



SpeedLabs

MATHS

CBSE 10th

TEEVRA EDUTECH PVT. LTD.

Q.1 Without actually performing the long division, state whether the following rational numbers will have a terminating decimal expansion or a non-terminating repeating decimal expansion:

$\frac{13}{3125}$	$\frac{17}{8}$	$\frac{64}{455}$	$\frac{15}{1600}$	$\frac{29}{343}$
$\frac{23}{2^3 5^2}$	$\frac{129}{2^2 5^7 7^5}$	$\frac{6}{15}$	$\frac{35}{50}$	$\frac{77}{210}$

Sol: (i) $\frac{13}{3125}$

$$3125 = 5^5$$

The denominator is of the form 5^m .

Hence, the decimal expansion of $\frac{13}{3125}$ is terminating.

(ii) $\frac{17}{8}$

$$8 = 2^4$$

The denominator is of the form 2^m .

Hence, the decimal expansion of $\frac{17}{8}$ is terminating.

(iii) $\frac{64}{455}$

$$455 = 5 \times 7 \times 13$$

Since the denominator is not in the form $2^m \times 5^n$, and it also contains 7 and 13 as its factors, its decimal expansion will be non-terminating repeating.

(iv) $\frac{15}{1600}$

$$1600 = 2^6 \times 5^2$$

The denominator is of the form $2^m \times 5^n$.

Hence, the decimal expansion of $\frac{15}{1600}$ is terminating.

$$(v) \frac{29}{343}$$

$$343 = 7^3$$

Since the denominator is not in the form $2^m \times 5^n$.

Hence, the decimal expansion of $\frac{29}{343}$ is non-terminating repeating.

$$(vi) \frac{23}{2^3 \times 5^2}$$

The denominator is of the form $2^m \times 5^n$.

Hence, the decimal expansion of $\frac{23}{2^3 \times 5^2}$ is terminating.

$$(vii) \frac{129}{2^2 \times 5^7 \times 7^5}$$

Since the denominator is not in the form $2^m \times 5^n$, and it has 7 as its factor, the decimal expansion

of $\frac{129}{2^2 \times 5^7 \times 7^5}$ is non-terminating repeating.

$$(viii) \frac{6}{15} = \frac{2 \times 3}{3 \times 5} = \frac{2}{5}$$

The denominator is of the form 5^n .

Hence, the decimal expansion of $\frac{6}{15}$ is terminating.

$$(ix) \frac{35}{50} = \frac{7 \times 5}{10 \times 5} = \frac{7}{10}$$

$$10 = 2 \times 5$$

Since the denominator is not of the form $2^m \times 5^n$.

Hence, the decimal expansion of $\frac{35}{50}$ is terminating.

$$(x) \frac{77}{210} = \frac{11 \times 7}{30 \times 7} = \frac{11}{30}$$

$$30 = 2 \times 3 \times 5$$

Since the denominator is not of the form $2^m \times 5^n$, and it also has 3 as its factors, the decimal

expansion of $\frac{77}{210}$ is non-terminating repeating.

Q.2 Write down the decimal expansions of those rational numbers in Q. 1 above which have terminating decimal expansions.

Sol:

(i) $\frac{13}{3125} = 0.00416$

$$\begin{array}{r}
 0.00416 \\
 3125 \overline{)13.00000} \\
 \underline{0} \\
 130 \\
 \underline{0} \\
 1300 \\
 \underline{0} \\
 13000 \\
 \underline{12500} \\
 5000 \\
 \underline{3125} \\
 18750 \\
 \underline{18750} \\
 \times
 \end{array}$$

(ii) $\frac{17}{8} = 2.125$

$$\begin{array}{r}
 2.125 \\
 8 \overline{)17} \\
 \underline{16} \\
 10 \\
 \underline{8} \\
 20 \\
 \underline{16} \\
 40 \\
 \underline{40} \\
 \times
 \end{array}$$

(iii) $\frac{15}{1600} = 0.009375$

$$\begin{array}{r}
 0.009375 \\
 1600 \overline{)15.000000} \\
 \underline{0} \\
 150 \\
 \underline{0} \\
 1500 \\
 \underline{0} \\
 15000 \\
 \underline{14400} \\
 6000 \\
 \underline{4800} \\
 12000 \\
 \underline{11200} \\
 8000 \\
 \underline{8000} \\
 \times
 \end{array}$$

$$(iv) \frac{6}{15} = \frac{2 \times 3}{3 \times 5} = 0.4$$

$$\begin{array}{r} 0.4 \\ 5 \overline{)2.0} \\ 0 \\ \hline 20 \\ 20 \\ \hline \times \end{array}$$

$$(v) \frac{35}{50} = 0.7$$

$$\begin{array}{r} 0.7 \\ 50 \overline{)35.0} \\ 0 \\ \hline 350 \\ 350 \\ \hline \times \end{array}$$

Q.3 The following real numbers have decimal expansions as given below. In each case, decide whether they are rational or not. If they are rational, and of the form $\frac{p}{q}$, what can you say about the prime factor of q ?

- (i) 43.123456789 (ii) 0.120120012000120000... (iii) $43.\overline{123456789}$

Sol:

- (i) 43.123456789

Since this number has a terminating decimal expansion, it is a rational number of the form $\frac{p}{q}$ and q

is of the form $2^m \times 5^n$

i.e., the prime factors of q will be either 2 or 5 or both.

- (ii) 0.120120012000120000.....

The decimal expansion is neither terminating nor recurring.

Therefore, the given number is an irrational number.

- (iii) $43.\overline{123456789}$

Since the decimal expansion is non-terminating recurring, the given number is a rational number of the form $\frac{p}{q}$ and q is not of the form $2^m \times 5^n$ i.e., the prime factors of q will also have a factor other than 2 or 5.

