

# Decimals

Jul 22-7:57 PM

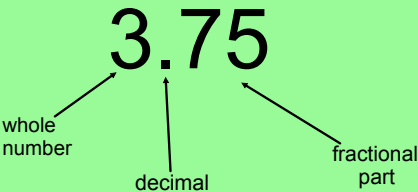
# Lesson 1: Decimal Place Value

Jul 23-11:10 AM

## What is a decimal?

A decimal is used to separate the whole number part of a number from the fractional part of a number, or the part of the number that is not whole. Fractions and decimals are the same, just written in different ways.

For example, if you have \$3.75, do you just have a whole number of dollars? No, you have 3 whole dollars and .75 (seventy-five hundredths) of a dollar. How many more cents do you need to make an even four dollars?



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## Whole Number Place Value

Just like whole numbers have place values, decimals have place values as well. In your notebook, quickly draw a place value chart up to the billions place. Label the chart "Whole Number Place Value" and remember to include the names of each period (group of 3 place values). Refer to your old notes of needed.

Billions			Millions			Thousands			Ones		
Hundred-billions	Ten-billions	Billions	Hundred-millions	Ten-millions	Millions	Hundred-thousands	Ten-thousands	Thousands	Hundreds	Tens	Ones
		7	0	9	3	4	0	0	4	5	1

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## Decimal Place Value

Since you know whole number place values, let's take a look at decimal place value. Here are some important things to remember.

1. Anything to the right of the decimal point in a number has a value of less than one whole. This is why it is on the fractional side of the decimal.
2. Any decimal place value ends in the letters "th" including tenths, hundredths, thousandths, ten thousandths, and so on.
3. When you read the decimal in the number, you say "and."

Ones	Tenths	Hundredths	Thousandths
1	3	7	5

Decimal place (AND)

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## Decimal Place Value

Remember that the decimal point separates the whole part of the number from the fractional part. When you read the decimal, you say AND.

Think of the ones place as a mirror. On one side of the mirror, you have the regular whole number place values. On the other side of the mirror, you have their evil twins, the decimal place values!

Thousands	Hundreds	Tens	Ones	Tenths	Hundredths	Thousandths
2	1	7	1	3	7	5

This number is two thousand, one hundred seventy-one AND three hundred seventy-five thousandths

Decimal place (AND)

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### Decimal Place Value and Value


Remember that place value is the place or position of a digit. Value is the value of a digit or what it is worth.

Thousands	Hundreds	Tens	Ones	Tenths	Hundredths	Thousandths
2	1	7	1	3	7	5

Decimal place (AND)

The 2 is in the **thousands place**. It has a value of 2 thousands, or 2,000.  
The 1 is in the **hundreds place**. It has a value of 1 hundred, or 100.  
The 7 is in the **tens place**. It has a value of 7 tens, or 70.  
The 1 is in the **ones place**. It has a value of 1.  
The 3 is in the **tenths place**. It has a value of 3 tenths, or 0.3. (also 3/10)  
The 7 is in the **hundredths place**. It has a value of 7 hundredths, or 0.07. (also 7/100)  
The 5 is in the **thousandths place**. It has a value of 5 thousandths, or 0.005. (also 5/1000)

Click the Study Jams crew to the right to learn more about decimal place value.



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### Let's Practice!

Given the number 19.456, give the value and place value of each digit.

Digit	Place Value	Value
1		
9		
4		
5		
6		

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### Let's Review

Click the decimals icon to the right to review how to read a decimal.



### Let's Play a Game!



\*\*Make sure to choose the option to play with decimals\*\*

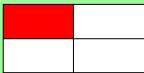
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# Lesson 2: Modeling Decimals


Jul 24-8:51 AM

### Fractions Review

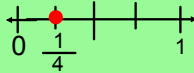
You already know that fractions are parts of a whole. The numerator represents the part and the denominator represents the number of pieces the whole is divided into. For example, if I wanted to show the fraction 1/4, I could do any of the following:



region



set



number line

Jul 23-4:40 PM

### Fractions and Decimals

Fractions and decimals are both parts of a whole. They are written differently. Decimals are written with a decimal point and fractions are written with a fraction bar, a numerator, and a denominator.

Since we are on a base ten number system, decimals only come in values including tenths, hundredths, and thousandths. Fractions can come with unlimited denominators including halves, thirds, fifths, sixths, tenths, and many more.

0.1 (one tenth) is the same as 1/10  
0.01 (one hundredth) is that same as 1/100  
0.001 (one thousandth) is the same as 1/1000

Jul 23-4:04 PM

Let's Practice

This chart shows the fraction equivalents of different decimals. Fill in the missing pieces of the chart.

Decimal	Fraction
0.11	
	54/100
0.893	
	7/10
0.9	
	45/1000
0.06	

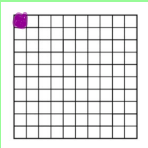
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Decimal Grids

The first way to model decimals is called a decimal grid. This grid looks like a hundreds board.



This entire model, when shaded in, represents 1 whole. If I shaded in one small square, what fraction have I shaded in?

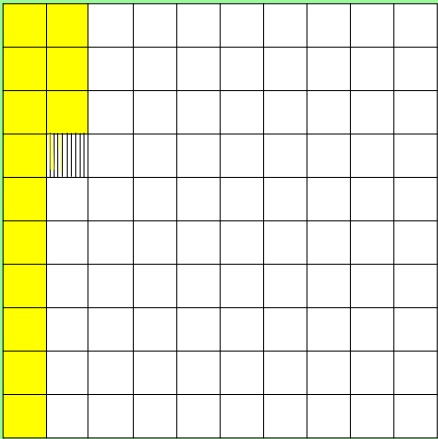


What if I wanted to show 1/10 (0.1)? How many small squares would I need to shade in

The way that this model looks, I can only show tenths and hundredths. How could I make this model show thousandths?

Jul 24-8:51 AM

Decimal Grids



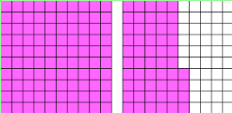
To show thousandths, you would need to zoom in and split each small square into ten pieces. Now, you have thousandths. Let's show the decimal 0.134 or (134/1000).

We will shade in the one in the tenths place, then the 3 in the hundredths place, and lastly, split a square into ten pieces to show the 4 in the thousandths place.

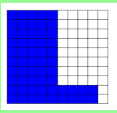
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Examples

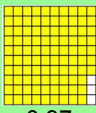
Here are some examples. Quickly sketch these into your notes.



1.54



0.58



0.97



0.44



3.47

Remember, if we want to show decimals to the thousandths, we will need to split a small hundredth square into ten pieces and shade the number of thousandths needed.

Jul 24-9:26 AM

Let's Practice!

Using the decimal grids provided, shade in the following decimals.

1.

0.87
5.

0.179
2.

0.3
6.

0.4
3.

0.985
7.

0.98
4.

0.72
8.

0.05

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Click the title of the game to play.

Decimal Models with Tenths Game

Decimal Models with Hundredths Game

Jul 24-9:44 AM

# Lesson 3: Modeling Decimals with Base Ten Blocks

Jul 24-10:02 AM

### Modeling Tenths and Hundredths

If we are modeling a decimal that only goes to the tenths or hundredths place (ex. 4.5 or 4.56), we can use the hundreds block ("flat"), the tens rod ("long"), and the ones cubes.

Flat:  
1 whole  
1

Long:  
1 tenth  
0.1 or 1/10

Small Cubes:  
1 hundredth  
0.01 or 1/100

1.24 one and twenty-four hundredths	
3.6 three and six tenths	
0.75 seventy-five hundredths	

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### Modeling Tenths, Hundredths, and Thousandths

If we are modeling a decimal that goes to the thousandths place, the base ten blocks would represent different values. To represent one whole, we would use the large cube as one whole, the "flat" as one tenth, the "long" as one hundredth, and the small cube as one thousandth.

Large Cube:  
1 whole  
1

Flat:  
1 tenth  
0.1 or 1/10

Long:  
1 hundredth  
0.01 or 1/100

Small Cube:  
1 thousandth  
0.001 or 1/1000

Jul 24-10:04 AM

### Modeling Tenths, Hundredths, and Thousandths

Large Cube:  
1 whole  
1

Flat:  
1 tenth  
0.1 or 1/10

Long:  
1 hundredth  
0.01 or 1/100

Small Cube:  
1 thousandth  
0.001 or 1/1000

Click on the base ten blocks to the right to see a video about using them to model decimals.


2.456	
0.870	
1.003	

Jul 24-10:04 AM

### Let's Practice

Remember that to model decimals that only go to the hundredths place, you only need to use the flat to represent the whole number, the long to represent the tenths, and the small cubes to represent the hundredths.

Click the star to go to a practice activity.



Recall that to model decimals that go to the thousandths place, you need to use the large cube to represent the whole number, the flat to represent the tenths, the long to represent the hundredths, and the small cubes to represent the thousandths.

In your notes, draw base ten block models to represent the following decimals. Check your work with your partner.

1. 1.209

4. 1.777

2. 4.456

5. 4.006

3. 0.983

6. 0.332

Jul 24-12:01 PM

# Lesson 4: Read and Write Decimals in Different Forms

Jul 23-1:04 PM

### Standard, Expanded, and Word Form

You must be able to recognize number in different forms. There are 3 main types which include standard, expanded, and word form. You may also see these called **notation** rather than form.

**standard form/notation:** a number as it is normally written with digits  
example: 45.789

**expanded form/notation:** expanded form involves breaking a number apart into the values of each digit

example: for 45.789 you would write  $40 + 5 + 0.7 + 0.08 + 0.009$

**word form/notation:** with word form, you just have to write the number in words as you hear it

example: for 45.789 you would write:

forty five and seven hundred eighty-nine thousandths

Jul 23-2:52 PM

### Standard Form/Notation

Let's Practice!

Read the following numbers out loud to your partner:

46.63

3.007

Write the following numbers in standard form:

eighty-nine and three hundred five thousandths

seven and twelve hundredths

ninety two and seven tenths

Jul 23-2:52 PM

### Expanded Form/Notation:

Remember that writing a number in expanded form involves breaking down a number into its individual digits and recording their values. Let's quickly review how to write a number in expanded form.

446 =  $400+40+6$  or in 5th grade expanded form,  $(4 \times 100) + (4 \times 10) + (6 \times 1)$

Writing a decimal number in expanded form is the same. Let's try it.  
Finish filling in the chart.

Standard Form	Regular Expanded	5th Grade Expanded
3.57	$3 + 0.5 + 0.07$	
1.657		
0.899	$0.8 + 0.09 + 0.009$	
345.2		

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### Expanded Form/Notation:

There is another way you might see 5th grade expanded form. It involves writing the decimal parts as fractions rather than decimals. Finish filling in the chart with the examples provided.

[Click the link to the right to see a demonstration on writing decimals in expanded form \(world icon\)](https://learnzillion.com/lesson_plans/8001-write-decimals-in-expanded-notation#indtn-lesson)  
[https://learnzillion.com/lesson\\_plans/8001-write-decimals-in-expanded-notation#indtn-lesson](https://learnzillion.com/lesson_plans/8001-write-decimals-in-expanded-notation#indtn-lesson)

Standard Form	5th Grade Expanded	5th Grade Expanded (with fractions)
3.57	$(3 \times 1) + (5 \times 0.1) + (7 \times 0.01)$	$(3 \times 1) + (5 \times \frac{1}{10}) + (7 \times \frac{1}{100})$
2.657	$(2 \times 1) + (6 \times 0.1) + (5 \times 0.01) + (7 \times 0.001)$	$(2 \times 1) + (6 \times \frac{1}{10}) + (5 \times \frac{1}{100}) + (7 \times \frac{1}{1000})$
0.899		
345.2		

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### Word Form/Written Notation

Word form is fairly simple. All you need to do is read a number and write exactly what you say. There are a few other simple grammatical rules to remember when writing numbers in word form

- Put commas in the word form of a number in the same place they are in the standard form (where you naturally pause). When you come to a comma, you would be writing one of the following words: billion, million, or thousand, depending on which comma you are on.
- When writing number parts like sixty-five and eighty-one, include a hyphen (dash) between the number words
- The only time to say/write AND is when there is a decimal in the number.

\*\*The most important thing is to get the word written down. You can edit your work to correct any mistakes involving the rules above afterwards.

Let's Practice!

Read the following numbers and write them in word form. Refer to your notes for help.

23.456	13.8	12.306
4.879	4.44	9.07

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# Lesson 5:

# Equivalent Decimals

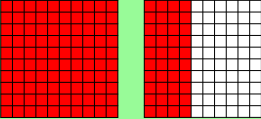
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**Equivalent Decimals**

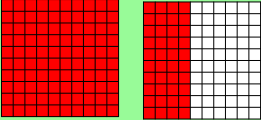
Equivalent decimals are decimals that are the same or equal. Let's look at a few examples.

We will start by making a grid model of the following decimals: 1.4 and 1.40

1.4



1.40




What do you notice about these 2 models? If there a digit you could remove from one of the numbers without changing the way the model looks?

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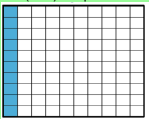
Decimals are equivalent if they have the same digits in the same place values.

This decimal grid represents the value 0.1 or 1/10



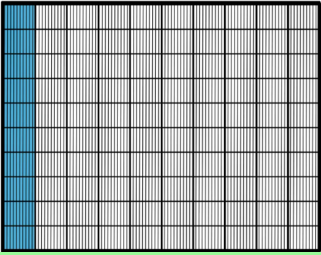
0.1

If we keep the same amount shaded and divide the grid into hundredths, we can see that 0.1 (1/10) is equivalent to 0.10 (10/100).



0.1 = 0.10

Now if we divide the same model into thousandths, we can see that 0.1, 0.10, and 0.100 are equivalent

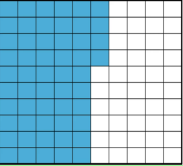


0.1 = 0.10 = 0.100

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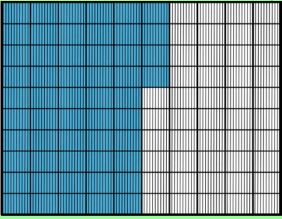
**Another Example**

Here is a grid model showing the decimal 0.54 (54/100).



0.54

If we divide the grid into thousandths but keep the same amount shaded, we can see that 0.54 is equivalent to 0.540. The pieces are just smaller.



0.54 = 0.540

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**Practice**

Write one equivalent decimal for each.

<https://learnzillion.com/resources/9776>

**\*\*Adding zeroes after the decimal number is over does not change the value of the decimal. If you are adding decimals in between the existing digits, you are changing the number. For example, 0.7 and 0.70 are equivalent, but 0.7 and 0.07 are not. Seven tenths is not the same as seven hundredths.**

1.4

1.3

0.76

0.560

0.06

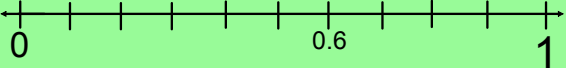
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**Lesson 6:**  
**Comparing**  
**and Ordering**  
**Decimals**

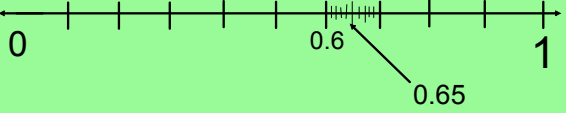
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**Number Lines**

A number line is a line that extends in both directions that is used to show where a number is located in relation to other numbers. To start your number line, you need to decide which numbers your number will fall between. Let's show the number 0.6, which is more than zero but less than one.



0.6 or 6/10 would be located 6 marks after the 0 and 4 marks before the 1. What if we wanted to use the same number line to show 0.65? How could we divide the number line even more?



0.65

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### Decimals on a Number Line

[https://learnzillion.com/lesson\\_plans/7225-represent-decimal-numbers-on-a-number-line#fndtn-lesson](https://learnzillion.com/lesson_plans/7225-represent-decimal-numbers-on-a-number-line#fndtn-lesson)

Click the link to see a video about decimals on a number line.

Complete the first part of the practice handout with the teacher. Check your work. Then, complete the second half of the handout on your own.

Name: \_\_\_\_\_

#### Decimal Number Line

Write the correct letter on the blank line next to each decimal.

0.38	c	1.16		1.75		0.54	
0.70		1.47		0.02		1.50	
1.29		0.25		1.83		0.91	

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### Comparing Decimals Using a Number Line

You can compare two decimals by placing them both on the same number line and seeing which one is larger, smaller, or if they are equivalent.

Let's start by comparing the decimals 0.6 (six tenths) and 0.4 (four tenths). If we plot both of those decimals on a number line, we can see that 0.6 is greater than 0.4.

$0.6 > 0.4$

Click the link below to see a video explaining how to compare decimals up to the hundredths place using a number line.

[https://learnzillion.com/lesson\\_plans/314-compare-two-decimals-using-a-number-line-and-comparison-symbols#fndtn-lesson](https://learnzillion.com/lesson_plans/314-compare-two-decimals-using-a-number-line-and-comparison-symbols#fndtn-lesson)

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### Comparing Decimals Using Fractions and Decimal Grid Models

Remember that decimals can be shown in fraction form. These can be shown on a grid model.

$0.1 = \frac{1}{10} = \text{one tenth} =$

$0.01 = \frac{1}{100} = \text{one hundredth} =$

$0.35 = \text{thirty-five hundredths} =$

$\frac{35}{100} =$

Let's compare 0.2 and 0.3

$0.2 = \frac{2}{10} < 0.3 = \frac{3}{10}$

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### Another Example

Emmanuel has 0.21 of a lb of grapes and Susanna has 0.3 lb. Who has more?

We want to make these fractions have the same denominators

Core Lesson

$0.21 = \frac{21}{100}$   $0.3 = \frac{3}{10} = \frac{30}{100}$

$\frac{21}{100} < \frac{30}{100}$

Core Lesson

$0.21 = \frac{21}{100}$   $0.3 = \frac{3}{10} = \frac{30}{100}$

$\frac{21}{100} < \frac{30}{100}$

Click the link to see a video of this lesson

[https://learnzillion.com/lesson\\_plans/5953-compare-decimals-using-fractions#fndtn-lesson](https://learnzillion.com/lesson_plans/5953-compare-decimals-using-fractions#fndtn-lesson)

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### Compare Decimals with the Cross-Out Method

$1.03 \bigcirc 1.026$

Step 1: Line up the decimals by their place values.

$1.03$   
 $1.026$

Step 2: Starting at the largest place value, begin crossing out the digits until they no longer match.

~~1.0~~3  
~~1.0~~26

The hundredths place of 1.03 is larger than the hundredths place of 1.026, therefore, 1.03 is the larger number.

$1.03 > 1.026$

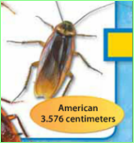
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### Let's Practice

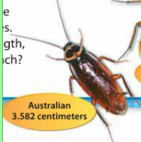
Use '<', '>' or '=' to compare the numbers.

- 6.81 \_\_\_\_\_ 6.37
- 6.32 \_\_\_\_\_ 6.5
- 2.216 \_\_\_\_\_ 2.149
- 6.48 \_\_\_\_\_ 6.99
- 5.75 \_\_\_\_\_ 5.750


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American  
3.576 centimeters



Australian  
3.582 centimeters



Oriental  
3.432 centimeters

### Ordering Decimals

Order the cockroaches from least to greatest length. Use the three steps below to help you.

**Step 1**

Write the numbers, lining up the decimal points. Start at the left. Compare digits of the same place-value.

3.576

3.432

3.582

**Step 2**

Write the remaining numbers, lining up the decimal points. Start at the left. Compare.

3.576

3.582

**Step 3**

Write the numbers from least to greatest.

3.432, 3.576, 3.582

In order of their lengths from least to greatest, the cockroaches are the Oriental, the American, and the Australian.

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# Lesson 7:

## Rounding Decimals

Jul 28-5:02 PM

### Rounding Decimals with a Number Line

Rounding to the Nearest Whole Number

[https://learnzillion.com/lesson\\_plans/5889-round-decimals-to-the-nearest-whole-number#fndtn-lesson](https://learnzillion.com/lesson_plans/5889-round-decimals-to-the-nearest-whole-number#fndtn-lesson)

Rounding to the Nearest Tenth

[https://learnzillion.com/lesson\\_plans/5374-round-decimals-to-the-nearest-tenth-using-a-number-line#fndtn-lesson](https://learnzillion.com/lesson_plans/5374-round-decimals-to-the-nearest-tenth-using-a-number-line#fndtn-lesson)

Rounding to the Nearest Hundredth

[https://learnzillion.com/lesson\\_plans/7226-round-decimals-to-the-nearest-hundredth#fndtn-lesson](https://learnzillion.com/lesson_plans/7226-round-decimals-to-the-nearest-hundredth#fndtn-lesson)

Jul 28-5:02 PM

You may also use another strategy to round decimals. For example, let's round 3.456 to the nearest tenth.

Step one: Underline the place you are rounding to     3.456

Step two: Circle the place to the right of the underlined place     3.4<sup>5</sup>6

Step three: If the circled number is 4 or less, then the underlined number stays the same. If the circled number is 5 or more, then the underlined number increases by one.     3.<sup>1</sup>4<sup>6</sup>

Step four: The numbers to the right of the underlined number change to zeros, and the numbers to the left of the underlined number stay the same.     Answer: 3.500 or 3.5

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### Let's Play a Game!

Choose an icon to play a game with rounding decimals.





Jul 28-5:34 PM

# Lesson 8:

## Place Value Relationships

Jul 28-5:38 PM

### Place Value Relationships

Place value increases ten times with each shift to the left and decreases ten times with each shift to the right.

Millions			Thousands			Ones			Thousandths		
Hundred Millions	Ten Millions	Millions	Hundred Thousands	Ten Thousands	Thousands	Hundreds	Tens	Ones	Tenths	Hundredths	Thousandths
								3	3		

Value increases ten times with each move to the left (to a higher place value).

One shift = 10 x greater  
 Two shifts = 100 x greater  
 Three shifts = 1,000 x greater  
 Four shifts = 10,000 x greater  
 Five shifts =  
 Six shifts =

Jul 28-5:38 PM

### Place Value Relationships

Place value increases ten times with each shift to the left and decreases ten times with each shift to the right.

Millions			Thousands			Ones			Thousandths		
Hundred Millions	Ten Millions	Millions	Hundred Thousands	Ten Thousands	Thousands	Hundreds	Tens	Ones	Tenths	Hundredths	Thousandths
					8	8					

Value decreases ten times with each move to the right (to a lower place value).

One shift = 1/10  
 Two shifts = 1/100  
 Three shifts = 1/1,000  
 Four shifts = 1/10,000  
 Five shifts =  
 Six shifts =

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### Place Value Relationships

You may be asked to determine place value relationships in several different ways.

- Compare the value of the 4 in 665.4 to the value of the 4 in 745.6.  
 The 4 in 665.4 is two places to the right of the 4 in 745.6, making the 4 in 665.4 1/100 the value of the 4 in 745.6.
- What is the relationship between the 3s in the number 35.43?  
 The 3 in the tens place is 1,000 times the value of the 3 in the hundredths place.
- Compare the values of the 4s in the number 334.457.  
 The four in the ones place is 10 times greater than the 4 in the tenths place.

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