9^{th} Class NCERT Maths
Chapter 1 Number Systems
Exercise - 1.3
(Real Numbers and Their Decimal Expansions)

Solutions:

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

(i) 36/100

(ii) 1/11

(iii) $4\frac{1}{8}$

(iv) 3/13

(v) 2/11

(vi) 329/400

(i) 36/100 :

On dividing 36 by 100, we will get

= 0.36 (Terminating)

(ii) 1/11 :

On dividing 1 by 11, we get

0.09090909… = 0.9 (Non terminating repeating)

(iii) **33/8:**

On dividing 33 by 8, we get

= 4.125 (Terminating)

(IV) 3/13 :

On dividing 3 by 13, we get

= 0.230769230… = 0.230769 (Non terminating repeating)

(V) **2/11 :**

On dividing 2 by 11, we get

Here we can see after decimal 18 is repeating itself in continue manner.

So, this is non-terminating repeating type decimal expansion.

= 0.18181818… = 0.18 (Non terminating repeating)

(vi) **329/400:**

On dividing 329 by 400, we get

=0.8225, which is non repeating type, terms got terminate after some steps.

= 0.8225 (Terminating)

Que2. You know that 1/7 = $\overline{\mathbf{0.142857}}$.Can you predict what the decimal expansion of 2/7, 3/7, 4/7, 5/7, 6/7 are without actually doing the long division? If so, how?

[Hint: Study the remainders while finding the value of 1/7 carefully.]

Solution: as we can write $\frac{1}{7} = \overline{\mathbf{0.142857}}$ = 0.142857.......

So, we get 2×0.142857....=.285714.....

3×0.142857.....=.428571....

4×0.142857.....=.571428.....

5×0.142857...=.714285...

6×0.142857....=.857142...

Que3) Express the following in the form p/q where p and q are integers and q ≠ 0.

(i) $\overline{0.6}$

(ii) $0.4\overline{7}$

(iii) $0.\overline{001}$

Solution: (i) $\overline{0.6}$ = 0.666…

Let x = 0.666… → (1)

Now do multiply by 10 both side. Then, we get

10x = 6.666…

10x = 6 + 0.666...

From eq (1) we put the value of o.666...

10x = 6 + x

9x = 6

x = 2/3 so, **answer is 2/3.**

(ii) $0.4\overline{7}$ = 0.4777…

Let x = 0.4777…

Multiply both side by 10.

10x = 4.777…→ (1)

Now multiply again both side by 10 to take bar value before to decimal.

100x = 47.777... → (2)

Now subtract eq (1) from eq (2)

90x = 43

X = 43/90

(iii) $0.\overline{001}$ = 0.001001…

Let x = 0.001001…

Now multiply both sides by 1000

1000x = 1.001001…

1000x = 1 + x

999x = 1

x = 1/999

So, answer is 1\999

Que4). Express 0.99999…in the form p/q. Are you surprised by your answer? With your teacher and classmates discuss why the answer makes sense.

Solution:

Let x = 0.9999…

There one term 0.9 doing repeat itself.

10x = 9.9999…

10x = 9 + x

9x = 9

x = 1

Yes, answer make us surprised.

The difference between 1 and 0.999999.... is very less which is

Negligible. Thus, 0.99999...... is too much near 1, Therefore, the 1 as answer can be justified.

Que5). What can the maximum number of digits be in the repeating block of digits in the decimal expansion of 1/17? Perform the division to check your answer.

Answer: As we know,

To calculate maximum number of digits in quotient

There is a formula: (N-1), where N is digit of divisor.

After long division .we get,

1/17 = 0.0588235294117647

There are 16 digits in the repeating block of the decimal expansion of

1/17.

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Que6). Look at several examples of rational numbers in the form p/q (q ≠0) where p and q are integers with no common factors other than 1and having terminating decimal representations (expansions). Can you guess what property q must satisfy?

Solution:

We observe that when q is 2, 4, 5, 8, 10… then the decimal expansion is terminating. For example:

1/2 = 0.5, denominator q = 2

7/8 = 0.875, denominator q = 2

4/5 = 0.8, denominator q = 5

1/10 = 0.1, denominator q =10 (2 x 5)

Here, we can see denominator (q) is power of only 2 and 5 or both.

Therefore, q must be satisfy in the form either 2^m and 5^m or both 2^m x 5^m.

Que7). Write three numbers whose decimal expansions are non-terminating non-recurring.

Solution: All irrational numbers decimal expansion is non-terminating non-recurring.

Such as: 0.01001000100001.....

0.202002000200002.......

$\sqrt{2}$= 1.414421356.......

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Que8). Find three different irrational numbers between the rational Numbers 5/7 and 9/11.

Solution: After dividing given numbers we get: 5/7 = 0.714285

9/11 = 0.81

Now write irrational nos. Between them

Three different irrational numbers are:

0.73073007300073000073.....

0.74074007400074000074.....

0.76076007600076000076.......

Que9). Classify the following numbers as rational or irrational:

(i) $\sqrt{23}$

(ii) $\sqrt{225}$

(iii) 0.3796

(iv) 7.478478.......

(v) 1.101001000100001...

Solution:

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

Since the number is non-terminating non-recurring therefore, it is an irrational number.

Or directly we can predicate $\sqrt{23}$ is an irrational no. Because it is not a perfect square root .so, it is an irrational number and all irrational numbers are non-terminating non-recurring type.

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

It is a perfect square root.
Since the number is rational number as it can represented in p/q form.

(iii) 0.3796

Since the number is terminating therefore, it is a rational number.

(iv) 7.478478.... = 7.478......

Since the this number is non-terminating recurring, therefore, it is a Rational number.

(v) 1.101001000100001…

Since the number is non-terminating non-repeating, therefore, it is an irrational number.