differ when you [Fix] your calculator to [0.01]?*

## Collecting and Organizing Data

While students explore with the 10 x 10 grid and their calculators, ask questions such as:

> **Questions for Students:**
>
> ❖ *What patterns do you see in the decimal representations?*
>
> *What patterns do you see in the fraction representations?*
>
> ❖ *What connections do you see between the fraction and decimal representations?*

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📟 **Using the Calculator**

- *What do the numbers that show on the calculator after you press* [Opl] *tell you?*

- *What did you enter to prepare the calculator to count by hundredths? Why?*

- *If you press the* [F↔D] *key, a fraction symbol will change to a decimal symbol and vice versa. Try this and see how it connects to your two grids.*

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**Analyzing Data and Drawing Conclusions**

After students have looked for patterns and conclusions, have them work as a group to analyze their observations. Ask questions such as:

**Questions for Students:**

❖ *What patterns did you notice in the decimal symbols? In the fraction symbols?*

❖ *How are the spaces on the grid and the symbols on the calculator connected?*

❖ *How are the two kinds of symbols connected?*

❖ *With what number does each grid end? Does that make sense? Why or why not?*

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📟 **Using the Calculator**

- *How did you set up the calculator to count by hundredths in decimal form? In fraction form? Explain your choices.*

- *How could you use the calculator to count ten squares at a time?*

- *What does using the* [F↔D] *key represent?*

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## Continuing the Investigation

Have students:

- Investigate the question: *How would you set up the calculator to count by tenths? How could counting by tenths be represented on the 10 x 10 grid if the whole grid represents 1?*

- Investigate the question: *One percent (1%) is another name for $\frac{1}{100}$ or 0.01.*

  *Label another 10 x 10 grid with percent symbols. What connections do you see between the three grids?*

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## SOLUTIONS

Student Activity

Name _____

Date _____

**Focus:** Find patterns when counting with decimals.

# Patterns in Counting with Decimals

### Collecting and Organizing Data

10 × 10 Grid

$\square = \dfrac{\dfrac{1}{100}}{\text{Fraction}}$

or $\dfrac{0.01}{\text{Decimal}}$

Answer:

Pattern for fractions in first row:

$\dfrac{1}{100}, \dfrac{2}{100}, \dfrac{3}{100}, \dots \dfrac{10}{100}$

Pattern for decimals in first row:

0.01, 0.02, 0.03,.....0.10

### Analyzing data and Drawing Conclusions

- The patterns we saw in the symbols:

  Possible answer: the digits in the hundreds place increased by one in the rows and by 10 in the columns. Similar to the ones values in a hundreds chart.

- The patterns we saw in the fraction symbols:

  Possible answer: the numerator increased by one in the rows and by 10 in the columns.

- The connections we saw between the two kinds of symbols:

  Possible answer: the numeral in the numerator and the hundredth place had the same pattern.

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