NUMBER SYSTEM

DECIMAL EXPANSION

- **Non-Terminating**
  - Ex: 2.7777 or 2.7, 2.456789.....
  - Repeating (Rational)
    - Ex: 2.8989..... or 2.89
    - 3.11111.... or 3.1
  - Non-Repeating [Irrational]
    - Ex: 1.41432358....
    - 3.1428654....
- **Terminating**
  - Ex: 2, 0, 2.4, 2.132753
  - [Rational]

NOTE

* Decimal expansion of a rational number is either terminating or Non-Terminating Recurring.

* Decimal expansion of an irrational number is Non-terminating Non-recurring.

x^2 → Power

x → Base

LAWS OF EXPONENT

Let $a > 0$ be a real number.

Let m & n be integers such that m and n have no common factors other than 1, and $n > 0$.

Then, $a^{m/n} = \left(\sqrt[n]{a}\right)^m$

$a^p \cdot a^q = a^{p+q}$	$a^0 = 1$
$[a^p]^q = a^{p \cdot q}$	$a^{-b} = \frac{1}{a^b}$
$a^{p/q} = [a^p]^{1/q}$	$\left[\frac{a}{b}\right]^p = \frac{a^p}{b^p}$
$a^p \cdot b^p = [ab]^p$	

NOTE: If the denominator of a fraction, contains two terms along with the surd, then we need to multiply both numerator & denominator by the conjugate of the denominator.

To rationalise the denominator of $\frac{1}{\sqrt{a}+\sqrt{b}}$, we multiply this by $\frac{\sqrt{a}-\sqrt{b}}{\sqrt{a}-\sqrt{b}}$.

For positive real numbers a & b, the following identities hold :

$$\sqrt{ab} = \sqrt{a}\cdot\sqrt{b}$$

$$\sqrt{\frac{a}{b}} = \frac{\sqrt{a}}{\sqrt{b}}$$

$$\left(\sqrt{a}+\sqrt{b}\right)\left(\sqrt{a}-\sqrt{b}\right) = a-b$$

$$\left[\sqrt{a}+\sqrt{b}\right]^2 = a+b+2\sqrt{ab}$$