CUBES AND CUBE ROOTS
PERIOD 3

SUBJECT : MATHEMATICS
CHAPTER NUMBER: 4
CHAPTER NAME : CUBES AND CUBE ROOTS

Previous concept

To find the cube root using prime factorisation method

We can find the cube-root of a number by the method of prime factorisation. Consider the following example for a clear understanding:

$2744 = 2 \times 2 \times 2 \times 7 \times 7 \times 7 = (2 \times 7)^3$

Therefore, the cube root of $2744 = \sqrt[3]{2744} = 2 \times 7 = 14$

Learning outcome

❑ Students will be able to find the cube root of a negative perfect cube using prime factorization method

Cube-root of a negative perfect cube

https://www.khanacademy.org/math/cc-eighth-grade-math/cc-8th-numbers-
operations/cc-8th-roots/v/finding-cube-roots(4:17)

Exercise-4(B)

(i) $64 = \sqrt[3]{64} = (2 \times 2 \times 2) \times (2 \times 2 \times 2)$
$= 2 \times 2 = 4$

2	64
2	32
2	16
2	8
2	4
2	2
	1

(ii) $343 = \sqrt[3]{343} = 7 \times 7 \times 7 = 7$

7	343
7	49
7	7
	1

(iii) $729 = \sqrt[3]{729} = (3 \times 3 \times 3) \times (3 \times 3 \times 3)$
$= 3 \times 3 = 9$

3	729
3	243
3	81
3	27
3	9
3	3
	1

2)

(i) $\dfrac{27}{64} = \sqrt[3]{\dfrac{27}{64}} = \dfrac{\sqrt{3 \times 3 \times 3}}{\sqrt{4 \times 4 \times 4}} = \dfrac{3}{4}$

(ii) $\dfrac{125}{216} = \sqrt[3]{\dfrac{125}{216}} = \dfrac{\sqrt{5 \times 5 \times 5}}{\sqrt{6 \times 6 \times 6}} = \dfrac{5}{6}$

(iii) $\dfrac{343}{512} = \sqrt[3]{\dfrac{343}{512}} = \dfrac{\sqrt{7 \times 7 \times 7}}{\sqrt{8 \times 8 \times 8}} = \dfrac{7}{8}$

(iv) $64 \times 729 = \sqrt[3]{64 \times 729}$

$= \sqrt{4 \times 4 \times 4 \times 9 \times 9 \times 9} = 4 \times 9 = 36$

(v) $64 \times 27 = \sqrt[3]{64 \times 27}$

$= \sqrt{4 \times 4 \times 4 \times 3 \times 3 \times 3} = 4 \times 3 = 12$

(vi) $729 \times 8000 = \sqrt[3]{729 \times 8000}$

$= \sqrt{9 \times 9 \times 9 \times 20 \times 20 \times 20}$

$= 9 \times 20 = 180$

(vii) $3375 \times 512 = \sqrt[3]{3375 \times 512}$

$= \sqrt{15 \times 15 \times 15 \times 8 \times 8 \times 8}$

$= 15 \times 8 = 120$

3)

(i) $-216 = \sqrt[3]{-216} = \sqrt{-6 \times -6 \times -6} = -6$

(ii) $-512 = \sqrt[3]{-512} = \sqrt{-8 \times -8 \times -8} = -8$

(iii) $-1331 = \sqrt[3]{-1331}$

$\qquad = \sqrt{-11 \times -11 \times -11} = -11$

(iv) $-\dfrac{27}{125} = -\dfrac{\sqrt{27}}{\sqrt{125}} = -\sqrt{\dfrac{3 \times 3 \times 3}{5 \times 5 \times 5}} = -\dfrac{3}{5}$

(v) $\dfrac{-64}{343} = \dfrac{\sqrt[3]{-64}}{\sqrt[3]{343}} = \dfrac{\sqrt[3]{-4 \times -4 \times -4}}{\sqrt[3]{7 \times 7 \times 7}} = \dfrac{-4}{7}$

(vi) $-\dfrac{512}{343} = -\sqrt[3]{\dfrac{512}{343}} = -\sqrt[3]{\dfrac{8 \times 8 \times 8}{7 \times 7 \times 7}} = -\dfrac{8}{7}$

(vii) $-2197 = \sqrt[3]{-2197}$

$$
\begin{array}{c|c}
13 & 2197 \\
\hline
13 & 169 \\
\hline
13 & 13 \\
\hline
 & 1
\end{array}
$$

$\qquad = \sqrt[3]{-13 \times -13 \times -13} = -13$

(viii) $-5832 = \sqrt[3]{-5832}$

Exercise-4(B)

5. Find the smallest number by which 26244 may be divided so that the quotient is a perfect cube.

Sol: 26244 = 2 x 2 x3 x 3 x 3 x 3 x 3 x 3 x 3 x 3

= 3³ x 3³ x 3² x 2²

Clearly,26244 must be divided by 3² x 2² = 9 x 4 = 36

4)

(i) $2.744 = \sqrt[3]{\dfrac{2744}{1000}}$

$$\begin{array}{c|c} 2 & 2744 \\ \hline 2 & 1372 \\ \hline 2 & 686 \\ \hline 7 & 343 \\ \hline 7 & 49 \\ \hline 7 & 7 \\ \hline & 1 \end{array}$$

$= \sqrt[3]{\dfrac{2 \times 2 \times 2 \times 7 \times 7 \times 7}{10 \times 10 \times 10}}$

$= \dfrac{2 \times 7}{10} = \dfrac{14}{10} = 1.4$

(ii) $9.261 = \sqrt[3]{\dfrac{9261}{1000}} = \sqrt{\dfrac{3 \times 3 \times 3 \times 7 \times 7 \times 7}{10 \times 10 \times 10}}$

$$\begin{array}{c|c} 3 & 9261 \\ \hline 3 & 3087 \\ \hline 3 & 1029 \\ \hline 7 & 343 \\ \hline 7 & 49 \\ \hline 7 & 7 \\ \hline & 1 \end{array}$$

Home assignment

Exercise 4(B) Q No- 6 and 7

THANKING YOU

ODM EDUCATIONAL GROUP