**CBSE Class 8 Maths Notes Chapter 6:** Chapter 6 of CBSE Class 8 Maths, "Cubes and Cube Roots," introduces the concept of cubes and cube roots. It begins by explaining that a cube results from multiplying a number by itself twice more. The chapter highlights the properties of perfect cubes and helps students identify them.

The concept of cube roots is then introduced, where students learn that the cube root of a number is a value that, when multiplied by itself three times, gives the original number. Methods to find the cube roots of perfect cubes using prime factorization are covered, along with estimation techniques.

# CBSE Class 8 Maths Notes Chapter 6 Overview

Chapter 6 of CBSE Class 8 Maths, titled "Cubes and Cube Roots," focuses on understanding the concepts of cubes and cube roots. The chapter begins by explaining what a cube of a number is, emphasizing that the cube of a number is the result of multiplying the number by itself three times. It then explores the properties of perfect cubes, helping students identify numbers that are perfect cubes.

The chapter further delves into the concept of cube roots, explaining that the cube root of a number is a value that, when multiplied by itself three times, gives the original number. Students learn how to find the cube roots of perfect cubes through prime factorization and estimation methods.

# CBSE Class 8 Maths Notes Chapter 6 Cubes and Cube Roots

Chapter 6 of CBSE Class 8 Maths, "Cubes and Cube Roots," introduces students to the fundamental concepts of cubes and cube roots, essential for understanding higher-level mathematics. The chapter starts by explaining that a cube is a number raised to the power of three, meaning it is multiplied by itself two more times.

## Introduction to Cube Numbers

A natural number is referred to as the cube number of n if it can be written as n cube, where n is a natural integer as well.
The cubes of 1, 2, and 3 are represented by numbers like 1, 8, and 27, in that order.
Multiplying a number by itself three times yields all perfect cube numbers.

$$
\begin{aligned}
1^3 &= 1 = 1\\
2^3 &= 8 = 3 + 5\\
3^3 &= 27 = 7 + 9 + 11\\
4^3 &= 64 = 13 + 15 + 17 + 19\\
5^3 &= 125 = 21 + 23 + 25 + 27 + 29\\
6^3 &= 216 = 31 + 33 + 35 + 37 + 39 + 41\\
7^3 &= 343 = 43 + 45 + 47 + 49 + 51 + 53 + 55\\
8^3 &= 512 = 57 + 59 + 61 + 63 + 65 + 67 + 69 + 71\\
9^3 &= 729 = 73 + 75 + 77 + 79 + 81 + 83 + 85 + 87 + 89\\
&\text{etc}
\end{aligned}
$$

## Cubes Relation with Cube Numbers

In geometry, a cube is a solid figure where all edges are **equal** and are **perpendicular** to each other.

Consider a cube with a unit side as an example. There are a total of 27 such unit cubes that make up a cube of 3 units when we arrange these cubes to form a larger cube of side 3 units. A cube of four units will also contain sixty-four of these unit cubes.

## Units Digits in Cube Numbers

A number's cube number is also odd or even depending on whether it is odd or even.
The type of unit digit on the cube numbers dictates this.

- The unit digit of a cube number is odd if the number is odd.
- The unit digit of a cube number is also even if the number is even.

The units digit of an integer and its units digit when represented as a cube are displayed in the table below:

| Units digit of number | Units digit of its cube |
|---|---|
| 1 | 1 |
| 2 | 8 |
| 3 | 7 |
| 4 | 4 |

| | |
|---|---|
| 5 | 5 |
| 6 | 6 |
| 7 | 3 |
| 8 | 2 |
| 9 | 9 |

# Inside Cube Numbers

## Adding Consecutive Odd Numbers

$1 = 1 = 1^3$

$3 + 5 = 8 = 2^3$

$7 + 9 + 11 = 27 = 3^3$

$13 + 15 + 17 + 19 = 64 = 4^3$

$21 + 23 + 25 + 27 + 29 = 125 = 5^3$

We can see from the above pattern, if we need to find the $n^3$, n consective odd numbers will be needed, such that their sum is equal to $n^3$.

This pattern holds true for all natural numbers.

Also, if we need to find $n^3$ then we should add n consecutive natural numbers starting from

$$\left(\frac{\frac{(n-1)(n)}{2}}{1}\right)^{th}$$

odd natural number.

## Prime Factorisation Method to Find a Cube

In the **prime factorisation** of any number, if **each prime factor** appears **three times**, then the number is a **perfect cube**.

> Consider, the number 216. By prime factorisation,
> $216 = 2 \times 2 \times 2 \times 3 \times 3 \times 3 = 2^3 \times 3^3 = 6^3$
> Hence, 216 is a perfect cube.
>
> Consider, the number 500. By prime factorisation,
> $500 = 2 \times 2 \times 5 \times 5 \times 5 = 2^2 \times 5^3$
> In the above prime factorisation 2 appears twice.
> Hence, 500 is not a perfect cube.

# Cube Roots

### Cube roots

Finding the **cube root** is the **inverse operation** of finding the **cube**.
We know that $3^3 = 27$. We can also write the same equation as $\sqrt[3]{27} = 3$. The symbol '$\sqrt[3]{\ }$' denotes '**cube root**'.

# Smallest Multiple that is a Perfect Cube

Take 53240 as an example.

We now need to determine if the supplied number, 53240, is a perfect cube or not.

Therefore, we must first determine 53240's prime factorisation in order to determine if the provided number is a perfect cube or not.

Thus, 2 × 2 × 2 × 5 × 11 × 11 × 11 is the prime factorisation of 53240.

In this instance, the digits 11 and "2" are both repeated three times. However, there aren't three fives.

The number provided is therefore not a perfect cube.

Therefore, we need to multiply 25 on both sides of 53240 to have a perfect cube.

$53240 \times 25 = 2 \times 2 \times 2 \times 5 \times 11 \times 11 \times 11 \times 5 \times 5$ [Since $25 = 5 \times 5$]

So, we have three 2's, three 5's and three 11's.

$1331000 = 2^3 \times 5^3 \times 11^3$

$1331000 = (2 \times 5 \times 11)^3$

$1331000 = 110^3$

Hence, 1331000 is a perfect cube.

Therefore, the smallest natural number by which 53240 must be multiplied to make a perfect cube is 25.

**Alternate Method:**

As we know, the prime factorisation of $53240 = 2 \times 2 \times 2 \times 5 \times 11 \times 11 \times 11$.

So, if we divide 53240 by 5 on both sides, we will get

$(53240/ 5) = [(2 \times 2 \times 2 \times 5 \times 11 \times 11 \times 11) / 5]$

On simplification, we get

$10648 = 2 \times 2 \times 2 \times 11 \times 11 \times 11$

Hence, we have three 2's and three 11's, and we can say that 10648 is a perfect cube number.

I.e.,

$10648 = 2^3 \times 11^3$

$10648 = (2 \times 11)^3$

$10648 = 22^3$

Therefore, the smallest natural number by which 53240 must be divided to make a perfect cube is 5.

## Cube root using prime factorisation

To find the cube root of a number using prime factorization, follow these steps:

**Step-by-Step Process:**

**Prime Factorization:**

- Break down the given number into its prime factors.
- Write the number as a product of prime numbers raised to their respective powers.

**Grouping the Factors:**

- Group the prime factors into triples (sets of three identical factors). Each group should contain three identical prime factors.

**Find the Cube Root:**

- For each group of three identical factors, take one factor from each group.
- Multiply these selected factors together to get the cube root of the given number.

We can find the cube root of a number by prime factorisation method by the following steps:

- resolve the number into its prime factors. Consider the number 5832. $5832 = (2\times2\times2)\times(3\times3\times3)\times(3\times3\times3)$.
- make groups of three same prime factors.
- take one **prime factor** from each group and multiply them. Their product is the required cube root.

Therefore, cube root of $5832 = \sqrt[3]{5832} = 2\times3\times3 = 18$

# Benefits of CBSE Class 8 Maths Notes Chapter 6

CBSE Class 8 Maths Notes for Chapter 6, "Cubes and Cube Roots," offer several benefits that help students understand the concepts more effectively. Here are some key benefits:

1. **Simplified Explanation of Concepts:**

The notes break down complex topics like finding cubes, cube roots, and their properties into simple, easy-to-understand explanations, making it easier for students to grasp the concepts.

2. **Step-by-Step Solutions:**

They provide step-by-step solutions to various problems related to cubes and cube roots. This helps students understand the methodology behind solving such problems.

3. **Time-Saving:**

These notes condense the chapter’s content into a more concise form, helping students revise quickly before exams or tests.

4. **Practice Problems:**

Many notes include practice problems with solutions, allowing students to test their understanding and gain confidence in solving similar problems.

5. **Visual Aids and Diagrams:**

Diagrams, tables, and other visual aids included in the notes can help students better visualize the concepts, leading to a deeper understanding.

6. **Important Formulas and Theorems:**

The notes highlight important formulas and theorems, ensuring that students remember these critical points for solving problems and for exams.