

Whole Number and Decimal Place Values

We will begin our review of place values with a look at whole numbers. When writing large numbers it is common practice to separate them into groups of three using commas as the separator. When separating into groups of three, start from the right and count toward the left.

2 3 , 9 2 1 , 7 7 4
 ↖ ↖

The following is a chart showing this separation and how the groups are labeled.

Billions	Millions	Thousands	Units
4 3 2 ,	5 6 1 ,	9 6 3 ,	8 7 5

Each digit *within* each group of three has its own individual place value. Therefore, digits put in different places, as well as different groups, take on different values. Consider the assigned values to the group of three in the following example.

EXAMPLE 1: Write 444 in words.

SOLUTION:

4	4	4
↓	↓	↓
4 <i>hundreds</i>	4 <i>tens</i>	4 <i>ones</i>
↓	↓	↓
<i>four hundred</i>	<i>forty - four</i>	

When reading large numbers each group of three is read individually *followed by its group name*.

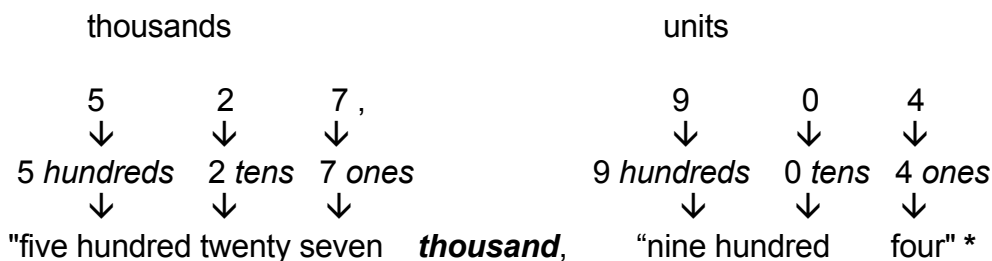
Let's look at a couple of examples of large numbers and how they would be written in words.

EXAMPLE 2: Write 527904 in words

SOLUTION: First separate the number into groups of three counting from right to left:

5 2 7 , 9 0 4
 ↖

Next evaluate the individual place values in each group and label each group with its group name:



* The "units" group name is usually not spoken or written.

After writing the place values within each group followed immediately by its group name, then write a comma to show the group separation.

Notice that when there is a zero digit in a particular place value (as in the tens position of the units group) or in an entire group, it is not read as "zero tens", as in our example, or "zero millions" it is simply not read or written.

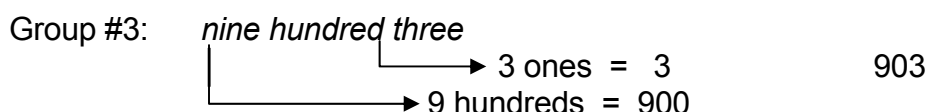
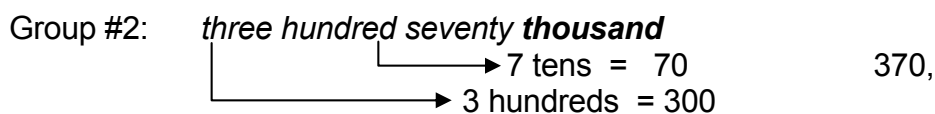
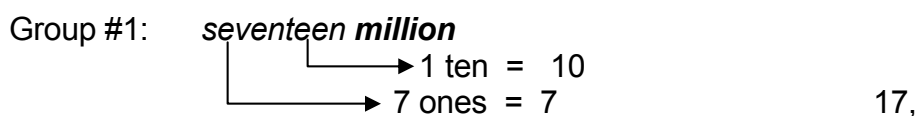
When writing numbers in words, as in writing numbers using digits, the comma is not required. However, when reading and writing larger numbers in any form, using commas to group the digits can make reading them much easier.

Now look at an example where we write the numeral from words.

EXAMPLE 3: Write the following words in numerals

"seventeen million, three hundred seventy thousand, nine hundred three"

SOLUTION: First separate the words, using the group names as the separators.



Putting the groups together and placing our commas in the correct place gives us the following:

17,370,903

The following place value chart has been presented to show place values for very large numbers and can be used for study and reference.

hundred trillions	ten trillions	one trillion	hundred billions	ten billions	one billions	hundred millions	ten millions	one millions	hundred thousands	ten thousands	one thousands	hundreds	tens	ones
4	4	4	3	3	3	2	2	2	1	1	1	0	0	0

PRACTICE SET - 1

Write the following numbers in words:

1) 845 _____

2) 16,532 _____

3) 14,300,575 _____

4) 12,635 _____

5) 129,308,341,665 _____

Write in numerals.

- 6) six hundred thirty six 6) _____
- 7) forty thousand, eighty six 7) _____
- 8) one hundred six thousand, four 8) _____
- 9) four million, seven thousand, three hundred twenty eight 9) _____
- 10) thirteen billion, twelve 10) _____

SOLUTIONS - 1

- 1) eight hundred forty-five
 - 2) sixteen thousand, five hundred thirty-two
 - 3) fourteen million, three hundred thousand, five hundred seventy-five
 - 4) twelve thousand, six hundred thirty-five
 - 5) one hundred twenty-nine billion, three hundred eight million, three hundred forty-one thousand, six hundred sixty-five
- 6) 636 7) 40,086 8) 106,004 9) 4,007,328 10) 13,000,000,012

In our system of numbers we notice that *place values get smaller as we move from left to right*. What happens when we get to the end? Any digit to the right of the ones must have a value less than one --- a fractional part of a whole.

To distinguish the ones place from this fractional part we place a decimal point (.) to the right of the ones place before writing the fractional part. This fractional part is called a **decimal fraction**.

Study the following chart showing decimal fraction place values.

hundred millions	ten millions	one millions	hundred thousands	ten thousands	one thousands	hundreds	tens	ones	AND	<i>tenths</i>	<i>hundredths</i>	<i>thousandths</i>	<i>then thousandths</i>	<i>hundred thousandths</i>	<i>millionths</i>	<i>ten millionths</i>	<i>hundred millionths</i>
9	8	7	6	5	4	3	2	1	.	1	2	3	4	5	6	7	8

Numbers to the right of the decimal point are read like whole numbers and are given a value according to the *position* of the *last digit*. Notice that all place values to the right of the decimal point end in **ths**. This is so they can be easily distinguished from their whole number counter-parts.

When reading a number with both whole number and decimal parts it is appropriate to read the decimal point as "*and*" to indicate the separation from the whole number and the decimal fraction parts.

EXAMPLE 3: Write 37.4279 in words

SOLUTION: First, write the whole number part up to the decimal point.

3	7	.
↓	↓	↓
3 <i>tens</i>	7 <i>ones</i>	<i>and</i>
↓	↓	↓
"thirty - seven <i>and</i> "		

Next, write the digits to the right of the decimal point as though they were whole numbers. Then, attach the name of the place value of the last digit to the end.

4	2	7	9
↓	↓	↓	↓
4 <i>thousands</i>	2 <i>hundreds</i>	7 <i>tens</i>	9 <i>ones</i>
↓	↓	↓	↓
"four thousand, two hundred seventy-nine <i>ten-thousandths</i> "			

When put together they would read as follows:

"thirty - seven ***and*** four thousand, two hundred seventy-nine ***ten-thousandths***"

Let's look at a few more examples of decimal numbers written in words.

EXAMPLES:


a) 0.6	<i>is read</i>	"six <i>tenths</i> "
b) 0.45	<i>is read</i>	"forty five <i>hundredths</i> "
c) 0.234	<i>is read</i>	"two hundred thirty four <i>thousandths</i> "
d) 0.0537	<i>is read</i>	"five hundred thirty seven <i>ten-thousandths</i> "

Now look at some examples of words written as decimal numbers.

EXAMPLES:

- | | | |
|---|-------------------|------------|
| a) thirty thousand, forty two <i>and</i> seventy five thousandths | <i>is written</i> | 30,042.075 |
| b) two thousand, three <i>and</i> three tenths | <i>is written</i> | 2,003.3 |
| c) seven hundred <i>and</i> five hundredths | <i>is written</i> | 700.05 |
| d) ten thousand, one hundred seventy <i>and</i> twelve hundredths | <i>is written</i> | 10,170.12 |

The following is a list of steps for reading decimal numbers.



STEPS FOR READING DECIMAL NUMBERS

- 1) Read whole number digits, by groups, starting at the *left* of the number.
- 2) Read an ***and*** to indicate the decimal point.
- 3) Read decimal digits by *starting* at the decimal point and reading to the *right* as if the digits are whole numbers.
- 4) Attach the name of the ***last decimal place*** which contains a digit.

PRACTICE SET - 2

Write the following decimal numbers in words.

- 1) 0.4 _____
- 2) 0.19 _____
- 3) 6.039 _____
- 4) 15.42 _____
- 5) 327.5 _____

Write the following using decimal numbers.

- 6) seven tenths _____ 7) eleven hundredths _____
- 8) three hundred and fourteen hundredths _____
- 9) seventeen and seventeen thousandths _____
- 10) one thousand five hundred twenty six and three hundred twenty five thousandths _____

SOLUTIONS - 2

- | | |
|---|---|
| 1) four tenths | 6) 0.7 or .7 (leading zero is optional) |
| 2) nineteen hundredths | 7) 0.11 or .11 (leading zero is optional) |
| 3) six and thirty-nine thousandths | 8) 300.14 |
| 4) fifteen and forty-two hundredths | 9) 17.017 |
| 5) three hundred twenty-seven and five tenths | 10) 1,526.325 |

PRACTICE TEST

In the number **39,271,804** write the digit that represents the following place values:

- | | |
|-----------------------|----------------------------|
| 1) thousands _____ | 2) hundreds _____ |
| 3) ten millions _____ | 4) hundred thousands _____ |

Write the following whole numbers in words:

- 5) 4,270 _____
- 6) 28 _____
- 7) 907,291,302 _____
- 8) 20,000,037 _____

Write the following in numerals.

- 9) five hundred twelve 9) _____
- 10) three million, nine hundred thousand, twenty-seven 10) _____
- 11) three hundred twenty-eight billion, forty-six million, two hundred fifteen thousand, three hundred eighty-one 11) _____
- 12) seventy thousand, fifty-nine 12) _____



In the number **3,072.869135** write the digit that represents the following place values:

- 13) hundreds _____
- 14) hundredths _____
- 15) millionths _____
- 16) thousandths _____
- 17) tens _____
- 18) ones _____



Write the following decimal numbers in words.

- 19) 0.18

- 20) 7.077

- 21) 3,074,014.1397

- 22) 545.00129

- 23) 2004.020551

Write the following in decimal numbers.

- | | |
|---|-----------|
| 24) six tenths | 24) _____ |
| 25) nineteen and nineteen thousandths | 25) _____ |
| 26) five hundred sixty seven thousand, ninety five and eight hundred twenty two ten thousandths | 26) _____ |
| 27) nine million, six thousand, ten and three millionths | 27) _____ |
| 28) seven hundred seventy seven and seven hundred seventy seven thousandths | 28) _____ |

SOLUTIONS TO PRACTICE TEST

- | | |
|------|---|
| 1) 1 | 5) four thousand two hundred seventy |
| 2) 8 | 6) twenty eight |
| 3) 3 | 7) nine hundred seven million, two hundred ninety one thousand, three hundred two |
| 4) 2 | 8) twenty million thirty seven |
-
- | | | | | |
|---------------|---------------------|-------|-------|-------|
| 9) 512 | 11) 328,046,215,381 | 13) 0 | 15) 5 | 17) 7 |
| 10) 3,900,027 | 12) 70,059 | 14) 6 | 16) 9 | 18) 2 |
-
- 19) eighteen hundredths
 20) seven and seventy seven thousandths
 21) three million seventy four thousand fourteen and one thousand three hundred ninety seven ten-thousandths
 22) five hundred forty five and one hundred twenty nine hundred-thousandths
 23) two thousand four and twenty thousand five hundred fifty one hundred-thousandths
- | | | | | |
|---------|------------|------------------|----------------------|-------------|
| 24) 0.6 | 25) 19.019 | 26) 567,095.0822 | 27) 9,006,010.000003 | 28) 777.777 |
|---------|------------|------------------|----------------------|-------------|