CUBE AND CUBE ROOTS

Cube Roots:

It is the inverse operation of finding a cube. Symbol $\sqrt[3]{}$ represents a cube-root.

Example: $\sqrt[3]{8} = 2$, $\sqrt[3]{216} = 6$, etc.

Methods to find a cube root:

1. Prime factorisation method:

Follow the steps given below to understand this method:

Step 1: Find all the prime factors of given cube number.

Step 2: Make as many group of 3 for all common digit.

Step 3: Replace group of 3 by respective single digit.

Step 4: Product of these single digits will give the cube root.

Example 1: Find cube root of 3375.

Solution: Step 1: Find all the prime factors of given cube number.

The prime factors of 3375 will be 5, 5, 3, 3, 3, 5.

Step 2: Making group of 3 for every common digit.

Here, we get (3 x 3 x 3) and (5 x 5 x 5)

Step 3: Replacing group of 3 by respective digit.

Thus, we get 3 and 5.

Step 4: Taking product of digits.

We get, 3 x 5 = 15.

Thus, $\sqrt[3]{3375} = 15$.

Example 2: Find cube root of 46656.

Solution: The prime factors of 46656 are 2, 2, 2, 2, 2, 2, 3, 3, 3, 3, 3, 3.

On grouping, we have $46656 = \underline{2 \times 2 \times 2} \times \underline{2 \times 2 \times 2} \times \underline{3 \times 3 \times 3} \times \underline{3 \times 3 \times 3}$.

So, $\sqrt[3]{46656} = 2 \times 2 \times 3 \times 3 = 36$.

2. Estimation Method:

Follow the steps given below to understand this method:

Step 1: For given cube number start making groups of three digits starting from the right most digit of the number. We can estimate the cube root of a given cube number through a step-by-step process.

Step 2: First group will give you the one's (or unit's) digit of the required cube root.

Step 3: Now take another group, let it be xyz. Find, $a^3 < xyz < b^3$. We take the one's place, of the smaller number a^3 as the ten's place of the required cube root.

Step 4: The digits obtained in step 2 and step 3 will give the final result.

Example 1: Find the cube root of 17576.

Solution:

Step 1: We will form groups of three starting from the rightmost side of 17567.

Thus, the two groups formed will be 576 and 17.

Step 2: For the group 576, the number at unit's place will be 6.

Step 3: The other group is 17. The group 17 lies between 2^3 and 3^3. Now, as per the method we will take the smaller number which is 2 in this case.

Step 4: Combining the two digits obtained in step 2 and 3, we get 26.

Thus, $\sqrt[3]{17576} = 26$.

Example 2: Guess the cube root of 4913.

Solution: The two groups of 4913 will be 4 and 913.

For group 913, as the last digit is 3 so its cube root will have 7 at its unit place.

For group 4, it will lie between $1^3 < 4 < 2^3$. Taking the smaller number which is 1 in this case.

Thus, $\sqrt[3]{4913} = 17$.