# 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 *hundreds*    4 *tens*    4 *ones*
↓    ↓    ↓
**four hundred    forty - four**

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:

| thousands | | | | units | | |
|---|---|---|---|---|---|---|
| 5 | 2 | 7 , | | 9 | 0 | 4 |
| ↓ | ↓ | ↓ | | ↓ | ↓ | ↓ |
| 5 *hundreds* | 2 *tens* | 7 *ones* | | 9 *hundreds* | 0 *tens* | 4 *ones* |
| ↓ | ↓ | ↓ | | ↓ | ↓ | ↓ |

"five hundred twenty seven   ***thousand***,     "nine hundred     four" *

\* 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.

Group #1:      *seventeen **million***
                            → 1 ten  =   10
                            → 7 ones  = 7                          17,

Group #2:      *three hundred seventy **thousand***
                            → 7 tens  =  70                370,
                            → 3 hundreds  = 300

Group #3:      *nine hundred three*
                            → 3 ones  =  3                903
                            → 9 hundreds  =  900

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)_____

## S O L U T I O N S - 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* | ten*ths* | hundre*dths* | thousand*ths* | then thousand*ths* | hundred thousand*ths* | million*ths* | ten million*ths* | hundred milliont*hs* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 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 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 *tens*   7 *ones*  *and*
↓          ↓     ↓
"thirty  -  seven ***and***"

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 *thousands*   2 *hundreds*   7 *tens*  9 *ones*
↓          ↓          ↓       ↓
"four thousand, two hundred seventy-nine ***ten-thousandths***"

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      *is read*    "six ***tenths***"
                  b) 0.45     *is read*    "forty five ***hundredths***"
                  c) 0.234    *is read*    "two hundred thirty four ***thousandths***"
                  d) 0.0537   *is read*    "five hundred thirty seven ***ten-thousandths***"

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

**EXAMPLES:**

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

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

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✏️          **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.

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## 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
2) nineteen hundredths
3) six and thirty-nine thousandths
4) fifteen and forty-two hundredths
5) three hundred twenty-seven and five tenths

6) 0.7 *or* .7    (leading zero is optional)
7) 0.11 *or* .11 (leading zero is optional)
8) 300.14
9) 17.017
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) _____

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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             _____

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**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