

## 5. Decimal Fractions

- We can add or subtract decimals in the same way as whole numbers by placing decimal points one above the other.

### Example:

- If 9.56 and 17.15 are to be added, then we proceed as:

Tens	Ones	Tenths	Hundredths
	9	5	6
+ 1	7	1	5
2	6	7	1

$$\therefore 9.56 + 17.15 = 26.71$$

- If 72.18 has to be subtracted from 92, then we proceed as:

Tens	Ones	Tenths	Hundredths
9	2	0	0
- 7	2	1	8
1	9	8	2

$$\therefore 92 - 72.18 = 19.82$$

- We can represent a decimal (of tenths place) on a number line also. For this, we have to divide each unit length into 10 equal parts. Each of the equal parts represents 0.1.

To represent 3.6 on the number line, we have to divide the distance between 3 and 4 into 10 equal parts. The 6<sup>th</sup> part after 3 represents 3.6.



- Every decimal can be written as a fraction.

### Example:

$$2.96 = 2 + \frac{96}{100} = 2 + \frac{96 \div 4}{100 \div 4} = 2 + \frac{24}{25} = 2\frac{24}{25} = \frac{74}{25}$$

$$8.8 = 8 + 0.8 = 8 + \frac{8}{10} = 8 + \frac{8 \div 2}{10 \div 2} = 8 + \frac{4}{5} = 8\frac{4}{5} = \frac{44}{5}$$

- Every fraction with denominator 10 or 100 can be converted into decimal form easily.

**Example:**

$$\frac{56}{10} = \frac{50+6}{10} = 5 + \frac{6}{10} = 5.6$$

$$\frac{291}{100} = \frac{200+91}{100} = 2 + \frac{91}{100} = 2.91$$

- A fraction whose denominator is 10 or 100 can be converted into decimal form by multiplying the numerator and denominator by the same number such that the denominator is 10 or 100.

**Example:**

$$\frac{41}{20} = \frac{41 \times 5}{20 \times 5} = \frac{205}{100} = \frac{200+5}{100} = \frac{5}{100} = 2.05$$

$$\frac{9}{5} = \frac{9 \times 2}{5 \times 2} = \frac{18}{10} = \frac{10+8}{10} = 1 + \frac{8}{10} = 1.8$$

- We use decimals in our day to day lives in many ways, for example, in representing units of money, weight, length, volume, etc.

**Example:** If we want to represent 6 kg 5g into kg, then we may proceed as follows.

$$6\text{ kg } 5\text{ g} = 6\text{ kg} + 5 \times \frac{1}{1000}\text{ kg} = \left(6 + \frac{5}{1000}\right)\text{ kg} = 6.005\text{ kg}$$

$$\left(1\text{ g} = \frac{1}{1000}\text{ kg}\right)$$

## Multiplication of decimals

To multiply two decimal numbers, the numbers have to be first multiplied as whole numbers. Then, decimal is put in the product by counting the digits from the rightmost digit equal to the sum of the number of digits to the right of the decimal in both the numbers. For example,

$$0.32 \times 0.4$$

Here, the number of digits to the right of the decimal in 0.32 is 2 and in 0.4 is 1.

$$32 \times 4 = 128$$

Putting the decimal in 128 by counting  $(2 + 1) = 3$  places to the left of 8, we obtain

$$0.32 \times 0.4 = 0.128$$

- To divide a decimal number by another decimal number, firstly both the divisor and dividend are changed into fractional forms and then the dividend is multiplied with the reciprocal of the divisor.

For example, 0.96 can be divided by 0.8 as follows:

$$0.96 \div 0.8 = \frac{96}{100} \div \frac{8}{10}$$

$$= \frac{96}{100} \times \frac{10}{8}$$

$$= \frac{96 \times 1}{10 \times 8}$$

$$= \frac{12}{10}$$

$$= 1.2$$