Atomic Energy Education Society – Distance Learning Programme

Class – **VIII** Subject – **Mathematics**

Chapter – **7**: **CUBES AND CUBE ROOTS**

 **Hand-out (Module 3/3)**

***Cube Roots***

Finding the cube root is the inverse operation of finding a cube.

We know that 23 = 8; so we say that the cube root of 8 is 2.

We write $\sqrt[3]{8}$ = 2. The symbol $\sqrt[3]{}$ denotes ‘cube-root.’

Let us find the cube roots of a few cube numbers.

33 = 27 ; $\sqrt[3]{27}$ = $\sqrt[3]{3^{3}}$ = 3.

43 = 64 ; $\sqrt[3]{64}$ = $\sqrt[3]{4^{3}}$ = 4.

73 = 343 ; $\sqrt[3]{343}$ = $\sqrt[3]{7^{3}}$ = 7.

103 = 1000 ; $\sqrt[3]{1000}$ = $\sqrt[3]{10^{3}}$ = 10.

123 = 1728 ; $\sqrt[3]{1728}$ = $\sqrt[3]{12^{3}}$ = 12.

If the volume of a cube is given, then we can find the length of its side by finding the cube root of the volume.

***Cube root through prime factorisation method***

Consider 74088.

The prime factorisation of 74088 = 2 × 2 × 2 × 3 × 3 × 3 × 7 × 7 × 7

 = 23 × 33 × 73

 = (2 × 3 × 7)3

 $\sqrt[3]{74088}$ = $\sqrt[3]{(2 ×3×7)^{3} }$

 = 2 x 3 x 7

 = 42

 $\sqrt[3]{74088}$ **= 42**

Steps: 1. Find the prime factors of the given number.

 2. Group the like factors into triplets.

 3. Find the cube root.

***Cube root of a cube number through estimation method.***

If the given number is a cube number then the estimation method can be used.

Let us find the cube root of 17576 through estimation.

Step 1: Form groups of three starting from the rightmost digit of 17576.

 17 576

 2nd group 1st group

 Here one group i.e., 576 has three digits whereas 17 has only two
 digits.

Step 2: First group i.e., 576 will give the one’s digit of the required cube root.
 The digit 6 is at its one’s place. 6 comes in the unit’s place of a number
 only when its cube ends in 6.

 So the one’s place of the required cube root is 6.

Step 3: Take the second group, i.e., 17.

 Cube of 2 is 8 and cube of 3 is 27.

 17 lies between 8 and 27 i.e., 8 < 17 < 27 or 23 < 17 < 33

 The smaller number among 2 and 3 is 2.

 Take 2 as ten’s place of the cube root of 17576.

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

Hence, to find the cube root through estimation:

* Make groups of three digits starting from the rightmost digit of the given number.
* First group gives the one’s digit of the required cube root.
* Second group gives the ten’s digit of the required cube root.

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