



### Cubes and Cubes Roots Ex 4.1 Q22

**Answer :**

(i)

Let the three even natural numbers be 2, 4 and 8.

Cubes of these numbers are:

$$2^3 = 8, 4^3 = 64, 8^3 = 512$$

By divisibility test, it is evident that 8, 64 and 512 are divisible by 2.

Thus, they are even.

This verifies the statement.

(ii)

Let the three odd natural numbers be 3, 9 and 27.

Cubes of these numbers are:

$$3^3 = 27, 9^3 = 729, 27^3 = 19683$$

By divisibility test, it is evident that 27, 729 and 19683 are divisible by 3.

Thus, they are odd.

This verifies the statement.

(iii)

Three natural numbers of the form  $(3n + 1)$  can be written by choosing  $n = 1, 2, 3, \dots$  etc.

Let three such numbers be 4, 7 and 10.

Cubes of the three chosen numbers are:

$$4^3 = 64, 7^3 = 343 \text{ and } 10^3 = 1000$$

Cubes of 4, 7 and 10 can be expressed as:

$$64 = 3 \times 21 + 1, \text{ which is of the form } (3n + 1) \text{ for } n = 21$$

$$343 = 3 \times 114 + 1, \text{ which is of the form } (3n + 1) \text{ for } n = 114$$

$$1000 = 3 \times 333 + 1, \text{ which is of the form } (3n + 1) \text{ for } n = 333$$

Cubes of 4, 7, and 10 can be expressed as the natural numbers of the form  $(3n + 1)$  for some natural number  $n$ . Hence, the statement is verified.

(iv)

Three natural numbers of the form  $(3p + 2)$  can be written by choosing  $p = 1, 2, 3, \dots$  etc.

Let three such numbers be 5, 8 and 11.

Cubes of the three chosen numbers are:

$$5^3 = 125, 8^3 = 512 \text{ and } 11^3 = 1331$$

Cubes of 5, 8, and 11 can be expressed as:

$$125 = 3 \times 41 + 2, \text{ which is of the form } (3p + 2) \text{ for } p = 41$$

$$512 = 3 \times 170 + 2, \text{ which is of the form } (3p + 2) \text{ for } p = 170$$

$$1331 = 3 \times 443 + 2, \text{ which is of the form } (3p + 2) \text{ for } p = 443$$

Cubes of 5, 8, and 11 could be expressed as the natural numbers of the form  $(3p + 2)$  for some natural number  $p$ . Hence, the statement is verified.

### Cubes and Cubes Roots Ex 4.1 Q23

**Answer :**

(i) False

On factorising 392 into prime factors, we get:

$$392 = 2 \times 2 \times 2 \times 7 \times 7$$

On grouping the factors in triples of equal factors, we get:

$$392 = \{2 \times 2 \times 2\} \times 7 \times 7$$

It is evident that the prime factors of 392 cannot be grouped into triples of equal factors such that no factor is left over. Therefore, 392 is not a perfect cube.

(ii) True

On factorising 8640 into prime factors, we get:

$$8640 = 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 3 \times 3 \times 3 \times 5$$

On grouping the factors in triples of equal factors, we get:

$$8640 = \{2 \times 2 \times 2\} \times \{2 \times 2 \times 2\} \times \{3 \times 3 \times 3\} \times 5$$

It is evident that the prime factors of 8640 cannot be grouped into triples of equal factors such that no factor is left over. Therefore, 8640 is not a perfect cube.

(iii) True

Because a perfect cube always ends with multiples of 3 zeros, e.g., 3 zeros, 6 zeros etc.

(iv) False.

64 is a perfect cube, and it ends with 4.

(v) False

It is not true for a negative integer. Example:  $(-5)^2 = 25$ ;  $(-5)^3 = -125 \Rightarrow (-5)^3 < (-5)^2$

(vi) False

It is not true for negative integers. Example:  $(-5)^2 > (-4)^2$  but  $(-5)^3 < (-4)^3$

(vii) True

$\therefore a$  divides  $b$

$$\therefore \frac{b^3}{a^3} = \frac{b \times b \times b}{a \times a \times a} = \frac{(ak) \times (ak) \times (ak)}{a \times a \times a}$$

$\therefore a$  divides  $b$

$\therefore b = ak$  for some  $k$

$$\therefore \frac{b^3}{a^3} = \frac{(ak) \times (ak) \times (ak)}{a \times a \times a} = k^3 \Rightarrow b^3 = a^3 (k^3)$$

$\therefore a^3$  divides  $b^3$

(viii) False

$a^3$  ends in 7 if  $a$  ends with 3.

But for every  $a^2$  ending in 9, it is not necessary that  $a$  is 3.

E.g., 49 is a square of 7 and cube of 7 is 343.

(ix) False

$$\therefore 35^2 = 1225 \text{ but } 35^3 = 42875$$

(x) False

$$\therefore 100^2 = 10000 \text{ and } 100^3 = 100000$$

\*\*\*\*\* END \*\*\*\*\*