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CLASS – 9

MATHS

CHAPTER - 1

Number System

Part – 4

Exercise 1.3

Vikas Saini

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1. Write the following in decimal form and say what kind of decimal expansion each has :

I. $\frac{36}{100}$

$\frac{36}{100}$

$\frac{36}{100} = 0.36$

$100 \overline{)360} \; 0.36$

-300

600

-600

0

Terminating decimal

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II. $\frac{1}{11}$

$\frac{1}{11} = 0.090909\ldots$

$= 0.\overline{09}$

Non-terminating & Repeating decimal

11 | 100 | 0.090909...
99

100
99

100
99

100
99

1

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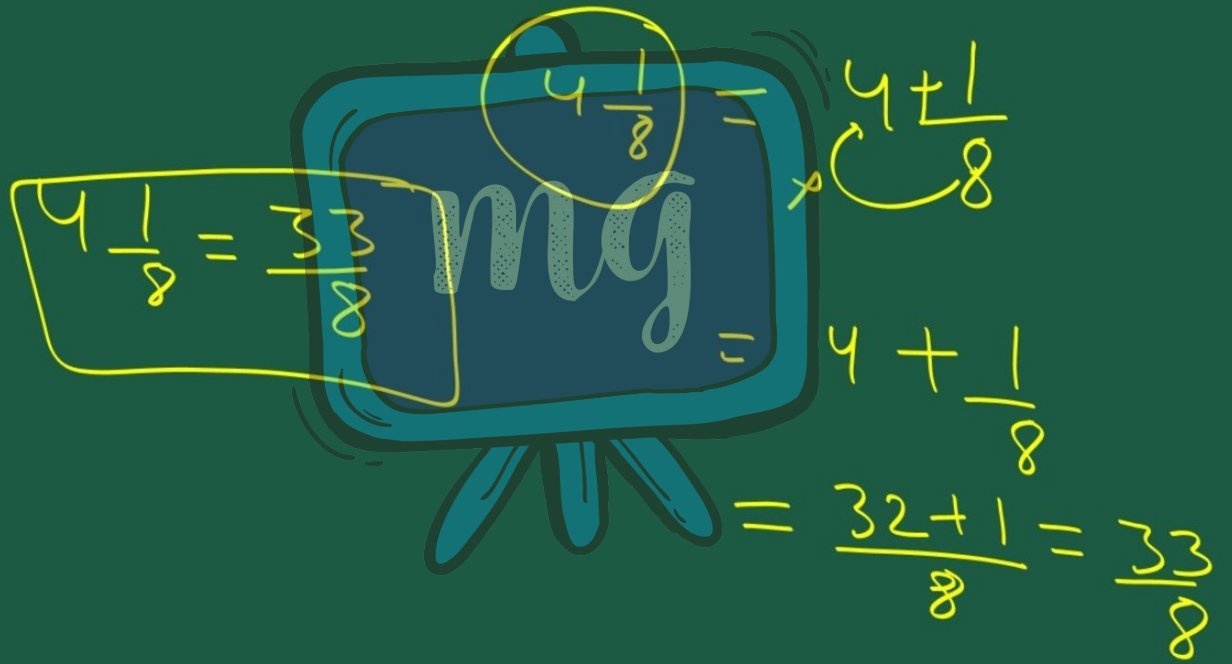
III. $4\frac{1}{8}$



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$4\frac{1}{8} = \frac{33}{8}$

$4\frac{1}{8} = \frac{33}{8} = 4.125$

$4\frac{1}{8} = 4.125$



terminating decimal

8 | 33 | 4.125
32
10
8
20
16
40
40
0

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IV. $\frac{3}{13}$



$$
\begin{array}{r|l|l}
13 & 30 & 0.23 \\
 & 26 & \\
\hline
 & 40 & \\
 & 39 & \\
\hline
 & 1 &
\end{array}
$$

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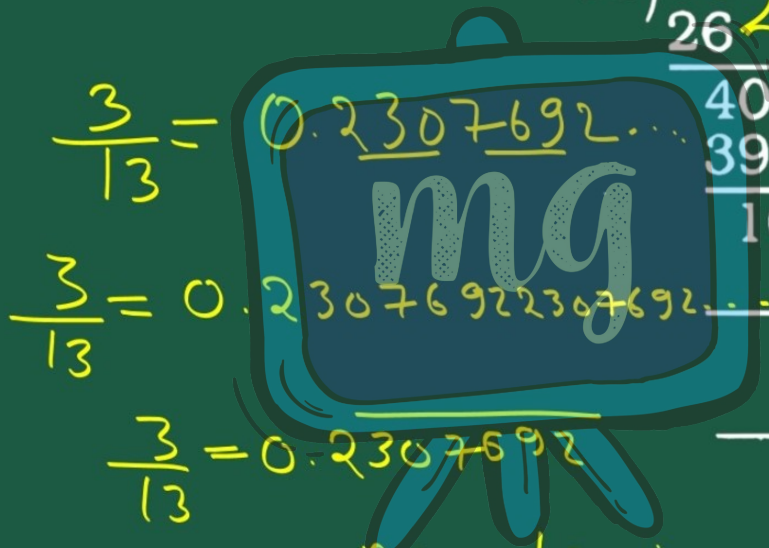

$\frac{3}{13} = 0.2307692\ldots$

$\frac{3}{13} = 0.230769230769\ldots$

$\frac{3}{13} = 0.2307692$

$$
\begin{array}{r|l}
13 & 30 \\
 & 26 \\
\hline
 & 40 \\
 & 39 \\
\hline
 & 100 \\
 & 91 \\
\hline
 & 90 \\
 & 78 \\
\hline
 & 120 \\
 & 117 \\
\hline
 & 30
\end{array}
\qquad (0.2307692\ldots
$$

30

Non terminating & Repeating decimal

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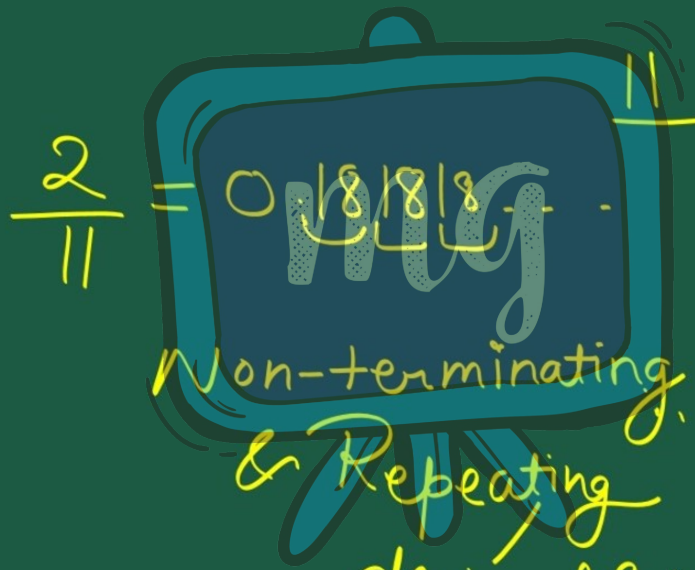
V. $\frac{2}{11}$



$\frac{2}{11} = 0.18181\ldots$

Non-terminating & Repeating decimal Exp.

$$
\begin{array}{r|l}
11 & 20 \quad 0.1818\ldots \\
 & 11 \\
\hline
 & 90 \\
 & 88 \\
\hline
 & 20 \\
 & 11 \\
\hline
 & 90 \\
 & 88 \\
\hline
 & 2
\end{array}
$$

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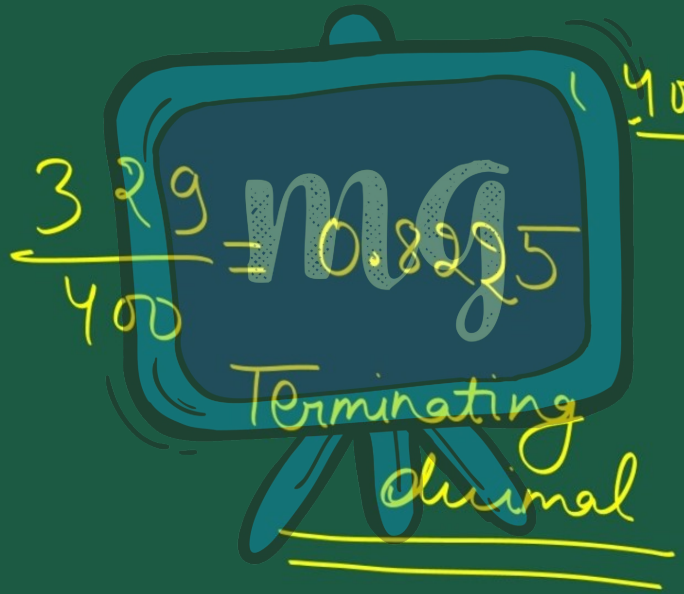
VI. $\frac{329}{400}$



$\frac{329}{400} = 0.8225$

Terminating decimal

400 | 3290 | 0.8225
3200
900
800
1000
800
2000
2000
0

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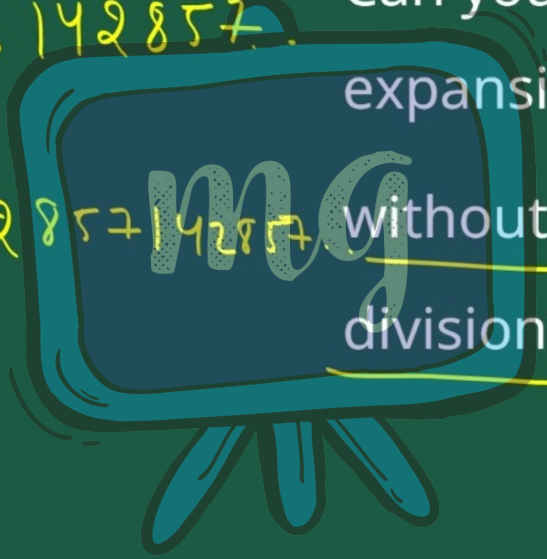
2. You know that $\frac{1}{7} = 0.\overline{142857}$.

Can you predict what the decimal expansions of $\frac{2}{7}, \frac{3}{7}, \frac{4}{7}, \frac{5}{7}, \frac{6}{7}$ are, without actually doing the long division? If so, how ?

$\frac{1}{7} = 0.\overline{142857}$

$\frac{1}{7} = 0.142857142857\ldots$

1



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$$\frac{1}{7} = 0.\overline{142857}$$

$$\frac{2}{7} = 2 \times \frac{1}{7} = 2 \times 0.\overline{142857}$$



$$\frac{2}{7} = 0.\overline{285714}$$

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$$\frac{3}{7} = 3 \times \frac{1}{7} = 3 \times 0.\overline{142857}$$

$$\frac{3}{7} = 0.\overline{428571}$$

$$\frac{4}{7} = 4 \times \frac{1}{7} = 4 \times 0.\overline{142857}$$

$$= 0.\overline{571428}$$

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$$\frac{5}{7} = 5 \times \frac{1}{7} = 5 \times 0.\overline{142857}$$



$$= 0.\overline{714285}$$

$$\frac{6}{7} = 6 \times \frac{1}{7} = 6 \times 0.\overline{142857}$$

$$= 0.\overline{857142}$$

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3. Express the following in the form $\frac{p}{q}$, where p & q are integers and $q \neq 0$.

I. $0.\overline{6}$

$0.\overline{6}$

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

$x = 0.666666\ldots$ — (1) [let]

multiply 10 both sides

$10 \times x = 10 \times 0.66666\ldots$

$10x = 6.66666\ldots$ — (2)

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eq (2) − eq (1)

$10x - x = 6.6666\ldots - 0.6666\ldots$

$9x = 6$

$x = \frac{6}{9}$

$x = \frac{2}{3}$

$= 0.66666\ldots$

$\begin{array}{r} 6.6666\ldots \\ -\ 0.6666\ldots \\ \hline 6.0000 \end{array}$

2 ∈ I

3 ∈ I

3 ≠ 0

mg

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II. $0.\overline{47}$

$0.\overline{47} = 0.474747\ldots$

$x = 0.474747\ldots$ ∴ [let] — (1)

multiple 100 both side

$100 \times x = 100 \times 0.474747\ldots$

$100x = 47.474747\ldots$ — (2)

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$$eq(2) - eq(1)$$

$$100x - x = 47.474747\ldots - 0.474747\ldots$$

$$99x = 47$$

$$x = \frac{47}{99}$$

$47 \in I$

$99 \in I$

$99 \neq 0$

$$47.4747\ldots$$
$$-\ 0.4747\ldots$$
$$47.0000$$

$$x = \frac{47}{99} = 0.474747\ldots$$

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III. $0.\overline{001}$

$0.\overline{001} = 0.001001001\ldots\ldots$

$x = 0.001001001\ldots\ldots$ —①[let]

multiply 1000 both sides

$1000x = 1000 \times 0.001001001\ldots\ldots$

$1000x = 1.001001001\ldots\ldots$ —②

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eq(2) − eq(1)

$1000x - x = 1.00100100\ldots - 0.00100100\ldots$

$999x = 1$

$1 \in I$

$999 \in I$

$999 \neq 0$

$$x = \frac{1}{999} = 0.001001001\ldots$$

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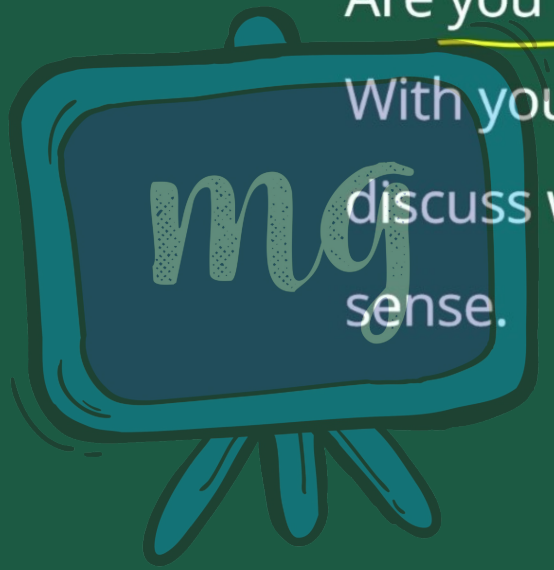
4. Express 0.99999 .... in the form $\frac{p}{q}$,

Are you surprised by your answer ?

With your teacher and classmates discuss why the answer makes sense.



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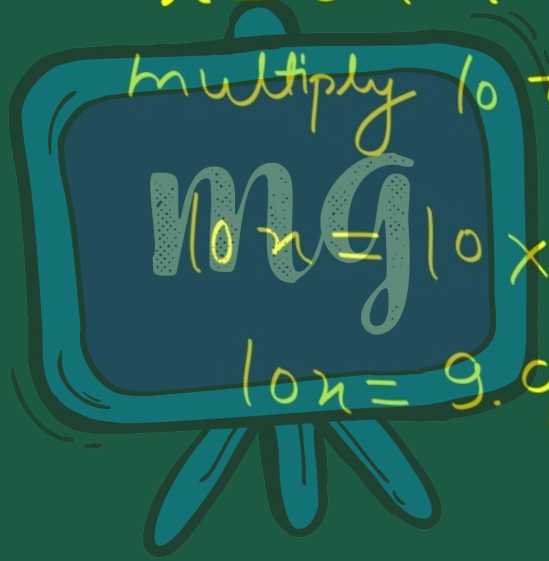
$x = 0.9999999999... = 0.\overline{9}$

$x = 0.99999...$ — (1)

Multiply 10 to both sides

$10x = 10 \times 0.9999...$

$10x = 9.99999...$ — (2)



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eq② − eq①

$10x - x = 9.99999\ldots - 0.9999\ldots$

$9x = 9 \Rightarrow x = \frac{9}{9}$

$\boxed{x = 1}$

$\frac{1}{1} = \frac{p}{q}$

$p = 1 \in I$

$q = 1 \in I$

$\boxed{1 \neq 0}$

$\boxed{x = 1 = 0.9999999\ldots -}$

$0.000000000\ldots 1$