# **CUBES AND CUBE ROOTS**

#### **CUBE ROOT THROUGH PRIME FACTORISATION METHOD**

### Prime Factorisation Method for Finding the Cube Root

Let us take some examples here

**Ex.1** Find the cube root of 1728.

**Sol.**  $\sqrt[3]{1728} = (1728)^{1/3}$ 

2	1728
2	864
2	432
2	216
2	108
2	54
3	27
3	9
	3

**Step : 1** First factorise the given number into its prime factors

 $\sqrt[3]{1728} = \sqrt[3]{2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 3 \times 3 \times 3}$ 

**Step : 2** Then group the factors in 3s.

 $\sqrt[3]{1728} = \sqrt[3]{2^3 \times 2^3 \times 3^3}$ 

**Step : 3** Take one prime factor from each group.

 $\sqrt[3]{1728} = 2 \times 2 \times 3 = 12$ 

 $\therefore \sqrt[3]{1728} = 12$ 

**Ex.2** Find the value of  $\sqrt[3]{216}$ 

**Sol.**  $\sqrt[3]{216} = (216)^{1/3}$ 

#### CLASS 8

2	216	
2	108	
2	54	
3	27	
3	9	
	3	

**Step-1:** Factorise the given number into its prime factors.

 $\sqrt[3]{216} = \sqrt[3]{2 \times 2 \times 2 \times 3 \times 3 \times 3}$ 

**Step-2:** Group the factors in 3s.

 $\sqrt[3]{216} = \sqrt[3]{2^3 \times 3^3}$ 

**Step-3**: Take one prime factor from each group.

 $\sqrt[3]{216} = 2 \times 3 = 6$ 

 $\therefore \sqrt[3]{216} = 2 \times 3 = 6$ 

Observe  $2^3 = 8$ ,  $3^3 = 27$ ,  $4^3 = 64$ ,  $5^3 = 125$ ,...

All cubes of even numbers are even and cubes of odd numbers are odd. Cubes of negative numbers are negative.

- **Ex.3** Find the cube root of 46656.
- Sol. (i) The unit digit of the number is 6, so the cube root will also have 6 in the unit digit.
  - (ii) Separate the number as 46 656. 46 is greater than 3<sup>3</sup> but less than 4<sup>3</sup>, so the tens digit is 3.
  - (iii) The required number is 36.
- **Ex.4** Find the cube root of 195112.
- Sol. (i) Unit digit of the given number is 2, so the required number has unit digit 8.
  (ii) 195 112, so 195 > 5<sup>3</sup> but < 6<sup>3</sup>.

So, required number is 58.

**Note :** Above method works for perfect cube numbers called cube root by approximation.

## DIGITS IN CUBE ROOT OF A NUMBER

Use dots on digit of given number starting from unit digit & leaving 2 next digits, now digits in cube root is same as the sum of dots.

**Ex.5** Find the digits in cube root of the following numbers.

	(i) 1728	(ii) 175616
	(iii) 8	(iv) 97336
	(v) 9261	(vi) 68921000
Sol.	1728	two dots 2 digits in cube root
	175616	two dots 2 digits in cube root
	<b>.</b> 8	Only one dot ∴ 1 digit in cube root
	926	Two dots ∴ 2 digit in cube root
	68921000	Three dots ∴ 3 digit in cube root