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CUBES AND CUBE ROOTS

PERIOD 4

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

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Previous concept

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

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

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

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

$$(iv)\ -\frac{27}{125} = -\frac{\sqrt{27}}{\sqrt{125}} = -\sqrt{\frac{3\times3\times3}{5\times5\times5}} = -\frac{3}{5}$$

$$(v)\ \frac{-64}{343} = \frac{\sqrt[3]{-64}}{\sqrt[3]{343}} = \frac{\sqrt[3]{-4\times-4\times-4}}{\sqrt[3]{7\times7\times7}} = \frac{-4}{7}$$

$$(vi)\ -\frac{512}{343} = -\sqrt[3]{\frac{512}{343}} = -\sqrt[3]{\frac{8\times8\times8}{7\times7\times7}} = -\frac{8}{7}$$

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Learning outcome

- Students will able to know about properties of cubes
- Students will be able to find the cube root of a perfect cube using prime factorization method.
- Students will be able to find the cube root of a negative perfect cube using prime factorization method.

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Recapitulation

1. **By what smallest number should 3600 be multiplied, so that the quotient is a perfect cube? Also, find the cube root of the quotient.**

Sol: Prime factors of 3600 = 2x2x2x2x3x3x5x5

We know that, if a number is to be a perfect cube, then each of its prime factors must occur thrice.

We find that 2 occurs once 3 and 5 occurs twice only.

Hence, the smallest number, by which the given number must be multiplied in order that the product is a perfect cube $= 2 \times 2 \times 3 \times 5 = 60$

Also, product $= 3600 \times 60 = 216000$

Now, arranging into triplets of equal prime factors, we have

$$216000 = \underline{2\times2\times2}\times\underline{2\times2\times2}\times\underline{3\times3\times3}\times\underline{5\times5\times5}$$

Taking one factor from each triplets, we get

$$\sqrt[3]{216000} = 2 \times 2 \times 3 \times 5 = 60$$

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Evaluation Questions

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

$= 3^3 \times 3^3 \times 3^2 \times 2^2$

Clearly,26244 must be divided by $3^2 \times 2^2 = 9 \times 4 = 36$

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7)

$$(iv)\ -\frac{27}{343} = \frac{3\times3\times3}{7\times7\times7} = -\frac{3}{7}$$

$$(v)\ \frac{729}{-1331} = \frac{(9\times9\times9)}{-(11\times11\times11)} = -\frac{9}{11}$$

$$(vi)\ 250.047 = \frac{250047}{1000}$$

3	250047
3	83349
3	27783
3	9261
3	3087
3	1029
7	343
7	49
7	7
	1

$$= \frac{(3\times3\times3)\times(3\times3\times3)\times(7\times7\times7)}{(10\times10\times10)}$$

$$= \frac{3\times3\times7}{10} = \frac{63}{10} = 6.3$$

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Home assignment

Exercise 4(B)

AQ

1. Using prime factorisation, find the cube root of 5832.
2. If the surface area of a cube is 486 cm^2, find its volume.

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THANKING YOU

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