## 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 $8,\ 64 \text{ and } 512$ 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 $27,\ 729 \text{ and } 19683$ are divisible by 3.

Thus, they are odd.

This verifies the statement.

(iii)

Three natural numbers of the form (3*n* + 1) can be written by choosing $\boldsymbol{n} = 1, 2, 3\ldots \text{ etc.}$

Let three such numbers be $4, 7 \text{ and } 10.$

Cubes of the three chosen numbers are:

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

Cubes of $4, 7 \text{ and } 10$ can expressed as:

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

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

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

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

(iv)

Three natural numbers of the form (3*p* + 2) can be written by choosing $\boldsymbol{p} = 1, 2, 3\ldots \text{ etc.}$

Let three such numbers be $5, 8 \text{ and } 11.$

Cubes of the three chosen numbers are:

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

Cubes of $5, 8, \text{ and } 11$ can be expressed as:

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

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

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

Cubes of $5, 8, \text{ and } 11$ could be expressed as the natural numbers of the form (3*p* + 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: $(-5)^2 > (-4)^2 \text{ but } (-5)^3 < (-4)^3$

(vii) True

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

$\because$ *a* divides *b*
$\therefore$ *b* = *ak* for some *k*

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

$\because 35^2 = 1225 \; but \; 35^3 = 42875$

(x) False

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

*********** END **********