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1. Find the cube root of each of the following numbers by prime factorisation method.

(i) 64

Solution:

$64 = 2\times2\times2\times2\times2\times2$

By grouping the factors in triplets of equal factors,

$64 = (2\times2\times2)\times(2\times2\times2)$

Here, 64 can be grouped into triplets of equal factors,

$\therefore 64 = 2\times2 = 4$

Hence, 4 is cube root of 64.

(ii) 512

Solution:

$512 = 2\times2\times2\times2\times2\times2\times2\times2\times2$

By grouping the factors in triplets of equal factors,

$512 = (2\times2\times2)\times(2\times2\times2)\times(2\times2\times2)$

Here, 512 can be grouped into triplets of equal factors,

$\therefore 512 = 2\times2\times2 = 8$

Hence, 8 is cube root of 512.

(iii) 10648

Solution:

$10648 = 2\times2\times2\times11\times11\times11$

By grouping the factors in triplets of equal factors,

$10648 = (2\times2\times2)\times(11\times11\times11)$

Here, 10648 can be grouped into triplets of equal factors,

$\therefore 10648 = 2\times11 = 22$

Hence, 22 is cube root of 10648.

(iv) 27000

Solution:

$27000 = 2\times2\times2\times3\times3\times3\times5\times5\times5$

By grouping the factors in triplets of equal factors,

$27000 = (2\times2\times2)\times(3\times3\times3)\times(5\times5\times5)$

Here, 27000 can be grouped into triplets of equal factors,

$\therefore 27000 = (2\times3\times5) = 30$

Hence, 30 is cube root of 27000.

(v) 15625

Solution:

$15625 = 5\times5\times5\times5\times5\times5$

By grouping the factors in triplets of equal factors,

$15625 = (5\times5\times5)\times(5\times5\times5)$

Here, 15625 can be grouped into triplets of equal factors,

$\therefore 15625 = (5\times5) = 25$

Hence, 25 is cube root of 15625.

(vi) 13824

Solution:

$13824 = 2\times2\times2\times2\times2\times2\times2\times2\times2\times3\times3\times3$

By grouping the factors in triplets of equal factors,

$13824 = (2\times2\times2)\times(2\times2\times2)\times(2\times2\times2)\times(3\times3\times3)$

Here, 13824 can be grouped into triplets of equal factors,

$\therefore 13824 = (2\times2\times 2\times3) = 24$

Hence, 24 is cube root of 13824.

(vii) 110592

Solution:

$110592 = 2\times2\times2\times2\times2\times2\times2\times2\times2\times2\times2\times2\times3\times3\times3$

By grouping the factors in triplets of equal factors,

$110592 = (2\times2\times2)\times(2\times2\times2)\times(2\times2\times2)\times(2\times2\times2)\times(3\times3\times3)$

Here, 110592 can be grouped into triplets of equal factors,

$\therefore 110592 = (2\times2\times2\times2\times3) = 48$

Hence, 48 is cube root of 110592.

(viii) 46656

Solution:

$46656 = 2\times2\times2\times2\times2\times2\times3\times3\times3\times3\times3\times3$

By grouping the factors in triplets of equal factors,

$46656 = (2\times2\times2)\times(2\times2\times2)\times(3\times3\times3)\times(3\times3\times3)$

Here, 46656 can be grouped into triplets of equal factors,

$\therefore 46656 = (2\times2\times3\times3) = 36$

Hence, 36 is cube root of 46656.

(ix) 175616

Solution:

$175616 = 2\times2\times2\times2\times2\times2\times2\times2\times2\times7\times7\times7$

By grouping the factors in triplets of equal factors,

$175616 = (2\times2\times2)\times(2\times2\times2)\times(2\times2\times2)\times(7\times7\times7)$

Here, 175616 can be grouped into triplets of equal factors,

$\therefore 175616 = (2\times2\times2\times7) = 56$

Hence, 56 is cube root of 175616.

(x) 91125

Solution:

$91125 = 3\times3\times3\times3\times3\times3\times3\times5\times5\times5$

By grouping the factors in triplets of equal factors,

$91125 = (3\times3\times3)\times(3\times3\times3)\times(5\times5\times5)$

Here, 91125 can be grouped into triplets of equal factors,

$\therefore 91125 = (3\times3\times5) = 45$

Hence, 45 is cube root of 91125.

2. State true or false.

(i) Cube of any odd number is even.

Solution:

False

(ii) A perfect cube does not end with two zeros.

Solution:

True

(iii) If square of a number ends with 5, then its cube ends with 25.

Solution:

False

(iv) There is no perfect cube which ends with 8.

Solution:

False

(v) The cube of a two digit number may be a three digit number.

Solution:

False

(vi) The cube of a two digit number may have seven or more digits.

Solution:

False

(vii) The cube of a single digit number may be a single digit number.

Solution:

True

3. You are told that 1,331 is a perfect cube. Can you guess without factorisation what is its cube root? Similarly, guess the cube roots of 4913, 12167, 32768.

Solution:

- By grouping the digits, we get 1 and 331

We know that, since, the unit digit of cube is 1, the unit digit of cube root is 1.
∴ We get 1 as unit digit of the cube root of 1331.
The cube of 1 matches with the number of second group.
∴ The ten's digit of our cube root is taken as the unit place of smallest number.
We know that, the unit's digit of the cube of a number having digit as unit's place 1 is 1.

$\therefore \sqrt[3]{1331} = 11$

- By grouping the digits, we get 4 and 913

We know that, since, the unit digit of cube is 3, the unit digit of cube root is 7.
∴ we get 7 as unit digit of the cube root of 4913.
We know $1^3 = 1$ and $2^3 = 8$, $1 > 4 > 8$.
Thus, 1 is taken as ten digit of cube root.

$\therefore \sqrt[3]{4913} = 17$

- By grouping the digits, we get 12 and 167.

We know that, since, the unit digit of cube is 7, the unit digit of cube root is 3.
∴ 3 is the unit digit of the cube root of 12167
We know $2^3 = 8$ and $3^3 = 27$, $8 > 12 > 27$.

Thus, 2 is taken as ten digit of cube root.

$\therefore \sqrt[3]{12167} = 23$

- By grouping the digits, we get 32 and 768.

We know that, since, the unit digit of cube is 8, the unit digit of cube root is 2.
∴ 2 is the unit digit of the cube root of 32768.
We know $3^3 = 27$ and $4^3 = 64$, $27 > 32 > 64$.
Thus, 3 is taken as ten digit of cube root.

$\therefore \sqrt[3]{32768} = 32$