<u>CHAPTER 4</u> <u>CUBE AND CUBE-ROOT</u>

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

 $216 = 2 \times 2 \times 2 \times 3 \times 3 \times 3$

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

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

 $\therefore 216 = (2 \times 3) = 6$

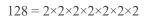
Hence, 216 is the cube of 6.

(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



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

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

 $1000 = 2 \times 2 \times 2 \times 5 \times 5 \times 5$

By grouping the factors in triplets of equal factors, $1000 = (2 \times 2 \times 2) \times (5 \times 5 \times 5)$

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

 $\therefore 1000 = (2 \times 5) = 10$

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

 $100 = 2 \times 2 \times 5 \times 5$

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	46 <mark>6</mark> 56
2	23328
2	11664
2	5832
2	2916
2	1458
3	729
3	243
3	81
3	27
3	9
3	3
	1

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

 $\therefore 46656 = (2 \times 2 \times 3 \times 3) = 36$

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

 $243 = 3 \times 3 \times 3 \times 3 \times 3$

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

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

 $256 = 2 \times 2$

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

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

 $72 = 2 \times 2 \times 2 \times 3 \times 3$

By grouping the factors in triplets of equal factors, $72 = (2 \times 2 \times 2) \times 3 \times 3$

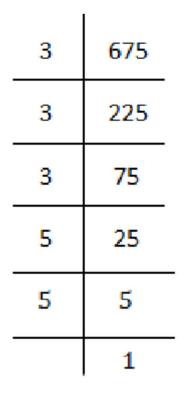
Here, 3 cannot be grouped into triplets of equal factors.

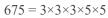
: We will multiply 72 by 3 to get the perfect cube.

(iv) 675

Solution:

By resolving 675 into a prime factor,





By grouping the factors in triplets of equal factors, $675 = (3 \times 3 \times 3) \times 5 \times 5$

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

 $100 = 2 \times 2 \times 5 \times 5$

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, $81 = (3 \times 3 \times 3) \times 3$

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

 $128 = 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2$

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

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



By grouping the factors in triplets of equal factors, $135 = (3 \times 3 \times 3) \times 5$

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	З
	1

 $192 = 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 3$

By grouping the factors in triplets of equal factors, $192 = (2 \times 2 \times 2) \times (2 \times 2 \times 2) \times 3$

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

 $704 = 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 11$

By grouping the factors in triplets of equal factors, $704 = (2 \times 2 \times 2) \times (2 \times 2 \times 2) \times 11$

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. \therefore Volume of cube = $5 \times 2 \times 5 = 50$

2	50
5	25
5	5
	1
50 -	$2 \times 5 \times 5$

 $50 = 2 \times 5 \times 5$

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

: We will multiply 50 by $(2 \times 2 \times 5)$ 20 to get the perfect cube. Hence, 20 cuboids are needed.