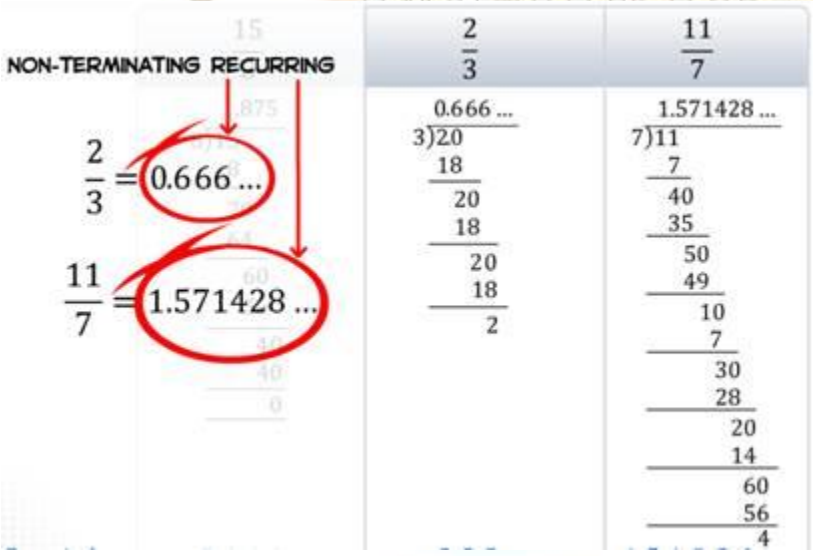
Real Numbers

We already know about **various types of numbers** such as **Natural numbers**, **Whole numbers**, **Integers**, **Rational** and **Irrational numbers**. We already learnt how to represent these numbers on the **number line**.
A number that can be expressed as $\frac{p}{q}$, where $p, q \in Z$, $q \neq 0$ is known as **Rational number**. **Collection of rational numbers** is denoted by **Q**.
A number that cannot be **e**xpressed as $\frac{p}{q}$, where $p, q \in Z, q \neq 0$ is called an **irrational number. Collection of irrational numbers** is denoted by $\bar{Q}$. The square root of any prime number is **irrational**. There are infinitely many **irrational numbers** between **two rational numbers**.
The **collection of real numbers** is the collection of all **rational numbers** and **irrational numbers** together. It is represented by **R**. A **real number** is either **rational or irrational**.
A **rational number** can be expressed as its **decimal expansion**.
In case of a division:

- If remainder becomes zero after certain stage, then the **decimal expansion** is **terminating**.
- If the **remainder** never becomes zero but repeats after certain stage, then the **decimal expansion** is **non-terminating recurring**.

The **decimal expansion** of a **rational number** is either **terminating** or **non-terminating recurring**.
The **decimal expansion** of an **irrational number** is **non-terminating non-recurring**. Every **real number** can be represented on a **number line** uniquely.
This **process of visualisation** of representing a **decimal expansion** on the **number line** is known as the process of **successive magnification**.



$\frac{15}{8}$

$$
\begin{array}{r}
1.875 \\
8\overline{)15} \\
8 \\
\hline
70 \\
64 \\
\hline
60 \\
56 \\
\hline
40 \\
40 \\
\hline
0
\end{array}
$$

TERMINATING

$$\frac{15}{8} = 1.875$$