CHAPTER 4

CUBE AND CUBE-ROOT

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

(i) 216

Solution:

By resolving 216 into a prime factor,

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

$216 = 2\times2\times2\times3\times3\times3$

By grouping the factors in triplets of equal factors, $216 = (2\times2\times2)\times(3\times3\times3)$

Here, 216 can be grouped into triplets of equal factors,

$\therefore 216 = (2\times3) = 6$

Hence, 216 is the cube of 6.

(ii) 128

Solution:

By resolving 128 into a prime factor,

2	128
2	64
2	32
2	16
2	8
2	4
2	2
	1

$128 = 2\times2\times2\times2\times2\times2\times2$

By grouping the factors in triplets of equal factors, $128 = (2\times2\times2)\times(2\times2\times2)\times2$

Here, 128 cannot be grouped into triplets of equal factors, and we are left with one factor: 2.

∴ 128 is not a perfect cube.

(iii) 1000

Solution:

By resolving 1000 into prime factor,

2	1000
2	500
2	250
5	125
5	25
5	5
	1

1000 = 2×2×2×5×5×5

By grouping the factors in triplets of equal factors, 1000 = (2×2×2)×(5×5×5)

Here, 1000 can be grouped into triplets of equal factors.

∴ 1000 = (2×5) = 10

Hence, 1000 is the cube of 10.

(iv) 100

Solution:

By resolving 100 into a prime factor,

2	100
2	50
5	25
5	5
	1

100 = 2×2×5×5

Here, 100 cannot be grouped into triplets of equal factors.

∴ 100 is not a perfect cube.

(v) 46656 Solution:

By resolving 46656 into prime factor,

2	46656
2	23328
2	11664
2	5832
2	2916
2	1458
3	729
3	243
3	81
3	27
3	9
3	3
	1

$46656 = 2\times2\times2\times2\times2\times2\times3\times3\times3\times3\times3\times3$ By grouping the factors in triplets of equal factors, $46656 = (2\times2\times2)\times(2\times2\times2)\times(3\times3\times3)\times(3\times3\times3)$

Here, 46656 can be grouped into triplets of equal factors,

∴ $46656 = (2\times2\times3\times3) = 36$

Hence, 46656 is the cube of 36.

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

(i) 243

Solution:

By resolving 243 into a prime factor,

3	243
3	81
3	27
3	9
3	3
	1

$243 = 3\times3\times3\times3\times3$

By grouping the factors in triplets of equal factors, $243 = (3\times3\times3)\times3\times3$

Here, 3 cannot be grouped into triplets of equal factors.

∴ We will multiply 243 by 3 to get the perfect cube.

(ii) 256

Solution:

By resolving 256 into a prime factor,

2	256
2	128
2	64
2	32
2	16
2	8
2	4
2	2
	1

$256 = 2\times2\times2\times2\times2\times2\times2\times2$

By grouping the factors in triplets of equal factors, $256 = (2\times2\times2)\times(2\times2\times2)\times2\times2$

Here, 2 cannot be grouped into triplets of equal factors.

∴ We will multiply 256 by 2 to get the perfect cube.

(iii) 72

Solution:

By resolving 72 into a prime factor,

2	72
2	36
2	18
3	9
3	3
	1

72 = 2×2×2×3×3

By grouping the factors in triplets of equal factors, 72 = (2×2×2)×3×3

Here, 3 cannot be grouped into triplets of equal factors.

∴ We will multiply 72 by 3 to get the perfect cube.

(iv) 675

Solution:

By resolving 675 into a prime factor,

3	675
3	225
3	75
5	25
5	5
	1

675 = 3×3×3×5×5

By grouping the factors in triplets of equal factors, 675 = (3×3×3)×5×5

Here, 5 cannot be grouped into triplets of equal factors.

∴ We will multiply 675 by 5 to get the perfect cube.

(v) 100

Solution:

By resolving 100 into a prime factor,

2	100
2	50
5	25
5	5
	1

100 = 2×2×5×5

Here, 2 and 5 cannot be grouped into triplets of equal factors.

∴ We will multiply 100 by (2×5) 10 to get the perfect cube.

3. Find the smallest number by which each of the following numbers must be divided to obtain a perfect cube. **(i) 81**

Solution:

By resolving 81 into a prime factor,

3	81
3	27
3	9
3	3
	1

81 = 3×3×3×3

By grouping the factors in triplets of equal factors, 81 = (3×3×3)×3

Here, 3 cannot be grouped into triplets of equal factors.

∴ We will divide 81 by 3 to get the perfect cube.

(ii) 128

Solution:

By resolving 128 into a prime factor,

2	128
2	64
2	32
2	16
2	8
2	4
2	2
	1

128 = 2×2×2×2×2×2×2

By grouping the factors in triplets of equal factors, 128 = (2×2×2)×(2×2×2)×2

Here, 2 cannot be grouped into triplets of equal factors.

∴ We will divide 128 by 2 to get the perfect cube.

(iii) 135

Solution:

By resolving 135 into prime factor,

3	135
3	45
3	15
5	5
	1

135 = 3×3×3×5

By grouping the factors in triplets of equal factors, 135 = (3×3×3)×5

Here, 5 cannot be grouped into triplets of equal factors.

∴ We will divide 135 by 5 to get the perfect cube.

(iv) 192

Solution:

By resolving 192 into a prime factor,

2	192
2	96
2	48
2	24
2	12
2	6
3	3
	1

192 = 2×2×2×2×2×2×3

By grouping the factors in triplets of equal factors, 192 = (2×2×2)×(2×2×2)×3

Here, 3 cannot be grouped into triplets of equal factors.

∴ We will divide 192 by 3 to get the perfect cube.

(v) 704

Solution:

By resolving 704 into a prime factor,

2	704
2	352
2	176
2	88
2	44
2	22
11	11
	1

704 = 2×2×2×2×2×2×11

By grouping the factors in triplets of equal factors, 704 = (2×2×2)×(2×2×2)×11

Here, 11 cannot be grouped into triplets of equal factors.

∴ We will divide 704 by 11 to get the perfect cube.

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

Solution:
Given the sides of the cube are 5 cm, 2 cm and 5 cm.
∴ Volume of cube = 5×2×5 = 50

2	50
5	25
5	5
	1

50 = 2×5×5
Here, 2 , 5 and 5 cannot be grouped into triplets of equal factors.
∴ We will multiply 50 by (2×2×5) 20 to get the perfect cube. Hence, 20 cuboids are needed.