

ATOMIC ENERGY CENTRAL SCHOOL – 1
Anushaktinagar, Mumbai – 400 094

Chapter 8

DECIMALS

Subject: Mathematics

Module 1

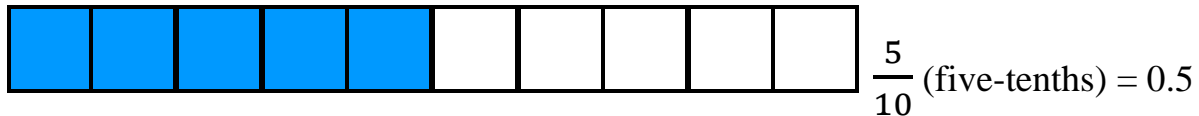
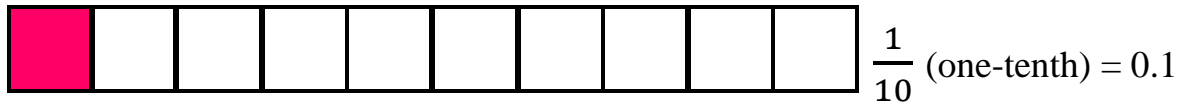
In this chapter we shall learn about another kind of numbers called decimals. This is closely related to the previous chapter on fractions.

Contents:

- *Tenths*
- *Decimals as an extension of place value table*
- *Representation of decimals on number line*
- *Hundredths*
- *Thousandths*

TENTHS

If a whole is divided into 10 equal parts, then each part is $\frac{1}{10}$ (one-tenth) of a unit. In decimal notation it is written as 0.1.



and so on.....

DECIMALS AS AN EXTENSION OF PLACE VALUE TABLE

Let us consider some numbers and the place value of the digit 7 in these numbers.

Number *Place value of 7 in these numbers*

7021 7000

3710 700

2975 70

9017 7

We observe that the value of the digit 7 becomes one-tenth ($\frac{1}{10}$) of the previous value as it moves one place from left to right. So we have to extend the place value table by introducing the place for tenths $\frac{1}{10}$ as shown below.

Thousands (1000)	Hundreds (100)	Tens (10)	Ones (1)	Tenths $\frac{1}{10}$

Remember:

- 1) Fractions with denominators 10, 100, 1000 etc. are called as fractions.
- 2) The numbers expressed in decimal form are called decimal numbers or simply decimals.
- 3) A decimal or decimal number consists of two parts - whole number part and a decimal part. These two parts are separated by a dot called the decimal point.
- 4) We write the whole number part to the left of the decimal point and the decimal part to its right.
- 5) The number of digits contained in the decimal part gives the number of its decimal places.
- 6) The decimals consisting of only one part i.e. decimal part or whole number part are written by making use of zero in the whole or decimal part. The decimal point is read as point.

Eg. 1) Write the following in words.

Numbers in figures

- i) 8.1
- ii) 12.6
- iii) 243.7
- iv) 15.9
- v) 3.0

Numbers in words

- a) Eight point one
- b) twelve point six
- c) Two hundred forty three point seven
- d) fifteen point nine
- e) three point zero

Eg. 2) Write the following decimals in the place value table.

- a) 14.7 b) 28.9 c) 6.7 d) 5501.4 e) 345.6

Ans:

Thousands (1000)	Hundreds (100)	Tens (10)	Ones (1)	Tenths $\frac{1}{10}$
		1	4	7
		2	8	9
			6	7
5	5	0	1	4
	3	4	5	6

Eg. 3) Write each of the following as decimals.

- a) $20 + 6 + \frac{3}{10}$ b) $100 + 50 + 7 + \frac{4}{10}$ c) $\frac{7}{10}$ d) $5000 + 200 + 20 + \frac{2}{10}$

Ans: a) $20 + 6 + \frac{3}{10} = 20.3$ b) $100 + 50 + 7 + \frac{4}{10} = 157.4$

c) $\frac{7}{10} = 0.7$ d) $5000 + 200 + 20 + \frac{2}{10} = 5220.2$

REPRESENTING DECIMALS ON NUMBER LINE

Like integers and fractions, decimals can also be represented in the number line.

We first decide into how many parts we should divide the successive points in the number line.

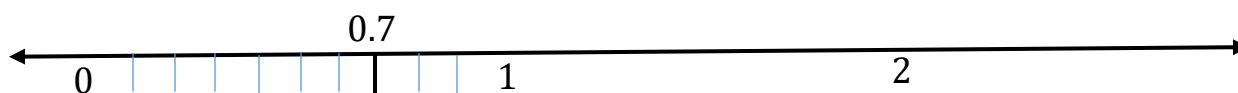
If there are 2 digits after the decimal point, we make 100 divisions, if there are 3 digits then we make 1000 divisions and so on.

Eg. 4) Represent 0.7 on number line.

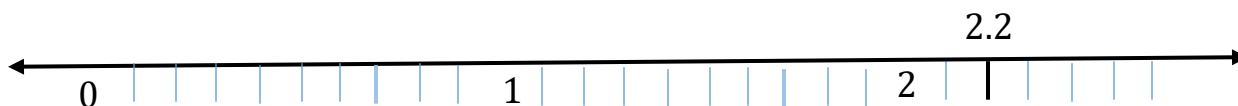
Answer:

- 1) 0.7 means it is less than 1 but greater than 0.
- 2) Draw a number line.
- 3) Divide the unit length between 0 and 1 into 10 parts. Each part is $\frac{1}{10}$
- 4) Now count 7 parts and mark the point.
- 5) This point represents 0.7 on number line.

Note: While representing the decimals on the number line, you need not write the steps given here. This is only for understanding purpose.



Eg. 4) Represent 2.2 on number line.



Fractions as decimals

Each fraction can be written as a decimal and vice versa.

Writing fractions with denominators 10, 2 or 5 as decimals

Look at the denominator. If it is not 10, then make it by making equivalent fractions.

Eg 6) Write the following fractions in decimal form.

- a) $\frac{7}{10}$ b) $\frac{3}{2}$ c) $\frac{4}{5}$ d) $\frac{8}{5}$ e) $\frac{1}{2}$

Ans: a) By moving decimal point one place, on 7, from right to left (since there is only one zero in denominator) i.e. $7/10=0.7$.

b) $\frac{3}{2} = \frac{3 \times 5}{2 \times 5} = \frac{15}{10} = 1.5$ (c) $\frac{4}{5} = \frac{4 \times 2}{5 \times 2} = \frac{8}{10} = 0.8$

d) $\frac{8}{5} = \frac{8 \times 2}{5 \times 2} = \frac{16}{10} = 1.6$ (e) $\frac{1}{2} = \frac{1 \times 5}{2 \times 5} = \frac{5}{10} = 0.5$

We can convert a fraction into decimal by counting the zeros in denominator, and moving the decimal dot those many places before the numerator, from right to left equal to the number of zeros in denominator.

Decimals to Fractions

We know that decimals are another name of fractions whose denominators are 10, 100, 1000 etc.

Eg. 7) Write the following decimals as fraction.

a) 0.6

b) 1.7

c) 2.5

d) 15.3

Ans: a) $0.6 = \frac{6}{10}$

b) $1.7 = 1 + \frac{7}{10} = \frac{10}{10} + \frac{7}{10} = \frac{17}{10}$

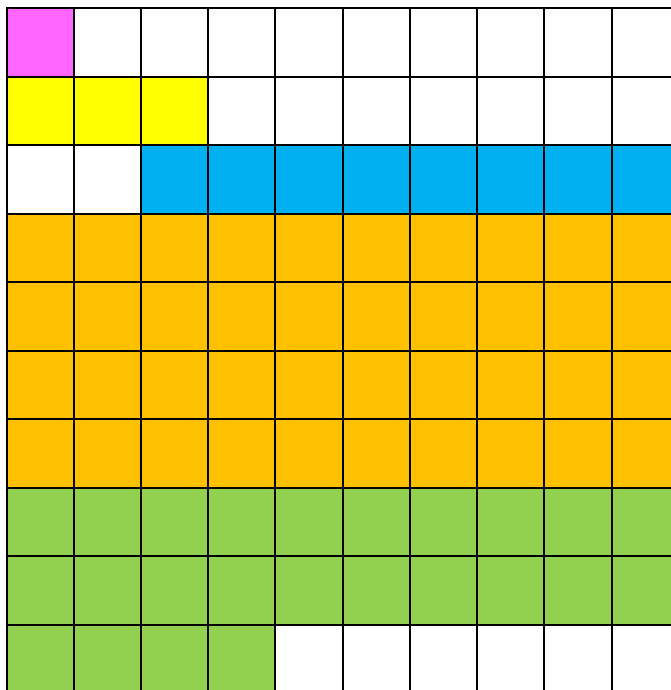
c) $2.5 = 2 + \frac{5}{10} = \frac{20}{10} + \frac{5}{10} = \frac{25}{10}$

d) $5.3 = 5 + \frac{3}{10} = \frac{50}{10} + \frac{3}{10} = \frac{53}{10}$

Assignment: Complete Exercise 8.1 of mathematics textbook.

HUNDREDTHS

The figure below is divided into 100 equal parts out of which each part is $\frac{1}{100}$ of the whole.



<i>Shaded Part</i>	<i>Written as</i>	<i>Read as</i>	<i>Decimal</i>
1 (pink)	$\frac{1}{100}$	One - hundredths	0.01
3 (yellow)	$\frac{3}{100}$	Three - hundredths	0.03
8 (blue)	$\frac{8}{100}$	Eight - hundredths	0.08
40 (orange)	$\frac{40}{100}$	Forty – hundredths	0.40
24 (green)	$\frac{24}{100}$	Twenty four - hundredths	0.24

Similarly, $\frac{128}{100} = 1.28$, $\frac{649}{100} = 6.49$, $\frac{2035}{100} = 20.35$, $\frac{7984}{100} = 79.84$

THOUSANDTHS

If an object/figure is divided into 1000 equal parts, then each part is one-thousandth of the whole.

One - thousandth is written as $\frac{1}{1000} = 0.001$

Number	Written as	Decimal
Eight- thousandths	$\frac{8}{1000}$	0.008
Sixty four thousandths	$\frac{64}{1000}$	0.064
One hundred forty seven thousandths	$\frac{147}{1000}$	0.147
Two and thirty thousandths	$2\frac{30}{1000}$	2.030
Forty seven and nine thousandths	$47\frac{9}{1000}$	47.009
Five and one hundred twenty	$5\frac{120}{1000}$	5.120

Eg. 8) Write the following decimals in the place value table.

- a) 243.25 b) 1.42 c) 132.15 d) 2.345 e) 15.807

Ans:

Sl. No.	Hundreds (100)	Tens (10)	Ones (1)	Tenths $\frac{1}{10}$	hundredths $\frac{1}{100}$	Thousandths $\frac{1}{1000}$
a)	2	4	3	2	5	
b)			1	4	2	
c)	1	3	2	1	5	
d)			2	3	4	5
e)		1	5	8	0	7

Eg. 9) Write as decimals.

a) $200 + \frac{5}{10} + \frac{2}{100}$

b) $100 + 30 + 5 + \frac{1}{10} + \frac{6}{100}$

c) $18 + \frac{4}{100}$

d) $29 + \frac{6}{100} + \frac{1}{1000}$

e) $500 + 3 + \frac{1}{10} + \frac{2}{1000}$

Answer: a) $200 + \frac{5}{10} + \frac{2}{100} = 200.52$

b) $100 + 30 + 5 + \frac{1}{10} + \frac{6}{100} = 135.16$

c) $18 + \frac{4}{100} = 18.04$

d) $29 + \frac{6}{100} + \frac{1}{1000} = 29.061$

e) $500 + 3 + \frac{1}{10} + \frac{2}{1000} = 503.102$

Eg. 10) Write as decimal.

a) two hundred fifty eight and thirty two hundredths

b) sixty six and 17 thousandths

c) seven and four hundredths

d) forty nine point six three two

e) five hundred point zero zero one

Ans: a) two hundred fifty eight and thirty two hundredths = 258.32

b) sixty six and 17 thousandths = 66.017

c) seven and four hundredths = 7.04

d) forty nine point six three two = 49.632

e) five hundred point zero zero one = 500.001

Eg. 11) Write as fractions in lowest terms.

a) 0.04

b) 2.34

c) 0.342

d) 5.105

e) 16.86

Answer

$$\text{a) } 0.04 = \frac{4}{100} = \frac{4 \div 2}{100 \div 2} = \frac{2}{50} = \frac{2 \div 2}{50 \div 2} = \frac{1}{25}$$

$$\text{b) } 2.34 = \frac{234}{100} = \frac{234 \div 2}{100 \div 2} = \frac{117}{50} = 2 \frac{17}{50} = 2 \frac{17}{50}$$

$$\text{c) } 0.342 = \frac{342}{1000} = \frac{342 \div 2}{1000 \div 2} = \frac{171}{500}$$

$$\text{d) } 5.105 = \frac{5105}{100} = \frac{5105 \div 5}{1000 \div 5} = \frac{1021}{200} = 5 \frac{21}{200}$$

$$\text{e) } 16.86 = \frac{1686}{100} = \frac{1686 \div 2}{100 \div 2} = \frac{843}{50} = 16 \frac{43}{50}$$

Eg. 12) Write as decimals.

a) $\frac{4}{5}$

b) $\frac{3}{4}$

c) $\frac{7}{1000}$

d) $\frac{12}{20}$

e) $\frac{6}{50}$

Answer:

$$\text{(a) } \frac{4}{5} = \frac{4 \times 2}{5 \times 2} = \frac{8}{10} = 0.8$$

$$\text{(b) } \frac{3}{4} = \frac{3 \times 25}{4 \times 25} = \frac{75}{100} = 0.75$$

$$\text{c) } \frac{7}{1000} = 0.007$$

$$\text{d) } \frac{12}{20} = \frac{12 \times 5}{20 \times 5} = \frac{60}{100} = 0.60$$

$$\text{e) } \frac{6}{50} = \frac{6 \times 2}{50 \times 2} = \frac{12}{100} = 0.12$$

ASSIGNMENT: Complete exercise 8.2 of mathematics textbook.