Euclid division lemma class 10 Handwritten pdf Notes

Chapter-1 / Real Numbers. / Class-10

* Numbers — 0, 1, 2, 3, 4, 5, 6, 7, 8, 9.

* Natural Numbers (N) → The numbers which are used for the counting
  Ex:- 1, 2, 3, 4, 5, 6, ------

* Whole Numbers (W) → Including zero in Natural numbers, are called whole numbers.
  Ex:- 0, 1, 2, 3, 4, 5, 6,

* Integers (Z) — (Integers are three types)
  - positive Integer — Ex:- +1, +2, +3, +4, ---
  - Negative Integer — Ex:- −1, −2, −3, −4, ---
  - Zero Integers — Ex:- '0'

Numbers
- Real Numbers
- Complex Number (Class-12th sallybus)

Real Number = Rational numbers + IRational numbers

→ Rational number and Irrational numbers taken together are Known as Real Numbers — Ex:- $-\frac{3}{4}$, -2, π, $\frac{1}{3}$

Note:- Every Real Number can be either Rational or Irrational Numbers..

Ex:- $-\frac{3}{4}$, 0, +2, 5, −3.14, π, $\frac{7}{2}$

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Real Numbers

Rational Numbers

A number which can represent in the form of $\frac{p}{q}$, where p and q are both integers and $q \neq 0$.

Ex:- $\frac{1}{2}, \frac{3}{4}, 0.1, 0.\overline{41}, 0.333, -0.5, \sqrt{4}$

$\Rightarrow 0.414141......$

Let $x = 0.414141.....$ ①

multiple by 100 in eqn ①

$100x = 41.414141.....$ ②

Subtracting ② − ①

$99x = 43.0$

$x = \frac{43}{99}$

$\Rightarrow \boxed{0.\overline{41} = \frac{43}{99}}$ ($\frac{p}{q}$ form)

IRRATIONAL NUMBERS

A number which can not represent in the form of $\frac{p}{q}$, where p and q are both integers and $q \neq 0$.

Ex:- $\sqrt{2}, \sqrt{3}$, $\pi \rightarrow$ pie

$\pi = 3.1415....$

Golden ratio

$\varphi = 1.6180339...$

e → eulers numbers.

$e = 2.718281...$

More example →

0.101001000100001........

0.313113111311113........

0.59599599959999 5........

3.14159265358979........

2.7182818284 5904........

1.6180339887 4989........

Rankers study point by Dhananjay Sir

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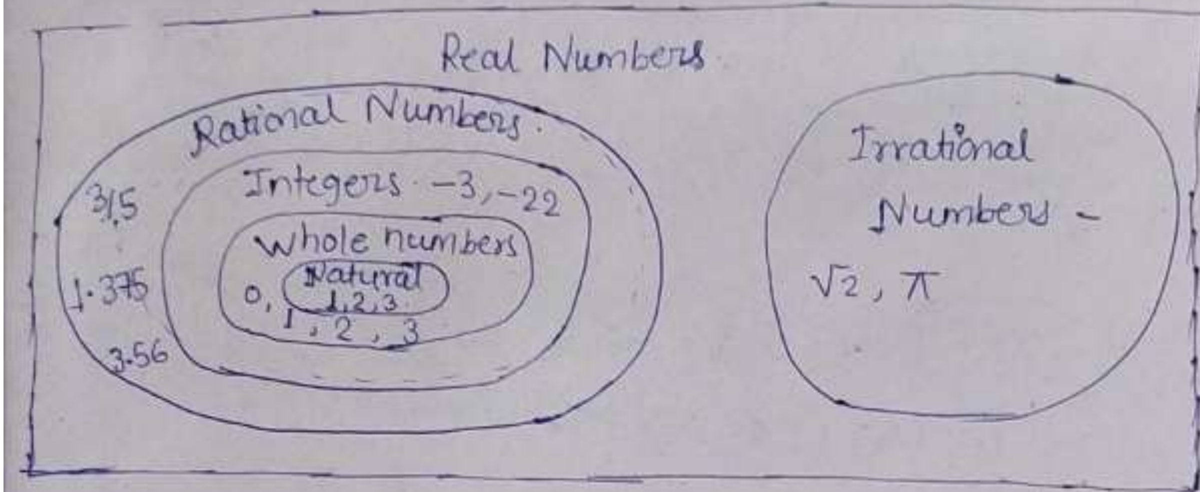
Note :- IRRATIONAL NUMBERS ARE represented by non-terminating non-repeating decimals.



Example - Prove that $\sqrt{2}$ is an irrational numbers by Contradiction method -

(or)

Example - Prove that $\sqrt{2}$ is an irrational numbers by division method.

Contradiction Method -

→ Let $\sqrt{2}$ is rational number

→ $\sqrt{2} = \frac{p}{q}$ (where p & q are co-prime no)

→ $\cancel{2 \times \frac{p^2}{q^2}}$ $2 = \frac{p^2}{q^2}$

→ $\boxed{2q^2 = p^2}$ Hence 2 divides p^2

→ Mean '2' divides also 'p'

→ Let $p = 2m$

→ $p^2 = 4m^2$

→ $2q^2 = 4m^2$ Hence 2 divides q^2

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Ex: Using Euclid's Division Algorithm find H.C.F. of 92690, 7378 and 7161.

Soln

~~92690 =~~

(92690, 7378)

$\Rightarrow 92690 = 7378 \times 12 + 4154$

$$\begin{array}{r} 12 \\ 7378\,\overline{)\,92690\,}(12 \\ 7378 \\ \hline 18910 \\ 14756 \\ \hline 4154 \end{array}$$

(7378, 4154)

$\Rightarrow 7378 = 4154 \times 1 + 3224$

$$\begin{array}{r} 1 \\ 4154\,\overline{)\,7378\,}(\\ 4154 \\ \hline 3224 \end{array}$$

(4154, 3224)

$\Rightarrow 4154 = 3224 \times 1 + 930$

$$\begin{array}{r} 3224\,\overline{)\,4154\,}(1 \\ 3224 \\ \hline 930 \end{array}$$

(3224, 930)

$\Rightarrow 3224 = 930 \times 3 + 434$

$$\begin{array}{r} 930\,\overline{)\,3224\,}(3 \\ 2790 \\ \hline 434 \end{array}$$

(930, 434)

$\Rightarrow 930 = 434 \times 2 + 62$

$$\begin{array}{r} 434\,\overline{)\,930\,}(2 \\ 868 \\ \hline 62 \end{array}$$

(434, 62)

$\Rightarrow 434 = 62 \times 7 + 0$

$$\begin{array}{r} 62\,\overline{)\,434\,}(7 \\ 434 \\ \hline 0 \end{array}$$

$\boxed{\text{So, H.C.F.}(434, 62) = \text{H.C.F.}(92690, 7378) = 62}$

Now use Euclid's → for (7161, 62)

~~62)7161~~ (1

$\Rightarrow 7161 = 62 \times 115 + 31$

$$
\begin{array}{r|l}
62 & 7161 \ (115 \\
 & \underline{62} \\
 & 96 \\
 & \underline{62} \\
 & 341 \\
 & \underline{310} \\
 & 31
\end{array}
$$

$(62, 31)$

$\Rightarrow \boxed{62 = 31 \times 1 + 0}$

$$
\begin{array}{r|l}
31 & 62 \ (1 \\
 & \underline{62} \\
 & 0
\end{array}
$$

No, $\boxed{H.C.F(62, 31) = H.C.F(7161, 62) = 31}$

Ans:- $H.C.F(92690, 7378, 7161) = 31$

Que:- find L.C.M and H.C.F of the following pair of Integers by applying prime factorisation method.

(I) 26, 91 (II) 17, 25

Soln:

$26 = 2 \times 13$

$91 = 7 \times 13$

$\boxed{H.C.F(26, 91) = 13}$

$\boxed{L.C.M \Rightarrow 2 \times 7 \times 13 \Rightarrow 14 \times 13 \Rightarrow 182}$

$17 = 17 \times 1$

$25 = 5 \times 5 \times 1$

$\boxed{H.C.F(17, 25) = 1}$

$\boxed{L.C.M \Rightarrow 5 \times 17 \times 5 \times 1 \Rightarrow 425}$

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Ex:- Check whether 6^n can end with digit '0' or any $n \in N$.

Soln: → If the number 6^n ends with the digit zero.

→ Then it is divisible by 5.

→ Therefore prime factorisation of 6^n contains the prime 5.

→ So, this is not possible because the only prime factorisation of 6^n is 2 and 3.

→ So, there is no value of n in natural number for which 6^n ends with digit zero.

~~~~~ * best of luck * ~~~~~
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