

Introduction

A number obtained by multiplying it thrice by itself is called cube of the number.

In our mathematical calculations, sometimes, somewhere we may need the cube value of two digit numbers. But in behaviour cubes of large number is rarely used. The cubes of first ten natural numbers (1 to 10) generally are useful in our daily life; which are

$$1^3 = 1, \quad 2^3 = 8, \quad 3^3 = 27, \quad 4^3 = 64, \\ 5^3 = 125, \quad 6^3 = 216, \quad 7^3 = 343, \\ 8^3 = 512, \quad 9^3 = 729, \quad 10^3 = 1000.$$

Formalism

In mathematics, cubes of two digit number plays a vital role. The cube of two digit numbers can be calculated without calculator by using the following steps :

- (a) We have to write down the cube of the tens-digit in a row of 4 figures. The other three numbers in the first row of answer should be put in a geometrical ratio in exact proportion, which is
- (b) In next row, write down, under the second & third numbers just two times of second & third number of first row respectively.
- (c) In last row, add up the two rows.
The illustration of the steps :

Example - 1 $(16)^3 = 4096$

But according to the above steps :

$$\begin{array}{rcccc} 1 & 6 & 36 & 216 \\ & 12 & 72 & \\ \hline 4 & 0^3 & 9^{12} & 6^{21} = 4096 \end{array}$$

Explanation

1^3 (from 16) = 1, so 1 is first digit in first row. Digits of 16 are in the ratio 1:6, hence other numbers should be $1 \times 6 = 6$, $6 \times 6 = 36$, $36 \times 6 = 216$. In the second row, double the second & third number (or multiply second & third number by 2). In third row, we have to put down only one digit below each column (except under the last column which may have more than 1 digit). So after writing down the unit digit, we carry the rest to add up with left hand column. So in the above solved problem

- (a) Put down 6 of 216 and carry 21. (b) $36 + 72 + 21$ (carried) = 129, write down 9 and carry 12.
- (c) $6 + 12 + 12$ (carried) = 30, write down 0 & carry 3.
- (d) $1 + 3$ (carried) = 4, write down 4.

Example - 2

$$(23)^3 = 12167$$

$$\begin{array}{rcccc} 8 & 12 & 18 & 27 \\ & 24 & 36 & \\ \hline 12 & 1^4 & 6^5 & 7^2 = 12167 \end{array}$$

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Explanation :

(a) $2^3 = 8$, the first figure (from left) in first row.

(b) $2 : 3$ is the required ratio so the next

number should be $\frac{3}{2}$ of its previous.

Then $\frac{3}{2} \times 8 = 12$, $\frac{3}{2} \times 12 = 18$, $\frac{3}{2} \times 18 = 27$.

(c) In second row double of 12 and 18 are written under second and third number respectively .

(d) Last row is obtained by adding the numbers in each column as above explanation.

Results

We can check the correctness of the result with the help of " sum of digits ".

For example 1 :

$$\begin{aligned} (16)^3 &= 4096 \\ \text{or, } (1+6)^3 &= 4+0+9+6 \\ \text{or, } 7^3 &= 19 \\ \text{or, } (49) \times 7 &= 1+9 \\ \text{or, } (4+9) \times 7 &= 10 \\ \text{or, } (13) \times 7 &= 1+0 \\ \text{or, } (1+3) \times 7 &= 1 \\ \text{or, } 4 \times 7 &= 1 \\ \text{or, } 28 &= 1 \\ \text{or, } 2+8 &= 1 \\ \text{or, } 10 &= 1 \\ \text{or, } 1+0 &= 1 \\ \text{or, } 1 &= 1, \text{ which is true.} \end{aligned}$$

For example 2 :

$$\begin{aligned} (23)^3 &= 12167 \\ \text{or, } (2+3)^3 &= 1+2+1+6+7 \\ \text{or, } (5)^3 &= 17 \\ \text{or, } (25) \times 5 &= 1+7 \\ \text{or, } (2+5) \times 5 &= 8 \\ \text{or, } 7 \times 5 &= 8 \\ \text{or, } 35 &= 8 \\ \text{or, } 3+5 &= 8 \\ \text{or, } 8 &= 8, \text{ which is true.} \end{aligned}$$

Here, by adding all the digits on both sides of equal to sign. We get same figure. Hence the values of the cubes in Example 1 and Example 2 are correct.

Conclusion

Hence by using such types of quicker math we can easily determine the cube value of any other two digit number. It not only saves the time but also gives entertainment to the mathematics. We can use this method as an alternate of electronic device.

References

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