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CLASS – 9

MATHS

CHAPTER - 1

Number System

Part – 3
Real Numbers & Their Decemial Expansion

Vikas Saini

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OVERVIEW

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1. Number
2. Irrational Number
3. Real Number & Their Decimal Expansions
4. Operations on Real Numbers
5. Laws of Exponents for Real Numbers

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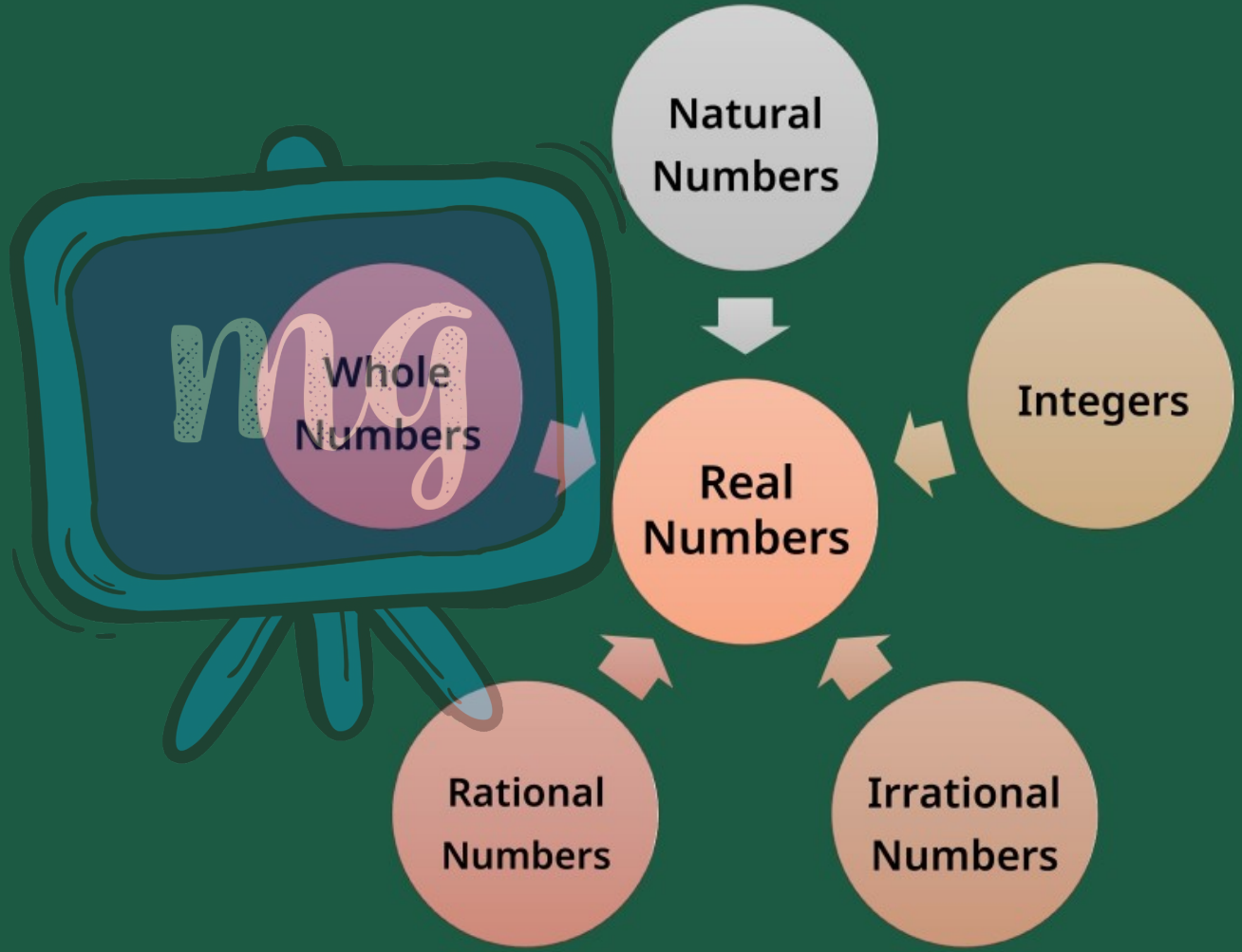

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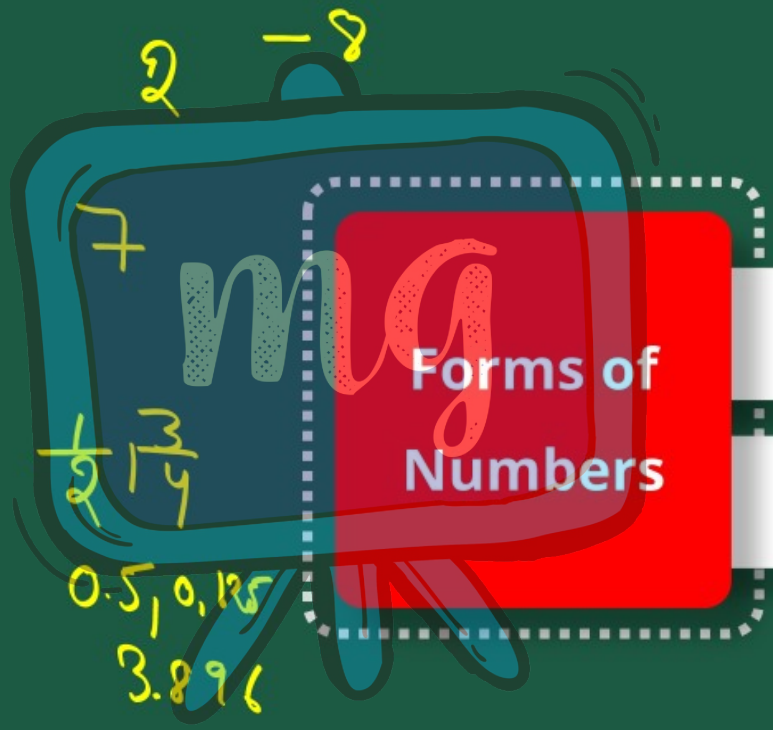

Forms of Numbers

- Fractional Form
- Decimal Form

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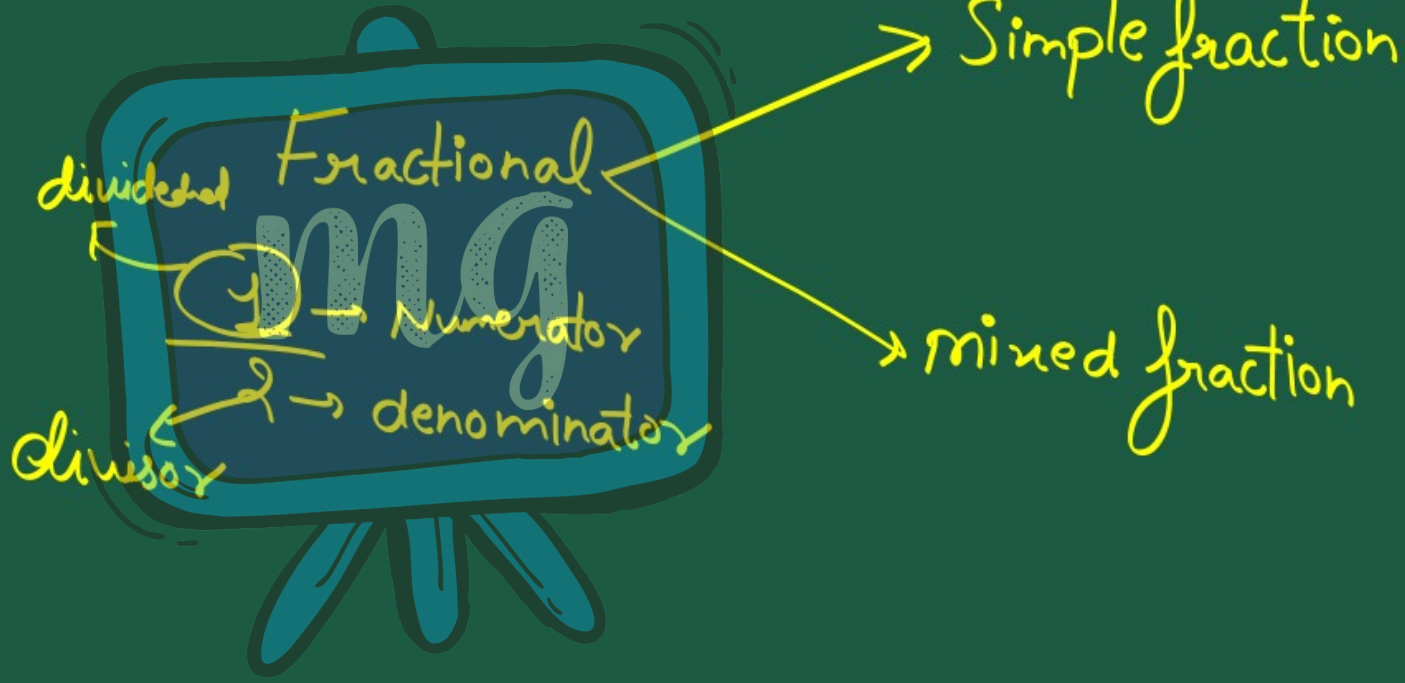

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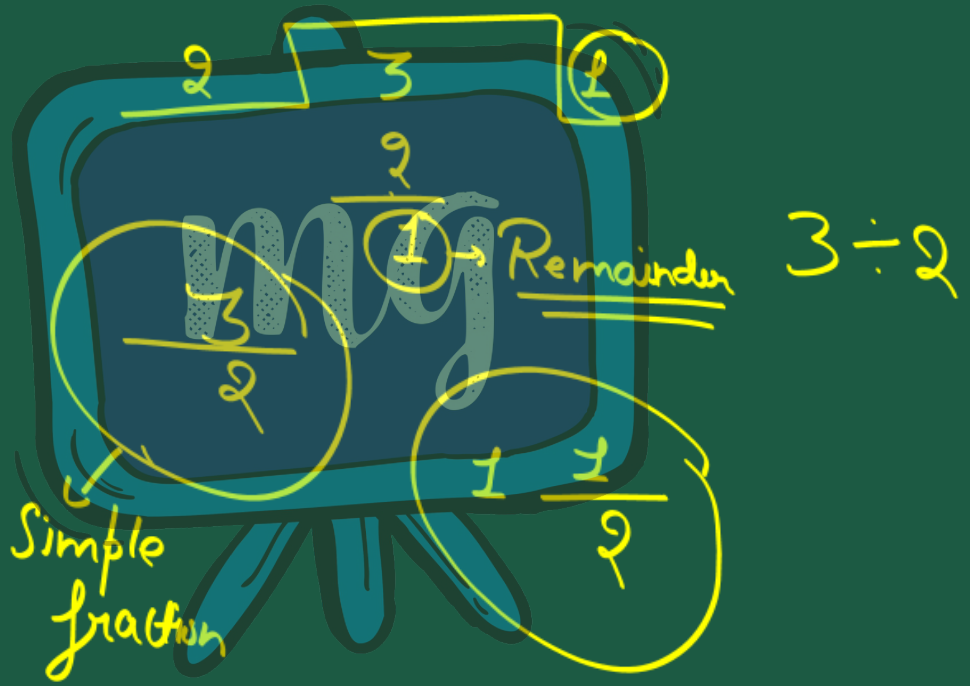

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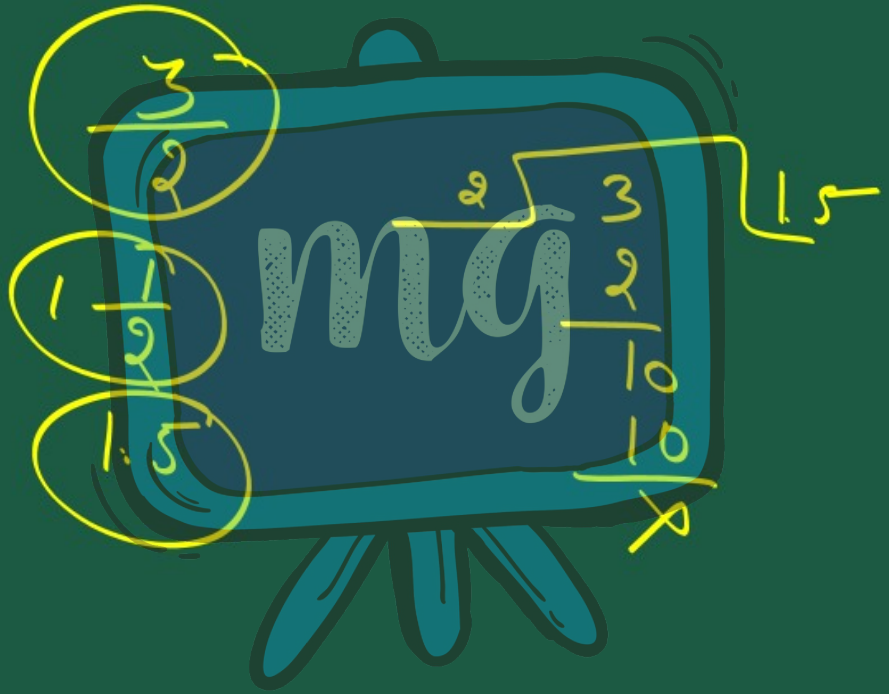

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Sub-Types of Number Bases of Decimal Form

1. Terminating Decimal Number
2. Non-Terminating Decimal Number
3. Repeating / Reoccurring Decimal Number
4. Non-Repeating / Non-Reoccurring Decimal Number

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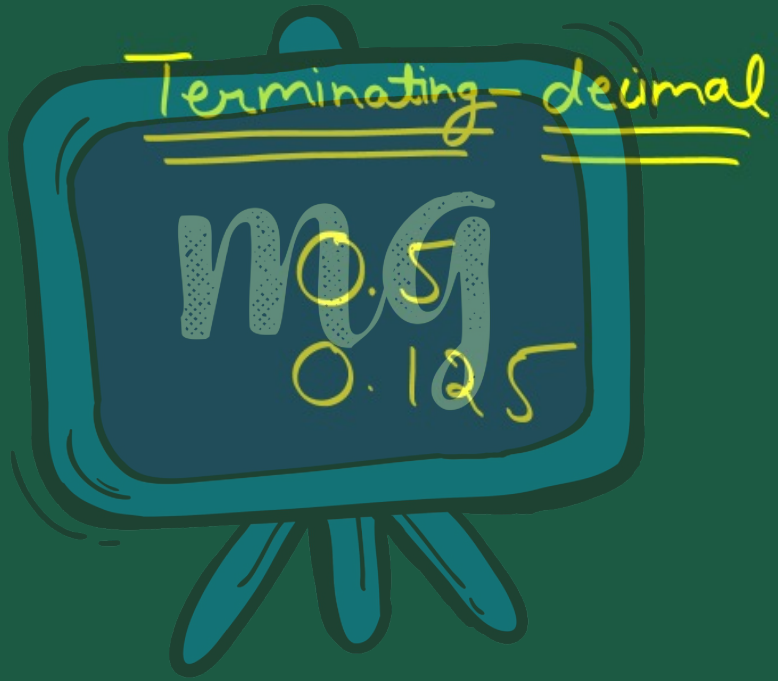

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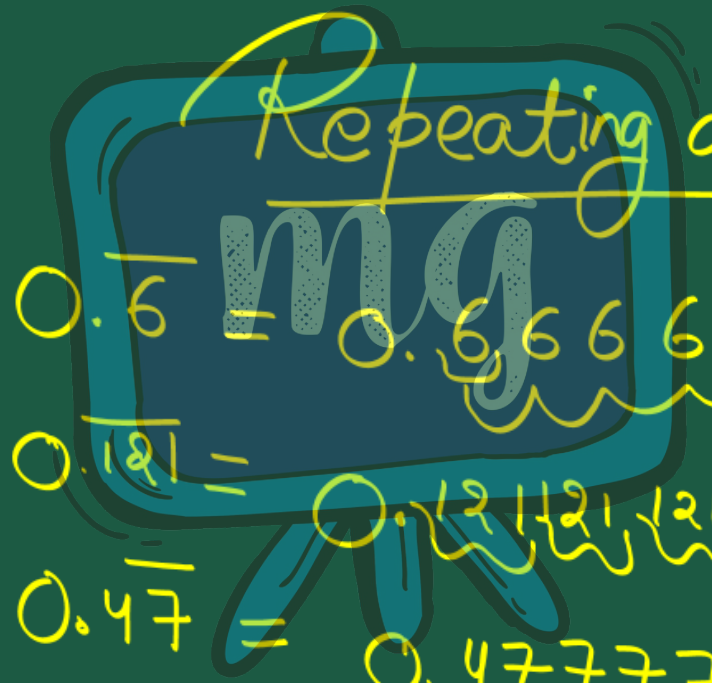

Repeating decimal No.

$0.\overline{6} = 0.6666666\ldots$

$0.\overline{12} = 0.121212\ldots$

$0.\overline{47} = 0.47777\ldots$

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Non-Repeating decimal No.



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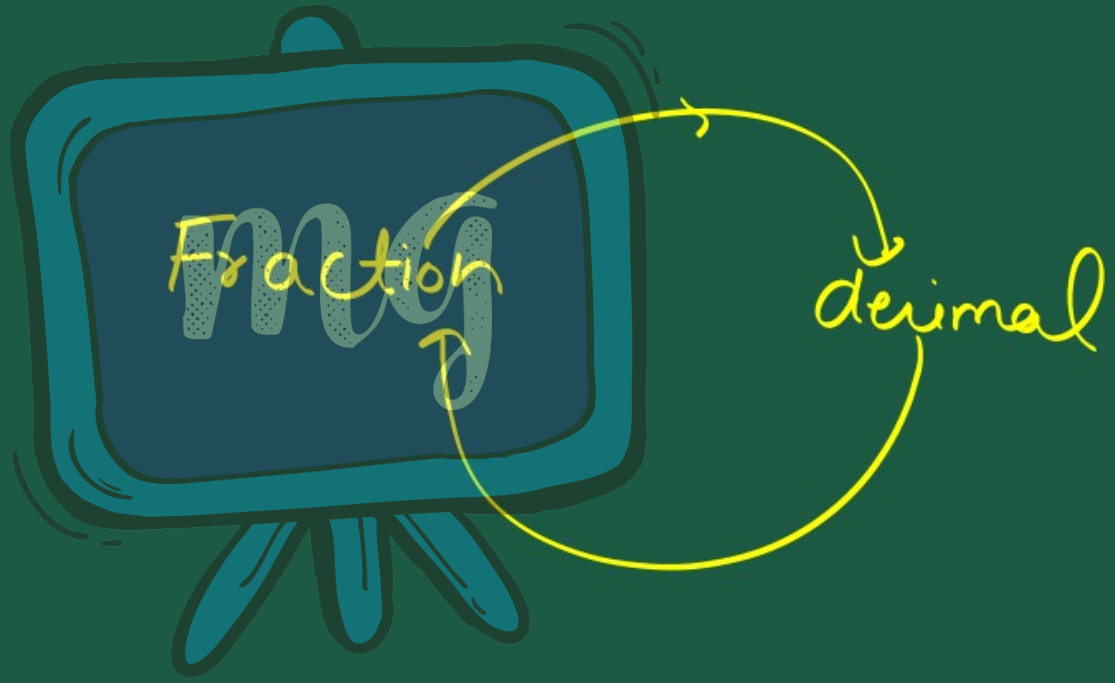

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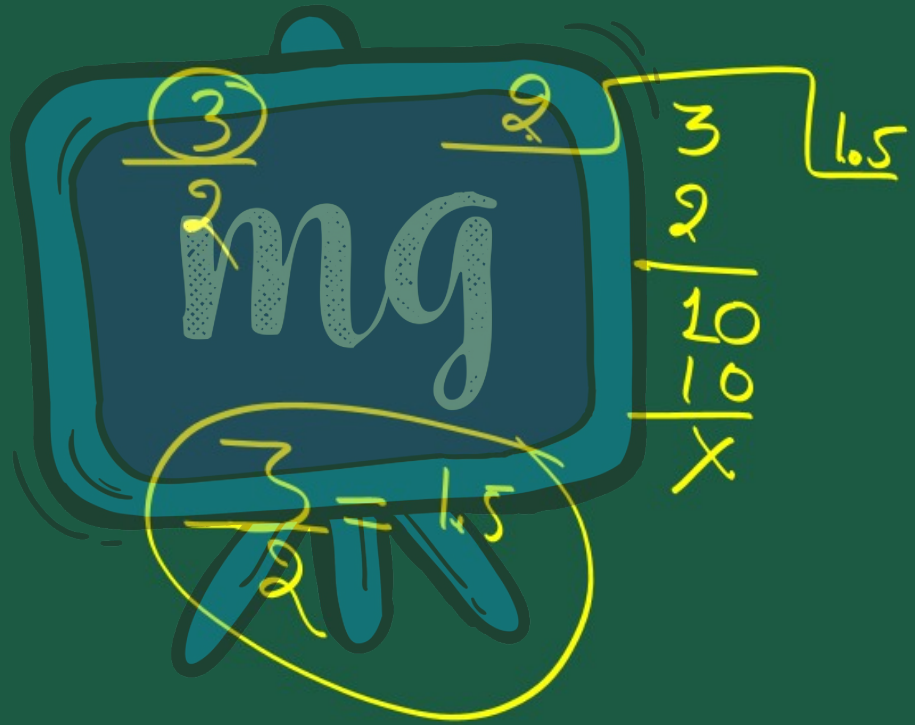

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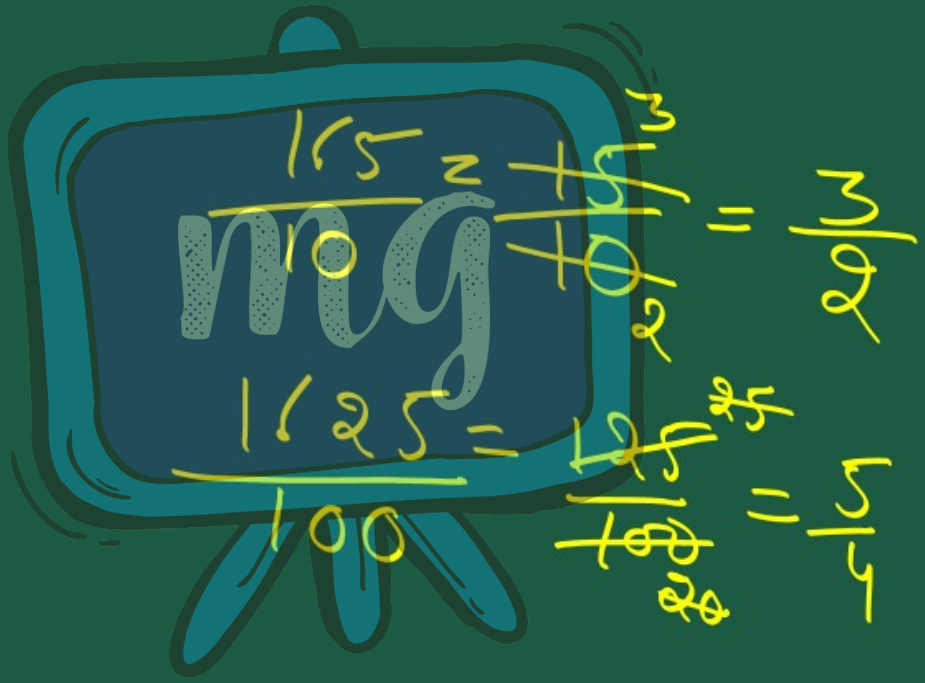

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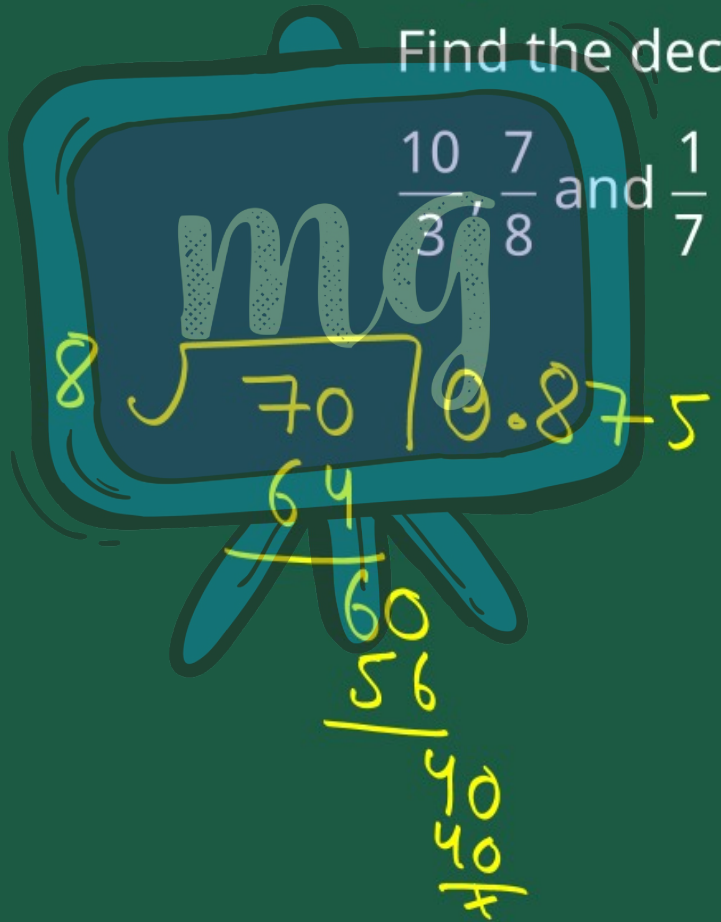
Example 5 :

Find the decimal expansions of $\frac{10}{3}$, $\frac{7}{8}$ and $\frac{1}{7}$



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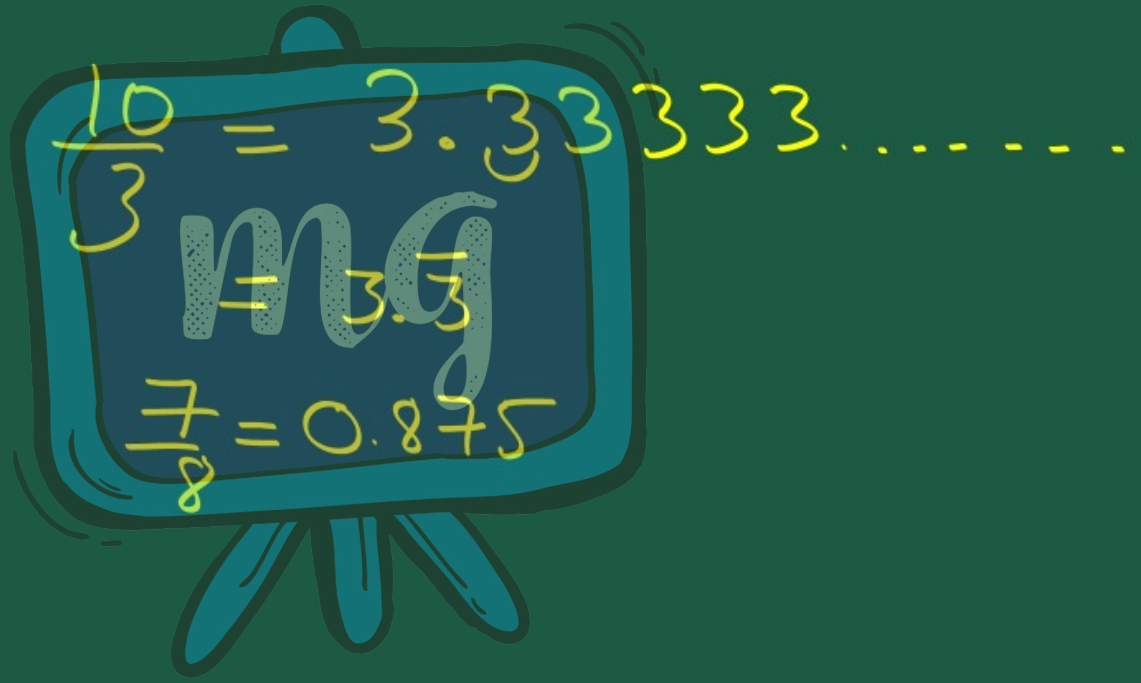

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Example 6 :

Show that 3.142678 is a rational number. In other words, express 3.142678 in the form $\frac{p}{q}$, where p and q are integers and $q \neq 0$.

3.142678

$= 3.142678$

$= \frac{3142678}{1000000}$

$\frac{P}{q}$

P, q → Integers

& $q \neq 0$

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Example 7 :

Show that $0.3333\ldots = 0.\overline{3}$ can be expressed in the form $\frac{p}{q}$, where p and q are integers and $q \neq 0$.

$= 0.\overline{3}$

$= 0.3333\ldots$

$x = 0.3333\ldots$ ——— (1)

multiply 10 both sides

$10x = 10 \times 0.3333\ldots$

$10x = 3.3333\ldots$ ——— (2)

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eq ② − eq ①

$10x - x = 3.333\ldots - 0.3333\ldots$

$9x = 3$

$x = \frac{\cancel{3}}{\cancel{9}} = \frac{1}{3}$

$x = \frac{1}{3} = 0.33333$

$$\begin{array}{r} 3.333333\ldots \\ -\ 0.333333\ldots \\ \hline 3.00000 \end{array}$$

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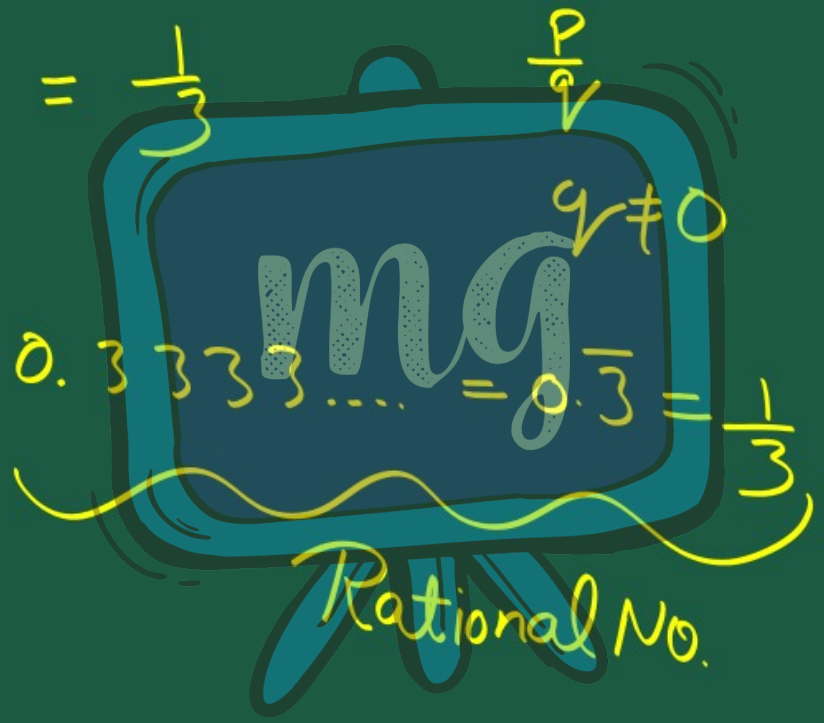

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Example 8 :

Show that $1.272727\ldots\ldots = 1.\overline{27}$.

can be expressed in the form $\frac{p}{q}$,

where p and q are integers and

$q \neq 0$.

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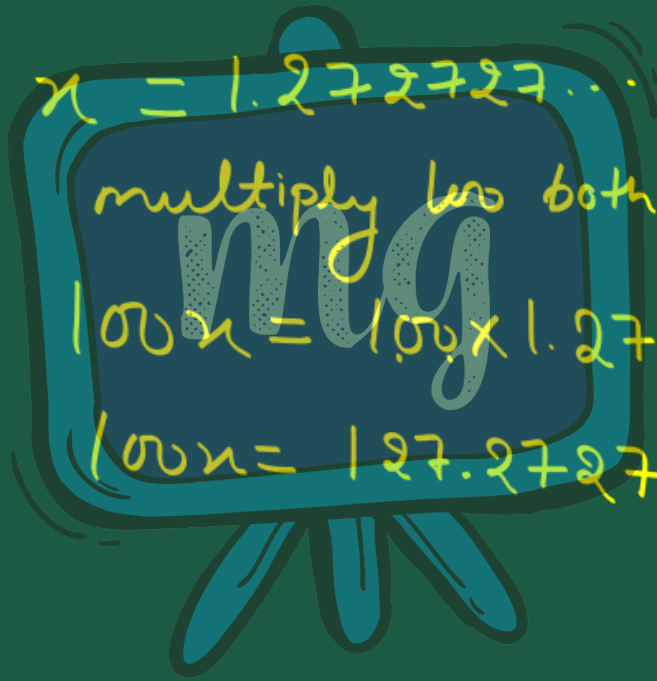
$1.\overline{27} = 1.27272727\ldots\ldots$



$x = 1.27272727\ldots\ldots$ — (1)

multiply by both sides

$100x = 100 \times 1.2727\ldots\ldots$

$100x = 127.2727\ldots\ldots$ — (2)

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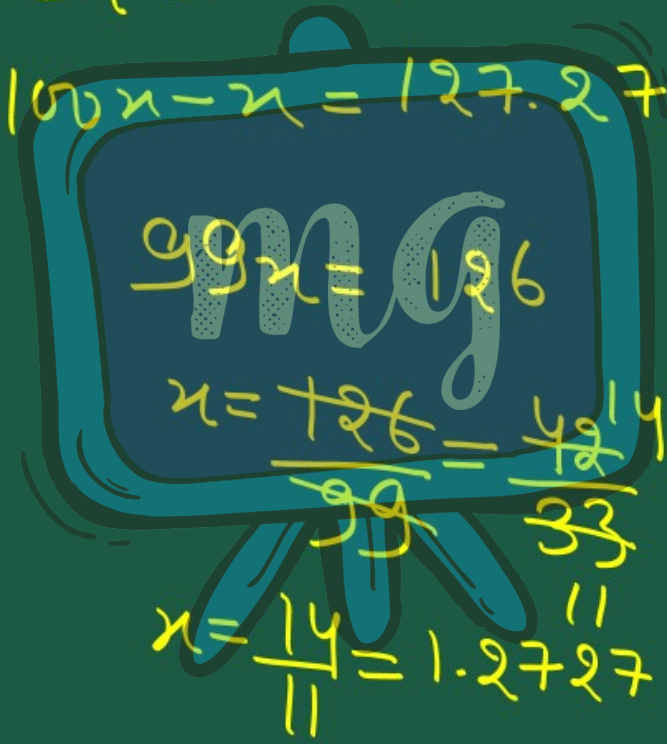

Eq ② − Eq ①

$100x - x = 127.272727\ldots - 1.2727\ldots$

$99x = 126$

$x = \frac{\cancel{126}}{\cancel{99}} = \frac{\cancel{42}^{14}}{\cancel{33}_{11}}$

$x = \frac{14}{11} = 1.2727\ldots$

$$\begin{array}{r} 127.27\cancel{27}\ldots \\ -\quad 1.2\cancel{7}27\ldots \\ \hline 126.000 \end{array}$$

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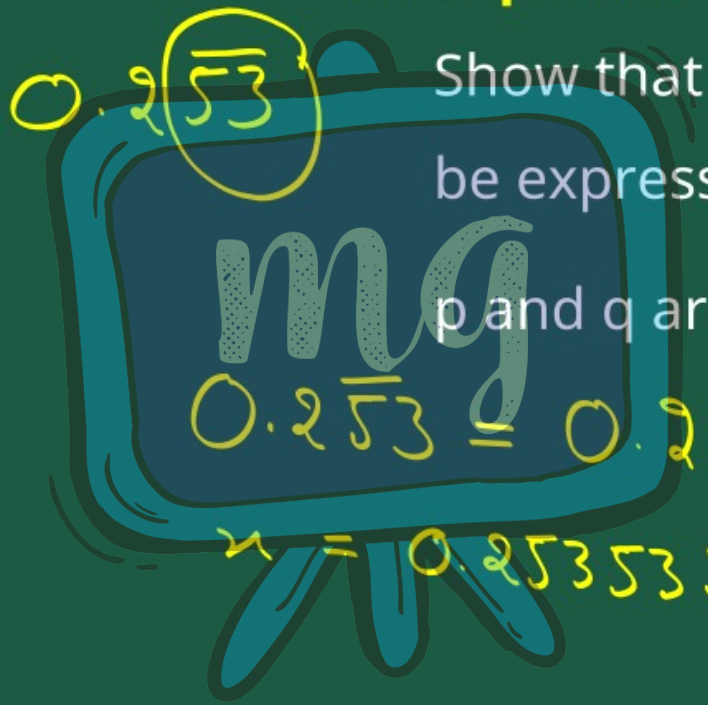
Example 9 :



Show that $0.2353535... = 0.2\overline{35}$ can be expressed in the form $\frac{p}{q}$, where p and q are integers and $q \neq 0$.

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$x = 0.25353535\ldots$ — (1)

multiply 100 both sides

$100x = 100 \times 0.25353535\ldots$

$100x = 25.35353535\ldots$ — (2)

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Eg (2) – 1

1000 n



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