Introduction to Decimal

Conversion Using Decimals

Operation on decimals

Introduction to Decimal

Decimal:

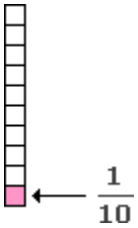
A number that uses place value and a decimal point to show tenths, hundredths, thousandths and so on.

For example:

The decimal 0.1 = $^{1}/_{10}$, 0.12 = $^{12}/_{100}$, 0.003 = $^{3}/_{1000}$

Tenths:

One out of ten equal parts is called a **tenth**.



The fractional form of one tenth is $\frac{1}{10}$ and the decimal equivalent is 0.1.

In a decimal, the first digit after the decimal point denotes tenth.

For example:

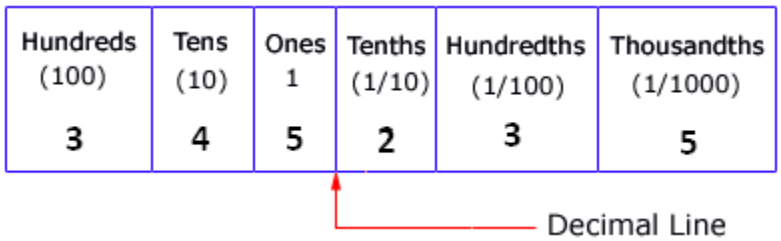
There are nine tenths in the number 2543.978.

Example:

Identify the digit in hundredths place of 345.235

Solution:

Step 1: Represent the places of the digits in the number as shown below.



Step 2: From the above figure, we learn that the digit in the tenth place is 2.

Representing Decimals on number line:

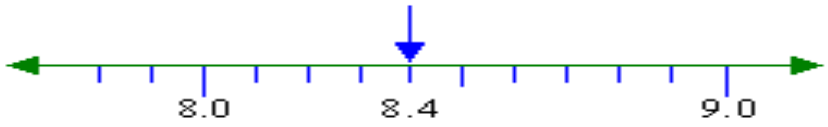
To represent a decimal on a number line, divide each segment of the number line into ten equal parts.

Example:

To represent 8.4 on a number line,

Solution:

First divide the segment between 8 and 9 into ten equal parts. The arrow is four parts to the right of 8 where it points at 8.4.

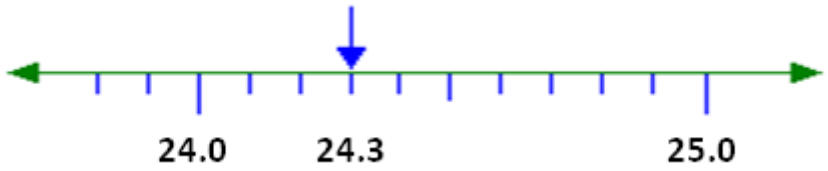


Example:

To represent 24.3 on a number line,

Solution:

First divide the segment between 24 and 25 into ten equal parts. The arrow is third part to the right of 8 where it points at 24.3.



Fractions as decimals:

We have seen how a fraction with denominator 10 can be represented using decimals. So Now, Let us try to find decimal representation of a fraction with the following examples:

Example: 1

Write in decimal notation.

(a) 3/2
(b) 4/5
(c) 8/5

Solution:

For writing in decimal notation, the denominator should be 10.

(a) 3/2

In 3/2, the denominator is 2. We first make an equivalent fraction of 3/2 which have denominator 10. So,

3/2 = (3x5) / (2x5) = 15/ 10 = 1.5

Therefore, 3/2 is **1.5** in decimal notation.

(a) 4/5

In 4/5, the denominator is 5. We first make an equivalent fraction of 4/5 which have denominator 10. So,

4/5 = (4x2) / (5x2) = 8/10 = 0.8

Therefore, 4/5 is **0.8** in decimal notation.

(c) 8/5

In 8/5, the denominator is 5. We first make an equivalent fraction of 8/5 which have denominator 10. So,

8/5 = (8x2) / (5x2) = 16/10 = 1.6

Therefore, 8/5 is **1.6** in decimal notation.

Decimals as fractions:

Any decimal can be converted to a fraction by counting the number of decimal places, and putting the decimal's digits over 1followed by the appropriate number of zeroes.

Example:

Write as fractions in lowest terms.

(a) 0.46
(b) 1.5
(c) 10.2
(d) 0.0003

Solution:

(a) 0.46 = 46/100 = 23/50

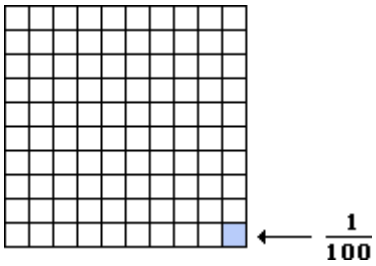
(b) 1.5 = 15/10 = 3/2

(c) 10.2 = 102/10 = 51/5

0.0003 = 3 / 10000

Hundredths:

One out of one hundred equal parts is called a **hundredths**



The fractional form of one hundredth is $\frac{1}{100}$ and the decimal equivalent is 0.01.

In a decimal, the second digit after the decimal point denotes hundredth.

For example: T

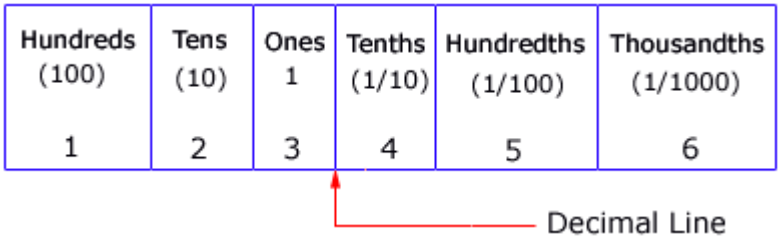
here are seven hundredths in the number 2543.978.

Example:

Identify the digit in hundredths place of 123.456.

Solution:

Step 1: Represent the places of the digits in the number as shown below.



Step 2: From the above figure, we learn that the digit in the hundredth place is 5.

Thousandth:

One part out of 1,000 equal parts of a whole
The fractional form of one hundredth is 1/1000 and the decimal equivalent is 0.001.

Comparing Decimals:

To compare two decimal numbers, compare digits in corresponding positions from left to right until the larger number is identified.

For example:

Compare 1.57 and 1.6.

Solution:

The unit's digit is 1 for both numbers and the tenths digit is 5 and 6 for the respective numbers.

Clearly, 5/10 < 6/10

So, 1.57 is less than 1.6.
Thus, 1.6 is the larger number.

Let us see some more examples:

Example:

Find the larger number in each pair:

a. 3.6 and 3.63
b. 5.738 and 5.74
c. 29.86527 and 29.869613

Solution:

(a). 3.6 is the same as 3.60. Now to compare 3.60 and 3.63, compare the digits in corresponding positions from left to right until the larger number is identified.

The unit's digit is 3 and the tenths digit is 6 for both numbers. The hundredths digit is 0 and 3 for the respective numbers.

Clearly, 0/100 < 3/100

So, 3.6 is less than 3.63.
Thus, 3.63 is the larger number.

(b). 5.74 is the same as 5.740. Now to compare 5.738 and 5.740, compare the digits in corresponding positions from left to right.

The unit's digit is 5 and the tenths digit is 7 for both numbers. The hundredths digit is 3 and 4 for the respective numbers.

Clearly, 3/100 < 4/100

So, 5.738 is less than 5.74.
Thus, 5.74 is the larger number.

(c). To compare 29.86527 and 29.869613, compare the digits in corresponding positions from left to right.

The tens digit, units digit, tenths digit and hundredths digit are the same for both numbers. The thousandths digit is 5 and 9 for the respective numbers.

Clearly, 5/1000 < 9/1000

So, 29.86527 is less than 29.869613.
Thus, 29.869613 is the larger number.

Conversion Using Decimals

Money:

We know that, 100 paise = Rs 1

Therefore, 1 paise = Rs 1/100 = Rs 0.01

So, 65 paise = Rs 65/ 100 = Rs 0.65

And 5 paise = Rs5/100 = Rs 0.05

Example:

What is 105 paise in Rs?

Solution:

1 paise = Rs 1/100 = Rs 0.01

105 paise = 100 paise +5 paise = 1Rs + (5/100) Rs = Rs (1 + 0.05) =Rs 1.05

Length:

In order to compare lengths (or distances), it is essential that we express them in the **same units**.

Example 1:

Convert 74 mm to cm.

Solution:

We know that 1cm = 10mm or 1mm =1/10cm

So, 74 = 74 x 1/10cm

= (74/10) cm

= 7.4cm.

Example 2:

Convert 38 cm to m.

Solution:

We know that 1m = 100cm or 1cm =1/100m

So, 38cm = 38 x 1/100m

= 0.38 m

Example 3:

Convert 10m to km.

Solution:

We know that 1km = 1000m or 1m = 1/1000km

So, 10m = 10 x 1/1000km

= 0.01km

Weight:

1000 g = 1 kg

Therefore, 1 g = 1/1000kg = 0.001 kg

Example: 1

Write 2kg 9g in 'kg' using decimals?

Solution:

We know that, 1000 g = 1 kg or 1 g = 1/1000kg = 0.001 kg

2kg 9g = 2kg + 9/1000kg
= 2 kg + 0.009kg
= 2.009kg

Example 2:

Convert 1086g to kg.

Solution:

We know that 1kg = 1000m or 1g = 1/1000kg

So, 1086g = 1086 x 1/1000kg

=1086/1000kg = 1.086kg

Operation on decimals

Addition of Numbers with Decimals:

To add decimal numbers, write them with decimal points below one another.

Example: 1

Add 6.7 + 3.9 + 4.6?

Solution:

we write them with decimal points below one another.

```
  2
  6.7
  3.9
+ 4.8
 15.4
```

Example: 2

Calculate 5.84 + 8 + 12.79.

Solution:

To add the given decimal numbers, insert zeros so that all of the numbers have the same number of decimal places and write the numbers with decimal points below one another.

```
 111
  5.84
  8.00
+12.79
 26.63
```

Example: 3

Mohan bought 9 kg 40 g of apples, 4 kg 70 g of grapes and 12 kg 500 g of mangoes. Find the total weight of all the fruits he bought.

Solution:

Weight of apples = 9 kg 40 g = 9.040 kg
Weight of grapes = 4 kg 70 g = 4.070 kg
Weight of mangoes = 12 kg 500 g = 12.500 kg

Therefore, the total weight of the fruits bought is

$$\begin{array}{r} {\scriptstyle 1\ 1\ 1\ \ \ \ \ \ \ \ } \\ 9.040\ \text{kg} \\ 4.070\ \text{kg} \\ +12.500\ \text{kg} \\ \hline 25.610\ \text{kg} \end{array}$$

Total weight of the fruits bought = 25.610 kg

Subtraction of Decimals:

To subtract a small decimal number from a larger decimal number, write them down with the larger one on top and the decimal points underneath one another. Then calculate the subtraction as you would for whole numbers and line up the decimal point in the answer.

Example:

Calculate 3.67 – 1.83?

Solution:

$$\begin{array}{r} {\scriptstyle 2\ 1\ 1\ \ \ \ \ \ \ \ } \\ 3.67 \\ -\ 1.83 \\ \hline 1.84 \end{array}$$

Thus, 3.67 – 1.83 = 1.84

Example:

Calculate 83.47 – 57.684?

Solution:

$$\begin{array}{r} 8\,{}^{7}\!\not{3}^{12}\!.\,{}^{13}\!\not{4}^{16}\!\not{7}^{11}0 \\ -\ 5\ 7.\ 6\ 8\ 4 \\ \hline 2\ 5.\ 7\ 8\ 6 \end{array}$$

Thus, 83.47 - 57.684 = 1.84

Example:

Sonia's school is at a distance of 5 km 350 m from her house.
She travels 1 km 70 m on foot and the rest by bus. How much distance does she travel by bus?

Solution:

Total distance of school from the house = 5.350 km
Distance travelled on foot = 1.070 km
Therefore, distance travelled by bus = 5.350 km – 1.070 km
= 4.280 km

Thus, distance travelled by bus = 4.280 km or 4 km 280 m