

FRACTIONS AND DECIMALS

A fraction is a number that represents a whole number that has been divided into equal parts.

Types of fractions
Like , Unlike , Proper ,
Improper , Mixed ,
Equivalent

- ❖ LIKE FRACTIONS-The fractions having same denominators are called like fractions. E.g.: $\frac{2}{6}$, $\frac{3}{6}$, $\frac{4}{6}$, $\frac{5}{6}$ etc.
- ❖ UNLIKE FRACTIONS-The fractions having different denominators are called unlike fractions. E.g.: $\frac{2}{3}$, $\frac{3}{5}$, $\frac{4}{6}$, $\frac{5}{9}$ etc.
- ❖ PROPER FRACTIONS-The fractions having numerators smaller than denominators are called proper fractions. E.g.: $\frac{2}{3}$, $\frac{3}{5}$, $\frac{4}{6}$, $\frac{5}{9}$ etc.
- ❖ IMPROPER FRACTIONS-The fractions having numerators larger than denominators are called improper fractions. E.g.: $\frac{4}{3}$, $\frac{8}{5}$, $\frac{9}{6}$, $\frac{55}{9}$ etc.
- ❖ MIXED FRACTIONS-The fractions that are formed by a whole number and a proper fraction are called mixed fractions.
- ❖ EQUIVALENT FRACTIONS-The fractions which look different but have the same value are called equivalent fractions. E.g.: $\frac{1}{2} = \frac{2}{4} = \frac{3}{6}$, $\frac{5}{10} = \frac{10}{20} = \frac{15}{30}$ etc.

HOW TO CHANGE MIXED FRACTION INTO IMPROPER FRACTION

Eg : $7 \frac{1}{9}$

$$\frac{(7 \times 9) + 1}{9} = \frac{64}{9}$$

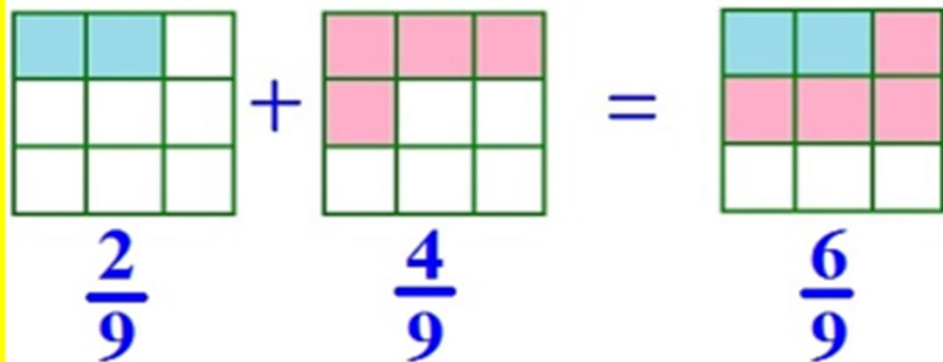
VICE VERSA

Eg : $\frac{17}{4} = 17/4 = 4$

4 is whole number and $\frac{1}{4}$

ADDITION

- Addition in like fractions
if we want to add the like fractions we first need to add the numerators. After adding them write the same denominator.

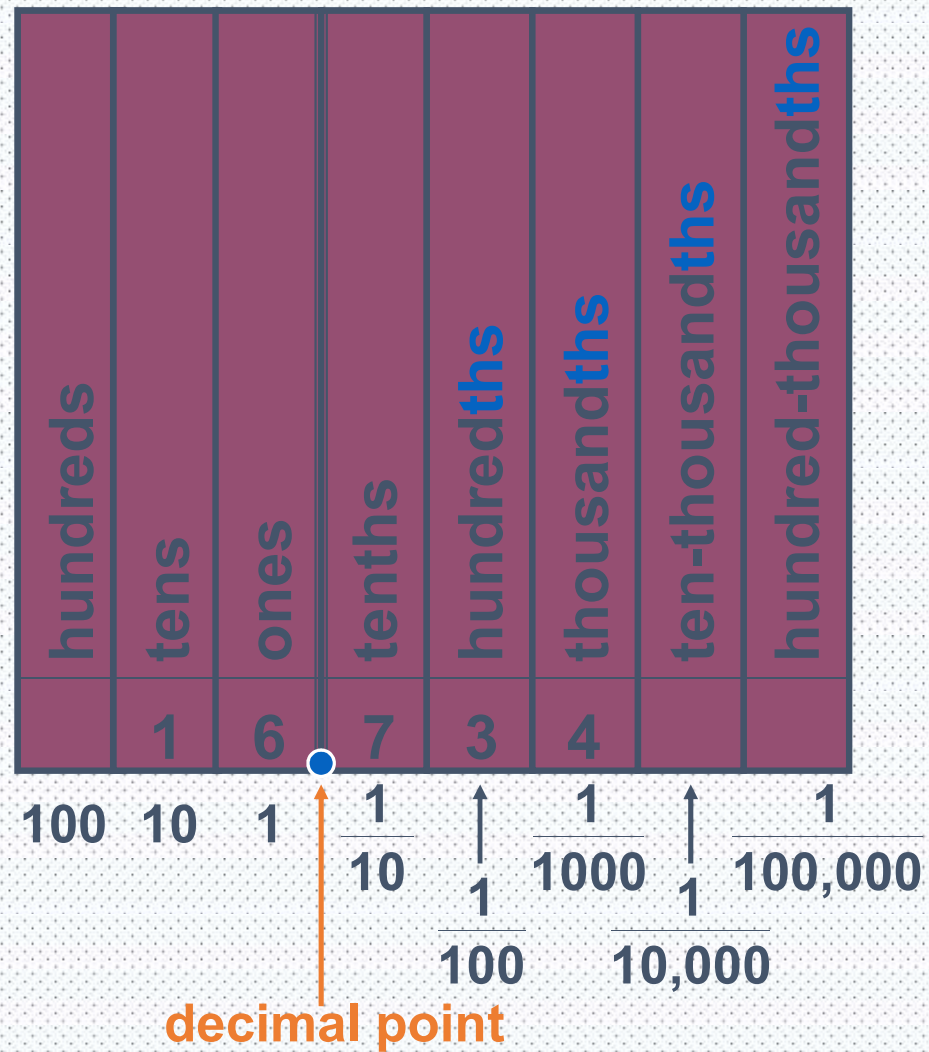


Decimals

Like fractional notation, decimal notation is used to denote a part of a whole. Numbers written in decimal notation are called decimal numbers, or simply decimals. The decimal 16.734 has three parts.

The position of each digit in a number determines its place value.

Place Value



Notice that the value of each place is

$$\frac{1}{10}$$

of the value of the place to its left.

16.734

The digit 3 is in the hundredths place, so
its value is 3 hundredths or $\frac{3}{100}$.

Writing (or Reading) a Decimal in Words

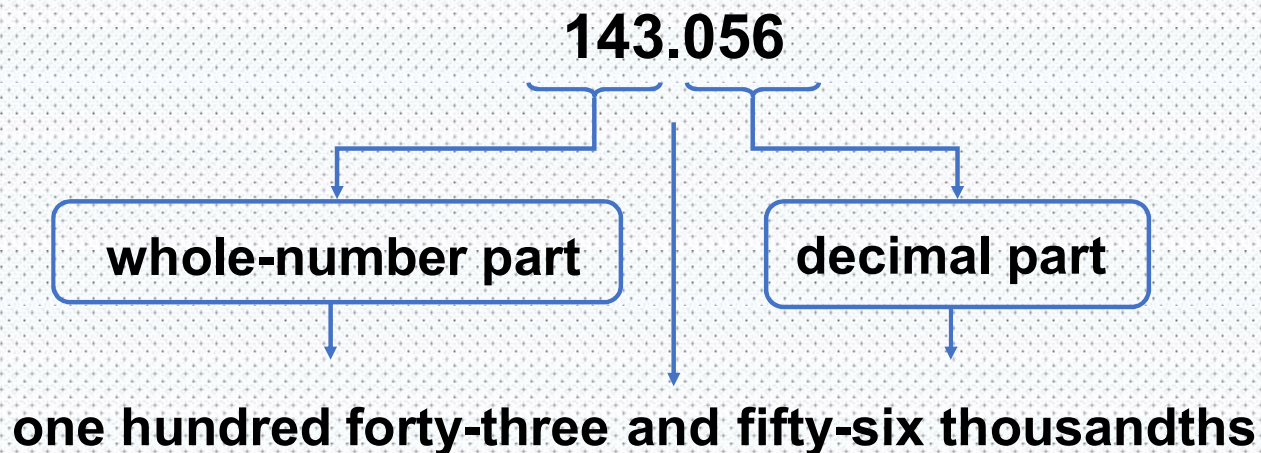
Step 1. Write the whole-number part in words.

Step 2. Write “and” for the decimal point.

Step 3. Write the decimal part in words as though it were a whole number, followed by the place value of the last digit.

Writing a Decimal in Words

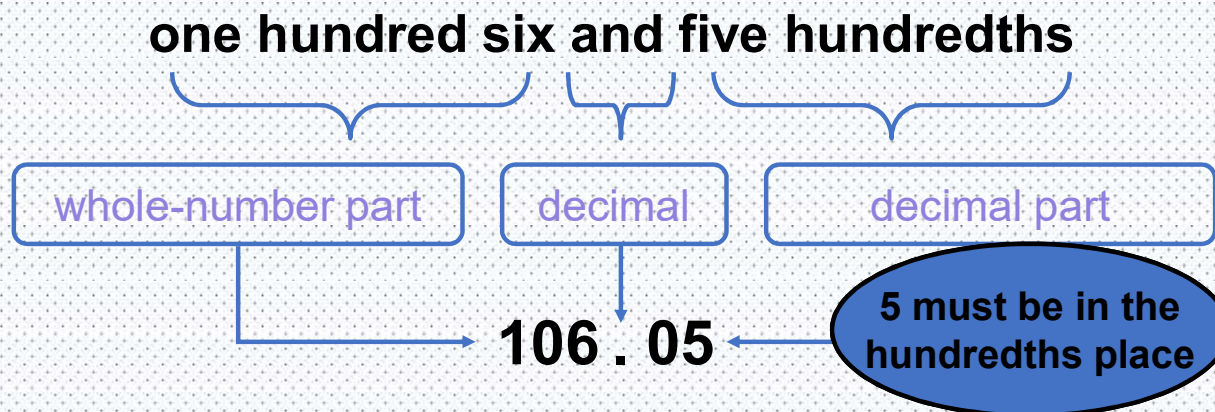
Write the decimal 143.056 in words.



Writing Decimals in Standard Form

A decimal written in words can be written in standard form by reversing the procedure.

Write one hundred six and five hundredths in standard form.



Writing Decimals as Fractions

Once you master writing and reading decimals correctly, then you write a decimal as a fraction using the fractions associated with the words you use when you read it.

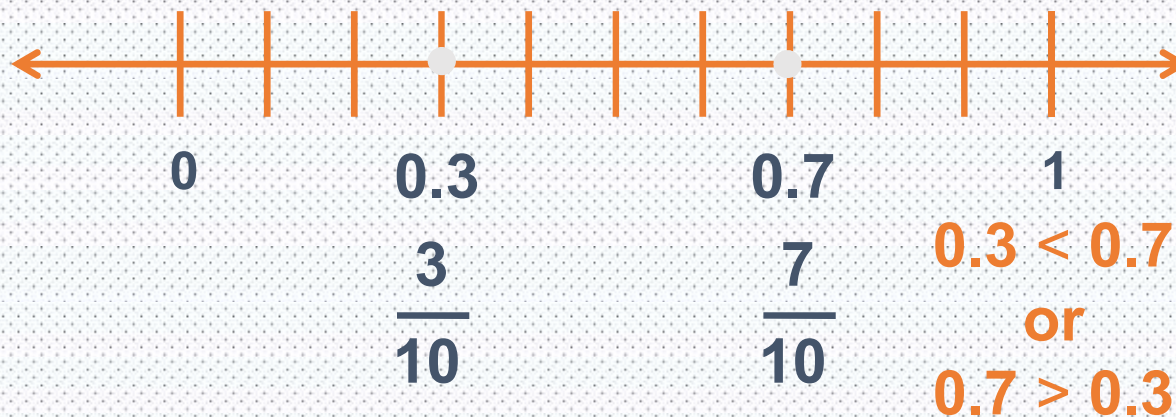
0.9

is read “nine tenths” and written as a fraction as

$$\frac{9}{10}$$

Comparing Decimals

One way to compare decimals is to compare their graphs on a number line. Recall that for any two numbers on a number line, the number to the left is smaller and the number to the right is larger. To compare 0.3 and 0.7 look at their graphs.



Comparing Two Positive Decimals

Compare digits in the same places from left to right. When two digits are not equal, the number with the larger digit is the larger decimal. If necessary, insert 0s after the last digit to the right of the decimal point to continue comparing.

Compare hundredths place digits

35.638


3
35.638

<
<

35.657


5
35.657

Rounding Decimals

We round the decimal part of a decimal number in nearly the same way as we round whole numbers. The only difference is that we drop digits to the right of the rounding place, instead of replacing these digits by 0s. For example,

63.782 rounded to the nearest hundredth is



63.78

Rounding Decimals To a Place Value to the Right of the Decimal Point

Step 1. Locate the digit to the right of the given place value.

Step 2. If this digit is 5 or greater, add 1 to the digit in the given place value and drop all digits to the right. If this digit is less than 5, drop all digits to the right of the given place.

Adding or Subtracting Decimals

- Step 1. Write the decimals so that the decimal points line up vertically.
- Step 2. Add or subtract as for whole numbers.
- Step 3. Place the decimal point in the sum or difference so that it lines up vertically with the decimal points in the problem.

Estimating Operations on Decimals

Estimating sums, differences, products, and quotients of decimal numbers is an important skill whether you use a calculator or perform decimal operations by hand.

Evaluating with Decimals

Evaluate $x + y$ for $x = 5.5$ and $y = 2.8$.

Replace x with 5.5 and y with 2.8 in $x + y$.

$$x + y = (5.5) + (2.8)$$

$$= 8.3$$

Multiplying Decimals

Multiplying decimals is similar to multiplying whole numbers. The difference is that we place a decimal point in the product.

$$\begin{array}{ccccccc} 0.7 & \times & 0.03 & = & \frac{7}{10} \times \frac{3}{100} & = & \frac{21}{1000} \\ \uparrow & & \uparrow & & & & \\ \text{1 decimal} & & \text{2 decimal} & & & & \\ \text{place} & & \text{places} & & & & \\ & & & & & & = 0.021 \quad \leftarrow \\ & & & & & & \text{3 decimal places} \end{array}$$

Multiplying Decimals

- Step 1. Multiply the decimals as though they were whole numbers.
- Step 2. The decimal point in the product is placed so the number of decimal places in the product is equal to the *sum* of the number of decimal places in the factors.

Multiplying Decimals by Powers of 10

There are some patterns that occur when we multiply a number by a power of ten, such as 10, 100, 1000, 10,000, and so on.

Multiplying Decimals by Powers of 10

$$76.543 \times 10 = 765.43$$

↑
1 zero

Decimal point moved 1 place to the right.

$$76.543 \times 100 = 7654.3$$

↑
2 zeros

Decimal point moved 2 places to the right.

$$76.543 \times 100,000 = 7,654,300$$

↑
5 zeros

Decimal point moved 5 places to the right.

The decimal point is moved the same number of places as there are zeros in the power of 10.

Multiplying by Powers of 10 such as 10, 100, 1000 or 10,000, . . .

Move the decimal point to the *right* the same number of places as there are *zeros* in the power of 10.

Multiply: 3.4305×100

Since there are *two zeros* in 100, move the decimal place *two places to the right*.

$$3.4305 \times 100 = 3.4305 = 343.05$$


Multiplying by Powers of 10 such as 0.1, 0.01, 0.001, 0.0001, . . .

Move the decimal point to the *left* the same number of places as there are *decimal places* in the power of 10.

Multiply: 8.57×0.01

Since there are *two decimal places* in 0.01, move the decimal place *two places to the left*.

$$8.57 \times 0.01 = 008.57 = 0.0857$$



Notice that zeros had to be inserted

Dividing by a Decimal

- Step 1. Move the decimal point in the divisor to the right until the divisor is a whole number.
- Step 2. Move the decimal point in the dividend to the right the *same number of places* as the decimal point was moved in Step 1.
- Step 3. Divide. Place the decimal point in the quotient directly over the moved decimal point in the dividend.

Estimating When Dividing Decimals

Divide $258.3 \div 2.8$

Exact

$$\begin{array}{r} 92.25 \\ 28 \overline{) 2583.} \\ \underline{-252} \\ 63 \\ \underline{-56} \\ 70 \\ \underline{-56} \\ 140 \\ \underline{-140} \\ 0 \end{array}$$

Estimate

$$\begin{array}{r} 100 \\ 3 \overline{) 300} \end{array}$$

rounds to

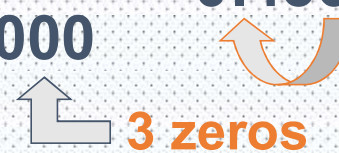
This is a reasonable answer.

There are patterns that occur when dividing by powers of 10, such as 10, 100, 1000, and so on.

$$\frac{456.2}{10} = 45.62$$


1 zero

The decimal point moved 1 place to the left.

$$\frac{456.2}{1,000} = 0.4562$$


3 zeros

The decimal point moved 3 places to the left.

The pattern suggests the following rule.

Dividing Decimals by Powers of 10 such as 10, 100, or 1000, . . .

Move the decimal point of the dividend to the *left* the same number of places as there are *zeros* in the power of 10.

Notice that this is the same pattern as *multiplying* by powers of 10 such as 0.1, 0.01, or 0.001. Because dividing by a power of 10 such as 100 is the same as multiplying by its reciprocal $\frac{1}{100}$, or 0.01.

$$\frac{463.7}{100} = 463.7 \times \frac{1}{100} = 463.7 \times 0.01 = 4.637$$

To divide by a number is the same as multiplying by its reciprocal.