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VIII- Mathematics Assignment – Cubes and Cube Roots

Basic Concepts:- A natural number 'a' is called a perfect cube if there exists another natural number 'b' such that

$$a = b \times b \times b = b^3$$

e.g; 8 Can be re written as $2 \times 2 \times 2$

OR 2^3

27 " " " " $3 \times 3 \times 3$

OR 3^3 etc.

In a simple language, if we multiply a number by itself three times, we get the cube of that number.

eg if we multiply 2 by itself 3 times i.e, $2 \times 2 \times 2$, we get 2^3 or 8.

Properties of Cubes of numbers :-

(a) Cubes of all odd numbers are odd.

eg, Cube of 5 = $5 \times 5 \times 5$ = 125 – odd

Cube of 7 = $7 \times 7 \times 7$ = 343 – odd

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(b) Cubes of all even numbers are even.

eg Cube of 4 = 4x4x4 = 64 – Even

Cube of 8 = 8x8x8 = 512 = Even

(c) Cube of a natural number of the form 3n is a multiple of 27

e.g. Cube of 3 = 27 which is a multiple of 27

Cube of 6 = 216 " " " 27.

(d) Cube of a natural number of the form 3n+1 is also a number of the form 3n+1

e.g. Cube of 7 = 343 = 3x114+1 (In the form of (3n+1))

also 7 = 2x3+1 (In the form of (3n+1))

(e) Cube of a natural number of the form (3n+2) is also in the form of (3n+2)

e.g., Cube of 5 = 125 = 3x41+2 (In the form of 3n+2)

also 5 = 3x1+2 (In the form of 3n+2)

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(f) Cube of a number which ends in a zero, ends in three zeros.

eg, $10^3 = 1000$

(one zero) (3 zeros)

(g) Cube of a negative number always ends in negative

eg, $(-2)^3 = -8 = -2 \times -2 \times -2$

$(-1)^3 = (-1) \times (-1) \times (-1) = -1$

(h) Cube of a rational number is also a rational number

eg,

$$\left(\frac{2}{3}\right)^3 = \left(\frac{2}{3}\right) \times \left(\frac{2}{3}\right) \times \left(\frac{2}{3}\right) = \frac{8}{27}$$

$$\left(-\frac{5}{6}\right)^3 = \left(\frac{-5}{6}\right) \times \left(\frac{-5}{6}\right) \times \left(\frac{-5}{6}\right) = \frac{-125}{216}$$

∴ Cube of a rational number of the form $\left(\frac{p}{q}\right)$ is Cube of numerator divided by the Cube of denominator.

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Method of finding a perfect Cube

Following points must be kept in mind to check whether the given number is a perfect cube or not.

(a) Resolve the given number into prime factors.

(b) Form the groups by taking three similar factors.

(c) If no factor is left ungrouped then the given number is a perfect cube, otherwise not.

If we have to find the <u>Cube Root</u> of a number then,

Repeat the above steps then the required Cube Root is obtained by taking one number from each group and then multiply them to find the Cube Root.

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Cube Root of a perfect Cube (Using Unit digits.

Cube Root of a perfect Cube having at the most Six digits can be found by using this method. The Unit digit of the Cube Root of a perfect Cube ending in 0, 1, 4, 5, 6 or 9 is 0, 1, 4, 5, 6 or 9 respectively. The Unit digit of the Cube Root of a number ending in 8 is 2. and Vice-Versa also. Similarly others.

To find the Cube Root of a number by this method, following points are to be kept in mind.

(i) Find the Units digit of the Cube Root of the given number by looking at its Unit digit.

(ii) After this Strike the three digits starting from it right. If nothing is left we stop and the number obtained in step (i) is its Cube Root

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