

Lesson 4: Decimals to Thousandths

☐ Getting Started

To help you review the different ways that decimal numbers can be represented, you will cut out the rectangles from the second "Decimal Sort" page and paste them in the correct spot in the chart on the first page. Once you've completed the sheet, you can store it in your Interactive Notebook as a reminder that decimals can be written and shown in multiple ways.

Stuff You Need

- fine point dry-erase markers (kit)
- glue or glue stick
- Interactive Notebook
- laminated decimal grid (kit)
- scissors

Ideas to Think About

- How do you read and write decimal numbers?

Things to Know

- **Thousandths:** decimal place to the right of the hundredths place, the third place to the right of the decimal point
- Decimal numbers can be written using expanded form. For example, 0.25 in fraction expanded form is $2/10 + 5/100$. In decimal expanded form, it is $0.2 + 0.05$.
- Decimal numbers can be written using expanded notation (in which the digit in each place is multiplied by its place value).
- In fraction expanded notation, 0.25 is $(2 \times 1/10) + (5 \times 1/100)$.
- In decimal expanded notation, 0.25 is $(2 \times 0.1) + (5 \times 0.01)$.

☐ Reading and Questions

Watch the video at the following web link. Stop the video at the 5:12 mark and then answer Questions 1-2. Then finish the video and answer Questions 3-5.



www.beyondthepage.com/link/9296/

1. Decimals, like fractions, allow you to show numbers that are less than or a part of what?

2. To see numbers that have *increasing* place values, you should look on what side of the decimal? To see numbers that have *decreasing* place values, you should look on what side of the decimal?

3. What place value is to the immediate right of the decimal point?

4. Each decimal place value is how much of the size of the value before it?

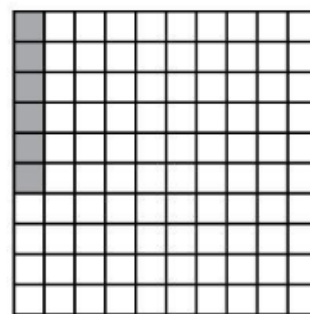
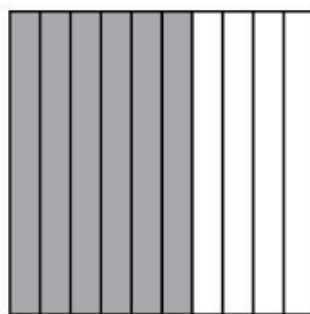
5. Give it a try: 0.3 is the same as what fraction?

Activities

☐ Activity 1: Getting to the Thousandths

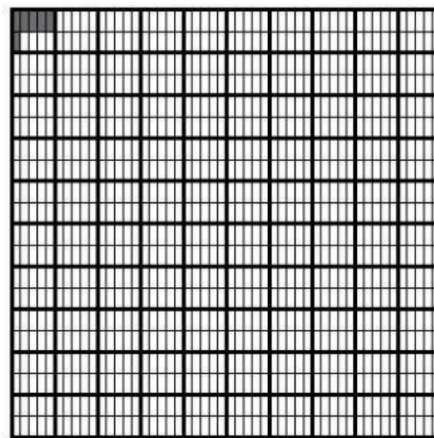
Look at the laminated decimal grid from your math kit. Each of the four grids represents a whole or the number 1. You should see that the Tenths grid is divided into 10 equal spaces. The Hundredths grid is divided into 100 equal spaces (10×10). So, how many equal spaces is the Thousandths grid divided into? You can check this mathematically by multiplying 100 times 10 because there are 100 small squares, and each of these squares is divided into 10 tiny columns: $100 \times 10 = 1,000$.

Use a dry-erase marker to show 0.6 on the Tenths grid and 0.06 on the Hundredths grid. You should color six spaces on each grid like this:



Notice that 0.6 is much greater than 0.06. In the same way that digits in whole numbers grow larger in value as you move left, digits in decimal numbers grow smaller in value as you move right.

The place to the right of the hundredths place is called the **thousandths place**. Here's what 0.006 or six thousandths looks like on the Thousandths grid.



Here are examples of decimals to the thousandths and how you write and say them:

0.563	$\frac{563}{1000}$	five hundred sixty-three thousandths
0.142	$\frac{142}{1000}$	one hundred forty-two thousandths
0.075	$\frac{75}{1000}$	seventy-five thousandths

Now, complete the "Thousandths" sheet by following the instructions provided. Use the laminated decimal grid as needed.

☐ Activity 2: Expanding Decimals

You already know about writing whole numbers in expanded form and expanded notation. For example, 463 can be expanded to $400 + 60 + 3$, and it can be expanded further into $(4 \times 100) + (6 \times 10) + (3 \times 1)$.

You can also write decimal numbers in both expanded form and expanded notation. Both expanded form and expanded notation can be shown with fractions or decimals. Look at the examples of each below.

The first one shows fraction expanded form.

$$0.82 = \frac{8}{10} + \frac{2}{100}$$

Here is the same number written in decimal expanded form:

$$0.82 = 0.8 + 0.02$$

In fraction and decimal expanded form, you can see that you simply expand, or stretch out, the number so that each digit value is shown separately. Expanded notation works just a bit differently.

Look at the example number written in fraction expanded notation:

$$0.82 = \left(8 \times \frac{1}{10} \right) + \left(2 \times \frac{1}{100} \right)$$

Expanded notation expands the number but does so by naming the digit and its place value. To see how this approach works, it's important to remember how to multiply whole numbers by unit fractions (fractions that have a numerator of 1). You multiply the numerator in the fraction (1) by the whole number and leave the denominator the same. So, $(8 \times 1/10)$ is the same as $8/10$, and $(2 \times 1/100)$ is the same as $2/100$. Did you notice that the resulting fractions are the same ones shown in fraction expanded form? That's how you can see that each of these methods are simply different ways to write the same number.

You can also write in expanded notation using decimals:

$$0.82 = (8 \times 0.1) + (2 \times 0.01)$$

Notice that the decimal after each digit tells the place value where the digit belongs. So, in this example, 8 belongs in the tenths place and 2 belongs in the hundredths place.

You may wonder why the zero in the ones place isn't included in expanded notation. When a number has only decimal values, a zero is often included in the ones place. Although it isn't required, it can help make the number easier to read. Since the 0 is not holding a set place between valued numbers (as with the 0 in 206, for example), it isn't included in expanded notation.

Now, you'll complete the "Expanding Decimals" sheets. Be sure to look closely at the examples provided. When you are finished, you can store the first page in your Interactive Notebook.

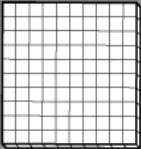
Wrapping Up

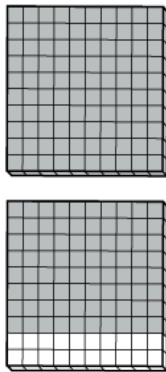
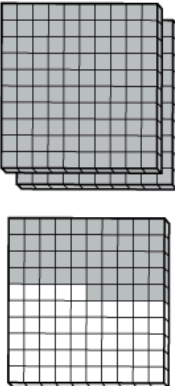
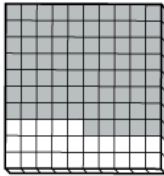
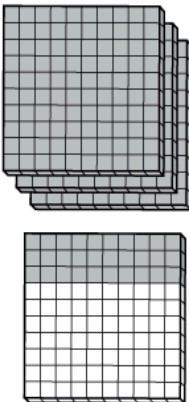
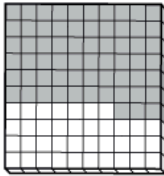
Thousandths are very small numbers. During the next lesson, you'll apply your understanding of decimals and decimal place value to comparing decimals to the thousandths.

Learning Gates

Take the [Learning Gates quiz](#) for this lesson.

DECIMAL SORT

Decimal Form	Word Form	Fraction Form		Money	Fraction Expanded Form
0.75					
1.8					
0.63					
2.45					
3.3					

$1 + \frac{8}{10}$	sixty-three hundredths	
$3 + \frac{3}{10}$	two and forty-five hundredths	
$2 + \frac{4}{10} + \frac{5}{100}$	seventy-five hundredths	
$\frac{7}{10} + \frac{5}{100}$	three and three tenths	
$\frac{6}{10} + \frac{3}{100}$	one and eight tenths	
$\frac{63}{100}$		
$2 \frac{45}{100}$		
$3 \frac{3}{10}$		
$\frac{75}{100}$		
$1 \frac{8}{10}$		

Thousandths



Instructions: Circle the digit that is in the given place.

Tenths place

2.381

Hundredths place

32.258

Thousandths place

45.321

Instructions: Answer each question. Write your answer in fraction form. Think about what you know about decimal place value!

Example: What is the value of 3 in the number 24.673? $\frac{3}{1000}$

What is the value of 6 in the number 254.586? _____

What is the value of 5 in the number 37.57? _____

What is the value of 3 in the number 25.43? _____

Instructions: Draw lines to match each decimal to its name.

0.002

four thousandths

0.05

one tenth

0.364

two thousandths

0.1

five hundredths

0.028

twenty-eight
thousandths

0.004

three hundred sixty-four
thousandths

Expanding Decimals

Instructions: Complete the table using the examples provided.

	Number form	Word form	Fraction form	Fraction expanded notation	Decimal expanded notation
Tenths	0.1				1×0.1
Hundredths		One hundredth	$\frac{1}{100}$		
Thousandths	0.001		$\frac{1}{1000}$	$1 \times \frac{1}{1000}$	

The decimal number **0.58** can be written in the following ways:

Word form:

fifty-eight hundredths

Fraction form:

$$\frac{58}{100}$$

Fraction expanded form:

$$\frac{5}{10} + \frac{8}{100}$$

Decimal expanded form:

$$0.5 + 0.08$$

Fraction expanded notation:

$$(5 \times \frac{1}{10}) + (8 \times \frac{1}{100})$$

Decimal expanded notation:

$$(5 \times 0.1) + (8 \times 0.01)$$

The decimal number **1.875** can be written in the following ways:

Word form:

one and eight hundred seventy-five thousandths

Fraction form:

$$1 \frac{875}{1000}$$

Fraction expanded form:

$$1 + \frac{8}{10} + \frac{7}{100} + \frac{5}{1000}$$

Decimal expanded form:

$$1 + 0.8 + 0.07 + 0.005$$

Fraction expanded notation:

$$(1 \times 1) + (8 \times \frac{1}{10}) + (7 \times \frac{1}{100}) + (5 \times \frac{1}{1000})$$

Decimal expanded notation:

$$(1 \times 1) + (8 \times 0.1) + (7 \times 0.01) + (5 \times 0.001)$$

Try it!Write **2.467** in each of the possible forms.

Word form: _____

Fraction form: _____

Fraction expanded form: _____

Decimal expanded form: _____

Fraction expanded notation: _____

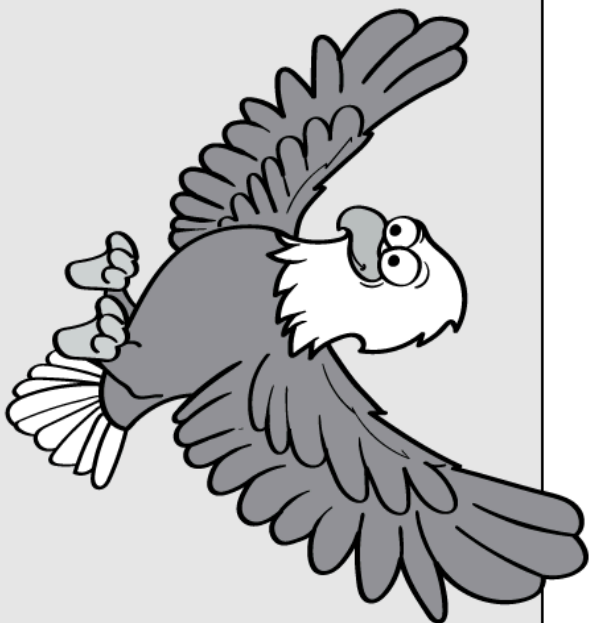
Decimal expanded notation: _____

Instructions: Write each of the following in number form.

$$(9 \times \frac{1}{10}) + (5 \times \frac{1}{100}) + (2 \times \frac{1}{1000}) = \underline{\hspace{2cm}}$$

$$(4 \times 1) + (3 \times 0.1) + (6 \times 0.01) = \underline{\hspace{2cm}}$$

$$(1 \times 1) + (4 \times \frac{1}{10}) + (0 \times \frac{1}{100}) + (9 \times \frac{1}{1000}) = \underline{\hspace{2cm}}$$



Lesson 4: Decimals to Thousandths

Getting Started

✿ Ideas to Think About

- How do you read and write decimal numbers?

📖 Things to Know

- **Thousandths:** decimal place to the right of the hundredths place, the third place to the right of the decimal point
- Decimal numbers can be written using expanded form. For example, 0.25 in fraction expanded form is $2/10 + 5/100$. In decimal expanded form, it is $0.2 + 0.05$.
- Decimal numbers can be written using expanded notation (in which the digit in each place is multiplied by its place value).
- In fraction expanded notation, 0.25 is $(2 \times 1/10) + (5 \times 1/100)$.
- In decimal expanded notation, 0.25 is $(2 \times 0.1) + (5 \times 0.01)$.

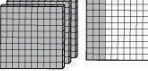
🎯 Skills

- Read, write, and compare decimals to thousandths
- Read and write decimals to thousandths using base-ten numerals, number names, and expanded form

Introducing the Lesson

During this lesson, your child will extend her understanding of decimals beyond hundredths to thousandths. In the introductory activity, she will sort cards into a chart to help reinforce the different ways that decimal numbers can be represented.

"Decimal Sort" Answer Key

Decimal Form	Word Form	Fraction Form		Money	Fraction Expanded Form
0.75	seventy-five hundredths	$\frac{75}{100}$			$\frac{7}{10} + \frac{5}{100}$
1.8	one and eight tenths	$1\frac{8}{10}$			$1 + \frac{8}{10}$
0.63	sixty-three hundredths	$\frac{63}{100}$			$\frac{6}{10} + \frac{3}{100}$
2.45	two and forty-five hundredths	$2\frac{45}{100}$			$2 + \frac{4}{10} + \frac{5}{100}$
3.3	three and three tenths	$3\frac{3}{10}$			$3 + \frac{3}{10}$

Reading and Questions



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1. Decimals, like fractions, allow you to show numbers that are less than or a part of what?

A whole

2. To see numbers that have *increasing* place values, you should look on what side of the decimal? To see numbers that have *decreasing* place values, you should look on what side of the decimal?

left; right

3. What place value is to the immediate right of the decimal point?

tenths

4. Each decimal place value is how much of the size of the value before it?

one tenth

5. Give it a try: 0.3 is the same as what fraction?

3/10

Activities

Activity 1: Getting to the Thousandths

During this activity, your child will use the laminated decimal grid sheet to identify decimal amounts to thousandths. Make sure that she has access to dry-erase markers.

"Thousandths" Answer Key

Tenths place	Hundredths place	Thousandths place
2.381	32.253	45.321

What is the value of 6 in the number 254.586?	$\frac{6}{1000}$
What is the value of 5 in the number 37.57?	$\frac{5}{10}$
What is the value of 3 in the number 25.43?	$\frac{3}{100}$

0.002	four thousandths
0.05	one tenth
0.364	two thousandths
0.1	five hundredths
0.028	twenty-eight thousandths
0.004	three hundred sixty-four thousandths

Activity 2: Expanding Decimals

Your child will extend her understanding of writing numbers in expanded form and expanded notation to writing decimals in both fraction and decimal expanded form and fraction and decimal expanded notation. To complete this activity, your child will review how to multiply whole numbers and unit fractions by multiplying the numerator by the whole number and leaving the denominator the same. If your child would benefit from further practice with this skill, the following video may be useful.

**Multiplying Fractions with Whole Numbers Song**

www.beyondthepage.com/link/12928/

"Decimal Expanded Form" Answer Key

	Number form	Word form	Fraction form	Fraction expanded notation	Decimal expanded notation
Tenths	0.1	One tenth	$\frac{1}{10}$	$1 \times \frac{1}{10}$	1×0.1
Hundredths	0.01	One hundredth	$\frac{1}{100}$	$1 \times \frac{1}{100}$	1×0.01
Thousandths	0.001	One thousandth	$\frac{1}{1000}$	$1 \times \frac{1}{1000}$	1×0.001

Word form: two and four hundred sixty-seven thousandths

Fraction form: $2 \frac{467}{1000}$

Fraction expanded form: $2 + \frac{4}{10} + \frac{6}{100} + \frac{7}{1000}$

Decimal expanded form: $2 + 0.4 + 0.06 + 0.007$

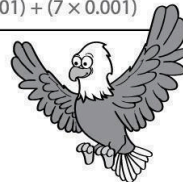
Fraction expanded notation: $(2 \times 1) + (4 \times \frac{1}{10}) + (6 \times \frac{1}{100}) + (7 \times \frac{1}{1000})$

Decimal expanded notation: $(2 \times 1) + (4 \times 0.1) + (6 \times 0.01) + (7 \times 0.001)$

$$(9 \times \frac{1}{10}) + (5 \times \frac{1}{100}) + (2 \times \frac{1}{1000}) = 0.952$$

$$(4 \times 1) + (3 \times 0.1) + (6 \times 0.01) = 4.36$$

$$(1 \times 1) + (4 \times \frac{1}{10}) + (0 \times \frac{1}{100}) + (9 \times \frac{1}{1000}) = 1.409$$

**Wrapping Up****Questions to Discuss**

- Ask your child to write the following numbers in decimal form as you read them aloud:
Four hundred sixty-nine thousandths (0.469)
One and eighty-seven hundredths (1.87)
- Now, ask her to write each of the numbers in expanded notation using fractions.
 $(4 \times 1/10) + (6 \times 1/100) + (9 \times 1/1,000)$
 $(1 \times 1) + (8 \times 1/10) + (7 \times 1/100)$

Things to Review

Review that there are different ways to represent decimals (number form, word form, fraction form, expanded form using fractions or decimals, expanded notation using fractions or decimals, base-10 grids, and money)

Review that decimal places get smaller as you move to the right