



SpeedLabs

MATHS

CBSE 9th

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

(i) $\frac{36}{100}$ (ii) $\frac{1}{11}$ (iii) $4\frac{1}{2}$ (iv) $\frac{3}{13}$ (v) $\frac{2}{11}$ (vi) $\frac{329}{400}$

Ans - - (i) $\frac{36}{100} = 0.36$

Terminating

(ii) $\frac{1}{11} = 0.090909 \dots = 0.\overline{09}$

Non-terminating repeating

(iii) $4\frac{1}{2} = \frac{33}{8} = 4.125$

Terminating

(iv) $\frac{3}{13} = 0.230769230769 \dots = 0.\overline{230769}$

Non-terminating repeating

(v) $\frac{2}{11} = 0.18181818 \dots = 0.\overline{18}$

Non-terminating repeating

(vi) $\frac{329}{400} = 0.8225$

Terminating

2. You know that $\frac{1}{7} = 0.\overline{0.142857}$ Can you predict what the decimal expansion 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?

[Hint: Study the remainders while finding the value of $\frac{1}{7}$ carefully.]

Ans - Yes. It can be done as follows.

$$\frac{2}{7} = 2 \times \frac{1}{7} = 2 \times 0.\overline{142857} = 0.\overline{285714}$$

$$\frac{3}{7} = 3 \times \frac{1}{7} = 3 \times 0.\overline{142857} = 0.\overline{428571}$$

$$\frac{4}{7} = 4 \times \frac{1}{7} = 4 \times 0.\overline{142857} = 0.\overline{571428}$$

$$\frac{5}{7} = 5 \times \frac{1}{7} = 5 \times 0.\overline{142857} = 0.\overline{714285}$$

$$\frac{6}{7} = 6 \times \frac{1}{7} = 6 \times 0.\overline{142857} = 0.\overline{857142}$$

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

(i) $0.\bar{6}$ (ii) $0.\overline{001}$ (iii) $0.4\bar{7}$

Ans - (i) $0.\bar{6} = 0.6666\dots$

$$\text{Let } x = 0.666\dots$$

$$10x = 6.666\dots$$

$$10x = 6 + x$$

$$9x = 6$$

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

(ii) $0.\overline{001} = 0.001001\dots$

$$\text{Let } x = 0.001001\dots$$

$$1000x = 1.001001\dots$$

$$1000x = 1 + x$$

$$999x = 1$$

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

$$\frac{4}{10} + \frac{0.777\dots}{10} = \frac{4}{10} + \frac{7}{10} = \frac{36 + 7}{90} = \frac{43}{90}$$

(iii) $0.4\bar{7}$

$$0.4\bar{7} = 0.4777\dots$$

$$= \frac{4}{10} + \frac{0.4777}{10}$$

$$\text{Let } x = 0.777\dots$$

$$10x = 7.777\dots$$

$$10x = 7 + x$$

$$x = \frac{7}{9}$$

$$\frac{4}{10} + \frac{0.777\dots}{10} = \frac{4}{10} + \frac{7}{10} = \frac{36 + 7}{90} = \frac{43}{90}$$

4. Express $0.99999\dots$ in the form $\frac{p}{q}$. Are you surprised by your answer? With your teacher and classmates discuss why the answer makes sense.

Ans - Let $x = 0.9999\dots$

$$10x = 9.9999\dots$$

$$10x = 9 + x$$

$$9x = 9$$

$$x = 1$$

5. What can the maximum number of digits be in the recurring block of digits in the decimal expansion of? Perform the division to check your answer.

Ans - We need to find the number of digits in the recurring block of $\frac{1}{17}$.

Let us perform the long division to get the recurring block of $\frac{1}{17}$.

We need to divide 1 by 17, to get

We can observe that while dividing 1 by 17 we got the remainder as 1, which will continue to be 1 after carrying out 16 continuous divisions.

Therefore, we conclude that,

$$\frac{1}{17} = 0.0588235294117647 \dots \dots \text{or } \frac{1}{17} = 0.\overline{0588235294117647}$$

which is a non-terminating decimal and recurring decimal.

6. Look at several examples of rational numbers in the form $\frac{p}{q}$, ($q \neq 0$) where p and q are integers with no common factors other than 1 and having terminating decimal representations (expansions). Can you guess what property q must satisfy?

Ans - Terminating decimal expansion will occur when denominator q of rational number $\frac{p}{q}$ is either of 2, 4, 5, 8, 10, and so on...

$$\frac{9}{4} = 2.25$$

$$\frac{11}{8} = 1.375$$

$$\frac{27}{5} = 5.4$$

It can be observed that terminating decimal may be obtained in the situation where prime factorization of the denominator of the given fractions has the power of 2 only or 5 only or both.

7. Write three numbers whose decimal expansions are non-terminating non-recurring.

Ans - 3 numbers whose decimal expansions are non-terminating non-recurring are as follows.

0.505005000500005000005...

0.720720072000720000720000...

0.08008000800008000008000008...

8. Find three different irrational numbers between the rational numbers $\frac{5}{11}$ and $\frac{9}{11}$.

Ans - $\frac{5}{7} = 0.\overline{0.714285}$

$$\frac{9}{11} = 0.\overline{81}$$

3 irrational numbers are as follows.

0.73073007300073000073...

0.75075007500075000075...

0.79079007900079000079...

9. Classify the following numbers as rational or irrational:

(i) $\sqrt{23}$ (ii) $\sqrt{225}$ (iii) 0.3796 (iv) 7.478478 (v) 1.101001000100001...

Ans - (i) $\sqrt{23} = 4.79583152331...$

As the decimal expansion of this number is non-terminating non-recurring, therefore, it is an irrational number.

(ii) $\sqrt{225} = 15 = \frac{15}{1}$

It is a rational number as it can be represented in form.

(iii) 0.3796

As the decimal expansion of this number is terminating, therefore, it is a rational number.

(iv) 7.478478 ...

As the decimal expansion of this number is non-terminating recurring, therefore, it is a rational number.

(v) 1.10100100010000 ...

As the decimal expansion of this number is non-terminating non-repeating, therefore, it is an irrational number.