Exercise 7.1

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

(i) 216

Solution:

By resolving 216 into 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 cube of 6.

(ii) 128

Solution:

By resolving 128 into 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, we are left of with one factors 2 .
$\therefore$ 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

$1000 = 2\times2\times2\times5\times5\times5$
By grouping the factors in triplets of equal factors, $1000 = (2\times2\times2)\times(5\times5\times5)$
Here, 1000 can be grouped into triplets of equal factors,
$\therefore 1000 = (2\times5) = 10$
Hence, 1000 is cube of 10.

(iv) 100

Solution:

By resolving 100 into prime factor,

2	100
2	50
5	25
5	5
	1

$100 = 2\times2\times5\times5$
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,

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

Hence, 46656 is 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 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 perfect square.

(ii) 256

Solution:

By resolving 256 into 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 perfect square.

(iii) 72

Solution:

By resolving 72 into prime factor,

2	72
2	36
2	18
3	9
3	3
	1

$72 = 2\times2\times2\times3\times3$
By grouping the factors in triplets of equal factors, $72 = (2\times2\times2)\times3\times3$
Here, 3 cannot be grouped into triplets of equal factors.
∴ We will multiply 72 by 3 to get perfect square.

(iv) 675

Solution:

By resolving 675 into prime factor,

3	675
3	225
3	75
5	25
5	5
	1

$675 = 3\times3\times3\times5\times5$
By grouping the factors in triplets of equal factors, $675 = (3\times3\times3)\times5\times5$
Here, 5 cannot be grouped into triplets of equal factors.
∴ We will multiply 675 by 5 to get perfect square.

(v) 100

Solution:

By resolving 100 into prime factor,

2	100
2	50
5	25
5	5
	1

$100 = 2\times2\times5\times5$
Here, 2 and 5 cannot be grouped into triplets of equal factors.
∴ We will multiply 100 by (2×5) 10 to get perfect square.

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 prime factor,

3	81
3	27
3	9
3	3
	1

$81 = 3\times3\times3\times3$
By grouping the factors in triplets of equal factors, $81 = (3\times3\times3)\times3$
Here, 3 cannot be grouped into triplets of equal factors.
∴ We will divide 81 by 3 to get perfect square.

(ii) 128

Solution:

By resolving 128 into 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, 2 cannot be grouped into triplets of equal factors.
∴ We will divide 128 by 2 to get perfect square.

(iii) 135

Solution:

By resolving 135 into prime factor,

3	135
3	45
3	15
5	5
	1

$135 = 3\times3\times3\times5$
By grouping the factors in triplets of equal factors, $135 = (3\times3\times3)\times5$
Here, 5 cannot be grouped into triplets of equal factors.
∴ We will divide 135 by 5 to get perfect square.

(iv) 192

Solution:

By resolving 192 into prime factor,

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

$192 = 2\times2\times2\times2\times2\times2\times3$

By grouping the factors in triplets of equal factors, $192 = (2\times2\times2)\times(2\times2\times2)\times3$

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

∴ We will divide 192 by 3 to get perfect square.

(v) 704

Solution:

By resolving 704 into prime factor,

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

$704 = 2\times2\times2\times2\times2\times2\times11$

By grouping the factors in triplets of equal factors, $704 = (2\times2\times2)\times(2\times2\times2)\times11$

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

∴ We will divide 704 by 11 to get perfect square.

4. 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?

Solution:

Given, side of cube is 5 cm, 2 cm and 5 cm.

∴ Volume of cube = $5 \times 2 \times 5 = 50$

2	50
5	25
5	5
	1

$50 = 2 \times 5 \times 5$

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 perfect square. Hence, 20 cuboid is needed.