



Find the Cube of Two-Digit Number (Alternative Method)

Understanding the Concept

- Cubing a two-digit number directly can be lengthy
- An alternative method uses the identity $(a + b)^3 = a^3 + 3a^2b + 3ab^2 + b^3$
- Break the number into two parts a and b where a is the tens place and b is the ones place
- Apply the formula step-by-step to get the final cube
- This method makes calculation easier and faster

Important Points

- a is the number in tens place and b is the number in ones place.
- Expand using $(a + b)^3 = a^3 + 3a^2b + 3ab^2 + b^3$.
- Calculate each term separately and then add.
- Useful when b is small compared to a .
- Helps in quick mental calculation and checking.

Examples with Solutions

Example Easy Level

➤ Find 12^3 using the alternative method

Solution: $a = 10$ $b = 2$

$$\begin{aligned}(10 + 2)^3 &= 10^3 + 3 \times 10^2 \times 2 + 3 \times 10 \times 2^2 + 2^3 \\ &= 1000 + 600 + 120 + 8 \\ &= 1728\end{aligned}$$

Example Easy Level

➤ Find 13^3 using the alternative method

Solution: $a = 10$ $b = 3$

$$\begin{aligned}(10 + 3)^3 &= 10^3 + 3 \times 10^2 \times 3 + 3 \times 10 \times 3^2 + 3^3 \\ &= 1000 + 900 + 270 + 27 \\ &= 2197\end{aligned}$$



Example Moderate Level

➤ Find 21^3 using the alternative method

Solution: $a = 20$ $b = 1$

$$\begin{aligned}(20 + 1)^3 &= 20^3 + 3 \times 20^2 \times 1 + 3 \times 20 \times 1^2 + 1^3 \\ &= 8000 + 1200 + 60 + 1 \\ &= 9261\end{aligned}$$

Example Moderate Level

➤ Find 32^3 using the alternative method

Solution: $a = 30$ $b = 2$

$$\begin{aligned}(30 + 2)^3 &= 30^3 + 3 \times 30^2 \times 2 + 3 \times 30 \times 2^2 + 2^3 \\ &= 27000 + 5400 + 360 + 8 \\ &= 32768\end{aligned}$$

Example Word Problem

➤ The side of a cube-shaped box is 11 cm Find its volume using the alternative method

Solution: $a = 10$ $b = 1$

$$\begin{aligned}(10 + 1)^3 &= 10^3 + 3 \times 10^2 \times 1 + 3 \times 10 \times 1^2 + 1^3 \\ &= 1000 + 300 + 30 + 1 \\ &= 1331 \text{ cubic centimeters}\end{aligned}$$

Summary Points

- Split the number into tens and ones.
- Apply $(a + b)^3$ formula carefully.
- Calculate each term separately and add them.
- Useful for quick cubing of two-digit numbers.
- Helps in saving time during exams and mental math.