SUM IT UP

Dear parent or guardian: This is a summary of the key ideas your child is learning in mathematics. You can use this summary as background as you support your child's work.
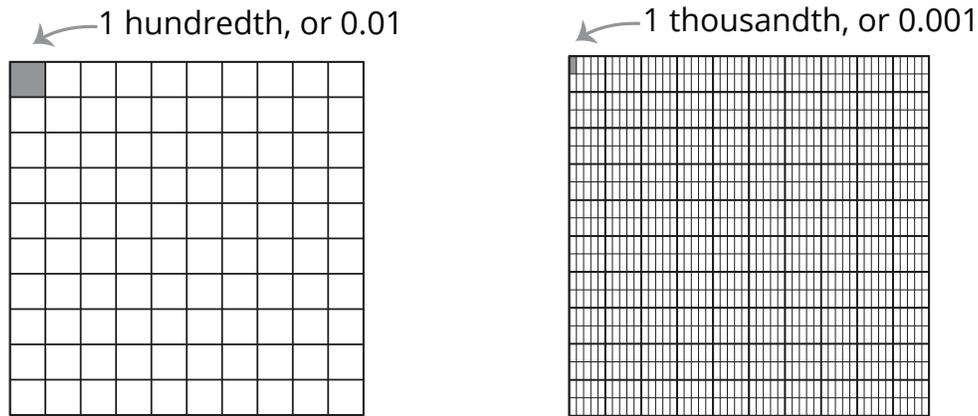
(2) Relating Tenths, Hundredths, and Thousandths

Introducing Decimal Thousandths

Students are familiar with decimal tenths (e.g., 0.4 and 2.5) and decimal hundredths (e.g., 0.23 and 8.15) from earlier grades. At this point, they are introduced to decimal thousandths (e.g., 0.042 and 3.124).

One of the models used to help make sense of thousandths is a thousandths grid. A square representing 1 whole is divided into 100 squares, and each square is divided into 10 rectangles. With each hundredth divided into 10 sections, it takes 1000 equal sections to fill the grid, so each section is $\frac{1}{1000}$.

1 hundredth, or 0.01

1 thousandth, or 0.001

You can model numbers like 125 thousandths on a thousandths grid.

125 thousandths, or 0.125
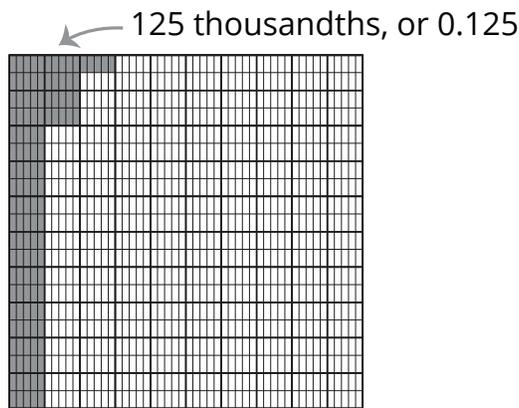
1 Tenth as 100 Thousandths and 1 Hundredth as 10 Thousandths

- There are 10 tenths columns on a thousandths grid. Each tenths column contains 100 thousandths. So, 0.1 = 0.100, or 100 thousandths.
  1 tenth = 1 tenth + 0 hundredths + 0 thousandths

1 tenth, or 0.1
100 thousandths, or 0.100
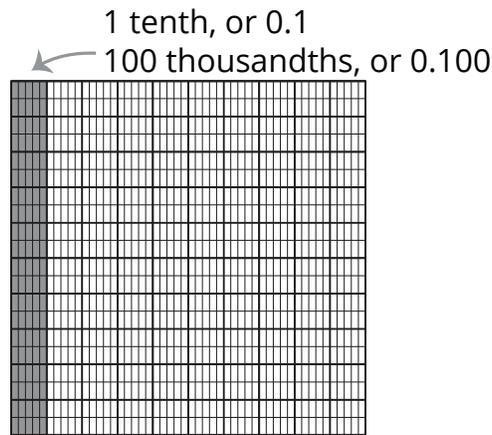
From equivalent fractions it makes sense that $\frac{1}{10} = \frac{100}{1000}$ (1 tenth = 100 thousandths).

- There are 100 hundredths squares on a thousandths grid. Each hundredths square contains 10 thousandths.

  So, 0.01 = 0.010 (1 hundredth = 10 thousandths).
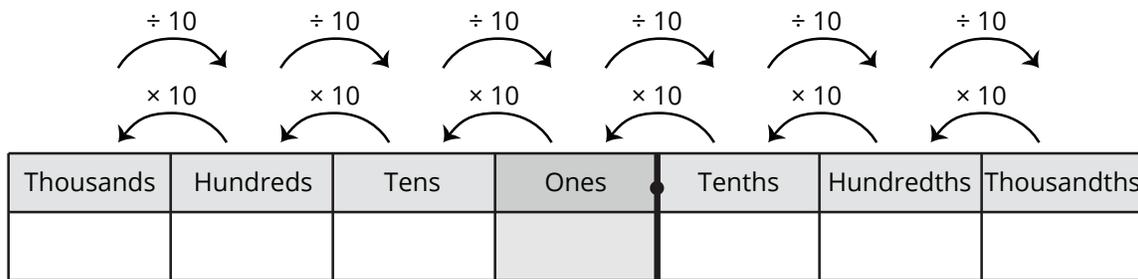
1 hundredth, or 0.01
10 thousandths, or 0.010
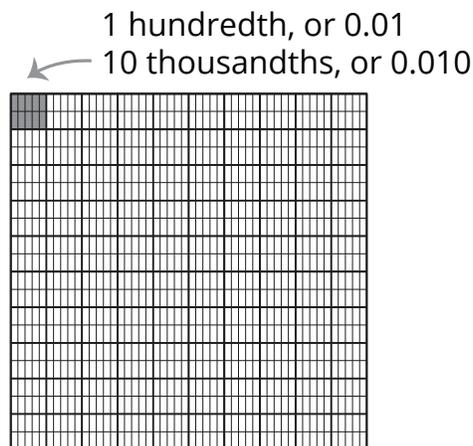
It makes sense that $\frac{1}{100} = \frac{10}{1000}$ when thinking of equivalent fractions. It also makes sense that 1 hundredth = 1 hundredth + 0 thousandths.
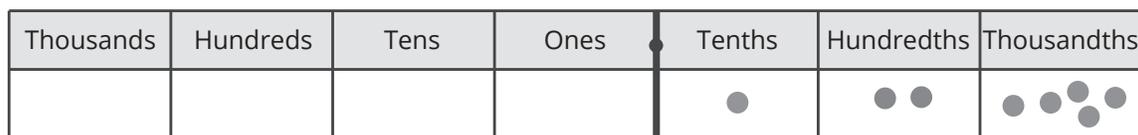
Why the Thousandths Place Is to the Right of the Hundreths Place on a Place-Value Chart

- To write numbers in the thousandths using decimals, students need to understand how the place-value system is extended to the right.

  Since every column is $\frac{1}{10}$ of the value of the column to its left, it makes sense that the place to the right of the hundredths is the thousandths. That's because $\frac{1}{10}$ of $\frac{1}{100}$ is $\frac{1}{1000}$.

	÷ 10	÷ 10	÷ 10	÷ 10	÷ 10	÷ 10
	× 10	× 10	× 10	× 10	× 10	× 10

Thousands	Hundreds	Tens	Ones	Tenths	Hundredths	Thousandths

- Notice that there is symmetry in the place-value chart: the hundredths is two places to the right of the ones place and the hundreds is two places to the left of the ones place. Similarly, the thousandths is three places to the right of the ones place and the thousands is three places to the left of the ones place.

- You can use counters to model numbers on a place-value chart. For example, this model shows 125 thousandths, or 0.125.

| Thousands	Hundreds	Tens	Ones	Tenths	Hundredths	Thousandths
				●	● ●	● ● ● ● ●

- Recall that groups of three places to the left of the decimal point form periods. The decimal values to the right of the ones are also grouped together to make periods. This helps explain why we read 0.125 as 125 thousandths (just as 125 000 is read 125 thousands).

Decimals Greater Than 1 and Less Than 1

Decimal values can be greater than 1, for example, 3.432 (3 wholes plus 432 thousandths) or less than 1, for example, 0.135 (135 thousandths).

Base ten blocks can be useful for representing decimals less than 1 and greater than 1. The blocks can have different values than they have with whole numbers, depending on which block you choose to call 1 whole.

For example, if you call the largest block 1 whole, the others can be named in this way:

| 1 whole | 1 tenth | 1 hundredth | 1 thousandth |
| 1 | 0.1 | 0.01 | 0.001 |
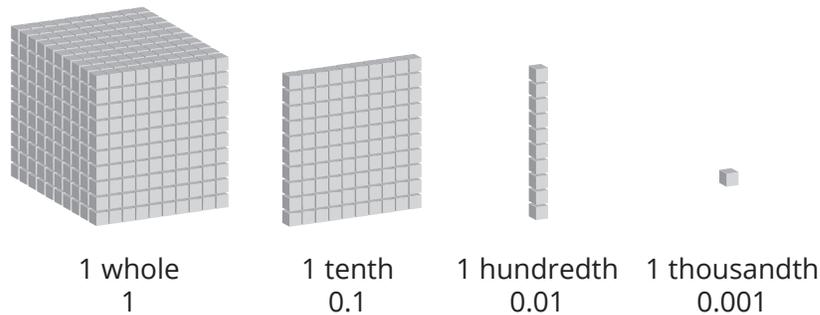
- The number 3.432 can be represented in this way:
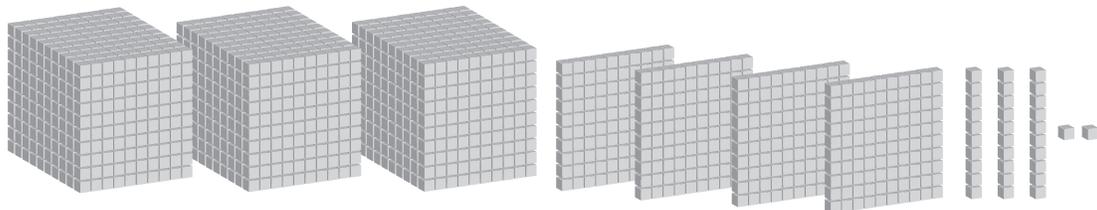
Definitions

decimal hundredth: a number that extends to the right of the whole number by two decimal places to the hundredths place, for example, 0.56, 3.74

decimal tenth: a number that extends to the right of the whole number by one decimal place to the tenths place, for example, 0.5, 3.7

decimal thousandth: a number that extends to the right of the whole number by three decimal places to the thousandths place, for example, 0.567, 3.742

Definitions (continued)

period: a group of three digits in a multi-digit numeral separated from other periods by spaces; for example, in the number 213 202, the thousands period is 213 and the ones period is 202

place value: the value of a digit in a numeral based on its position; for example, the 7 in 2<u>7</u>4 has a value of 7 tens, or 70