Cube and cube roots

Q1. Which of the following numbers are not perfect cubes?

(i) 216 (ii) 128 (iii) 1000 (iv) 100 (v) 46656

Sol. (i) We have 216 = 2 × 2 × 2 × 3 × 3 × 3

Grouping the prime factors of 216 into triples, no factor is left over.

∴ 216 is a perfect cube.

2	216
2	108
2	54
3	27
3	9
3	3
	1

(ii) We have 128 = 2 × 2 × 2 × 2 × 2 × 2 × 2

Grouping the prime factors of 128 into triples, we are left over with 2 as ungrouped factor.

∴ 128 is not a perfect cube.

Q2. Find the smallest number by which each of the following numbers must be multiplied to obtain a perfect cube.

(i) 243 (ii) 256 (iii) 72 (iv) 675 (v) 100

Sol. (i) We have 243 = 3 × 3 × 3 × 3 × 3

3	243
3	81
3	27
3	9
3	3
	1

The prime factor 3 is not a group of three.

∴ 243 is not a perfect cube.

Now, [243] × 3 = [3 × 3 × 3 × 3 × 3] × 3

or 729 =3 × 3 × 3 × 3 × 3 × 3

Now, 729 becomes a perfect cube.

Thus, the smallest required number to multiply 243 to make it a perfect cube is 3.

Q3. Find the smallest number by which each of the following numbers must be divided to obtain a perfect cube.

(i) 81 (ii) 128 (iii) 135 (iv) 192 (v) 704

Sol. (i) We have 81 = 3 × 3 × 3 × 3

3	81
3	27
3	9
3	3
	1

Grouping the prime factors of 81 into triples, we are left with 3.

∴ 81 is not a perfect cube.

Now, [81] 3 = [3 × 3 × 3 × 3] + 3

or 27 = 3 × 3 × 3

i.e. 27 is a prefect cube

Thus, the required smallest number is 3.

Q4. Parikshit makes a cuboid of plasticine of sides 5 cm, 2 cm, 5 cm. How many such cuboids will he need to form a cube?

Sol: Sides of the cuboid arc: 5 cm, 2 cm, 5 cm

∴ Volume of the cuboid = 5 cm × 2 cm × 5 cm

To form it as a cube its dimension should be in the group of triples.

∴ Volume of the required cube = [5 cm × 5 cm × 2 cm] × 5 cm × 2 cm × 2 cm

= [5 × 5 × 2 cm3] = 20 cm3

Thus, the required number of cuboids = 20.