

Definitions :

1. **Surd**: Any number which is in the form of $\sqrt[n]{a}$ (nth root of a) where 'n' is a natural and 'a' a rational number which is not the nth root of any natural number is called a surd (or) or a radical.

Ex: $\sqrt{2}$, $3\sqrt{3}$, $4\sqrt{5}$ etc.

Note:

- * 'n' is called the order of the surd.
- * 'a' is called the radicand of the surd.
- * $\sqrt[n]{a}$ is called the radical of the surd.
- * Every surd has a rational part and an irrational part.
- * All perfect squares and perfect cubes are not surds.

2. **Simple Surd**: Any surd whose rational part in unity (one) is called a simple surd.

Ex: $\sqrt{2}$, $\sqrt{3}$, $\sqrt{4}$ etc.

Note:

- * Simple surd is also called a 'Pure surd'.

3. **Mixed Surd**: Any surd whose rational part is not unity (one) is called a mixed surd.

Ex: $2\sqrt{2}$, $3\sqrt{5}$, $\frac{2}{3}\sqrt{2}$ etc.

Note:

- * Mixed surd is also called an impure surd.

4. **Monomial Surd**: Any surd which has atleast one term is called a monomial surd.

Ex: $\sqrt{2}$, $3\sqrt{3}$, $2\sqrt{2}$, $3\sqrt{3}$ etc.

Note:

- * Every simple surd and a mixed surd is called a monomial surd.

5. **Binomial Surd**: Any surd which is a combination of two surds is called a binomial surd.

Ex: $\sqrt{2} + \sqrt{3}$, $3\sqrt{3} + \sqrt{2}$ etc.

6. **Quadratic Surds**: Any surd whose order is 2 is called a quadratic surd.

Ex: $\sqrt{2}$, $\sqrt{3}$, $\sqrt{5}$, $\sqrt{7}$ etc.

7. **Cubic Surd**: Any surd whose order is 3 is called a cubic surd.

Ex: $\sqrt[3]{2}$, $\sqrt[3]{3}$, $\sqrt[3]{5}$, $\sqrt[3]{7}$ etc.

8. **Similar or Like Surds**: Surds whose irrational parts are the same are called like surds.

Note:

- * Like surds can be added.
- * Like surds can be subtracted.
- * Like surds can be divided.
- * Like surds can be multiplied.

9. **Dissimilar or Unlike Surds** : Surds whose irrational parts are not same are called unlike surds.

Note :

- * Unlike surds cannot be added.
- * Unlike surds cannot be subtracted.
- * Unlike surds can be multiplied
- * Unlike surds can be divided.

10. **Rationalisation** : Any procedure in which irrationals (surds) gets converted into rationals is called rationalisation.

11. **Rationalising Factor**: A number (surd) which converts an irrational into a rational through multiplication is called a rationalising factor.

Note :

Surd

$$\sqrt{a}$$

$$n\sqrt{a}$$

$$\sqrt{a+b}$$

$$a-\sqrt{b}$$

$$\sqrt{a}+\sqrt{b}$$

$$m\sqrt{a}+n\sqrt{b}$$

Rationalising factor

$$\sqrt{a}$$

$$\sqrt{a}$$

$$\sqrt{a-b}$$

$$a+\sqrt{b}$$

$$\sqrt{a}-\sqrt{b}$$

$$m\sqrt{a}-n\sqrt{b}$$