NUMBER SYSTEM

CONVERSION OF RATIONAL NUMBERS INTO DECIMAL

Decimal Representation of Rational Numbers :



(i) Finite or Terminating Decimal :

Every fraction p/q can be expressed as a decimal, if the decimal expression of p/q terminates, i.e. comes to an end, then the decimal so obtained is called a terminating decimal.

e.g.,
$$\frac{1}{4} = 0.25, \frac{5}{8} = 0.625, 2\frac{3}{5} = \frac{13}{5} = 2.6$$

Thus, each of the numbers $\frac{1}{4}, \frac{5}{8}, 2\frac{3}{5}$ can be expressed in the form of a terminating decimal.

CLASS 9

Important:

A fraction p/q is a terminating decimal only, when prime factors of q are 2 and 5 only.

e.g. Each one of the fractions $\frac{1}{2}, \frac{3}{4}, \frac{7}{20}, \frac{13}{25}$ is a terminating decimal, since the denominator of each has no prime factor other than 2 and 5.

(ii) Repeating (or Recurring) Decimals:

A decimal in which a digit or a set of digits repeats periodically, is called a repeating or a recurring decimal.

In a recurring decimal, we place a bar over the first block of the repeating part and omit the other repeating blocks.

e.g. (i)
$$\frac{2}{3} = 0.666... = 0.\overline{6}$$

(ii) $\frac{15}{7} = 2.142857142857... = 2.\overline{142857}$

Special Characteristics of Rational Numbers:

- Every rational number is expressible either as a terminating decimal or as a repeating decimal.
- (ii) Every terminating decimal is a rational number.
- (iii) Every repeating decimal is a rational number.
- **Ex.1:** Express $\frac{2157}{625}$ in the decimal form.

Sol. We have, $\begin{array}{rcl}
625 \overline{)2157.0000} \overline{(3.4512)} \\
& \underline{1875} \\
2820 \\
2500 \\
& \underline{3200} \\
3200 \\
& \underline{3125} \\
& 750 \\
& \underline{625} \\
& 1250 \\
& \underline{1250} \\
& 0 \end{array}$ $\begin{array}{rcl}
2157 \\
& \underline{625} \\
& \underline{1250} \\
& 0 \end{array}$

2

CLASS 9

Ex.2: Find the decimal representation of
$$\frac{-10}{45}$$

Sol. By long division, we have

$$\begin{array}{r}
45)\overline{160} \quad (0.3555) \\
\underline{135} \\
250 \\
225 \\
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25$$

1/

$$\frac{16}{45} = 0.355.... = 0.35$$

 $\frac{-16}{45} = -0.35$

Ex.3 Express $\frac{7}{8}$ in the decimal form by long division method.

$$\begin{array}{r}
8 \overline{)7.000} \\
64 \\
60 \\
56 \\
40 \\
40 \\
0
\end{array}$$

$$\frac{7}{8} = 0.875$$