Exercise 7.1

Question 1:

Which of the following numbers are not perfect cubes:

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

Answer 1:

(i) 216

Prime factors of 216 = 2 x 2 x 2 x 3 x 3 x 3
Here all factors are in groups of 3's (in triplets)
Therefore, 216 is a perfect cube number.

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

(ii) 128

Prime factors of 128 = 2 x 2 x 2 x 2 x 2 x 2 x 2
Here one factor 2 does not appear in a 3's group.
Therefore, 128 is not a perfect cube.

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

(iii) 1000

Prime factors of 1000 = 2 x 2 x 2 x 3 x 3 x 3
Here all factors appear in 3's group.
Therefore, 1000 is a perfect cube.

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

(iv) 100

Prime factors of 100 = 2 x 2 x 5 x 5
Here all factors do not appear in 3's group.
Therefore, 100 is not a perfect cube.

2	100
2	50
5	25
5	5
	1

(v) 46656

Prime factors of 46656 = 2 x 2 x 2 x 2 x 2 x 2 x 3 x 3 x 3 x 3 x 3 x 3
Here all factors appear in 3's group.
Therefore, 46656 is a perfect cube.

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

Question 2:

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

Answer 2:

(i) 243

Prime factors of 243 = 3 x 3 x 3 x 3 x 3

Here 3 does not appear in 3's group.

Therefore, 243 must be multiplied by 3 to make it a perfect cube.

3	**243**
3	81
3	27
3	9
3	3
	1

(ii) 256

Prime factors of 256 = 2 x 2 x 2 x 2 x 2 x 2 x 2 x 2

Here one factor 2 is required to make a 3's group.

Therefore, 256 must be multiplied by 2 to make it a perfect cube.

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

(iii) 72

Prime factors of 72 = 2 x 2 x 2 x 3 x 3

Here 3 does not appear in 3's group.

Therefore, 72 must be multiplied by 3 to make it a perfect cube.

2	**72**
2	36
2	18
3	9
3	3
	1

(iv) 675

Prime factors of 675 = 3 x 3 x 3 x 5 x 5

Here factor 5 does not appear in 3's group.

Therefore 675 must be multiplied by 3 to make it a perfect cube.

3	**675**
3	225
3	75
5	25
5	5
	1

(v) 100

Prime factors of 100 = 2 x 2 x 5 x 5

Here factor 2 and 5 both do not appear in 3's group.

Therefore 100 must be multiplied by 2 x 5 = 10 to make it a perfect cube.

2	**100**
2	50
5	25
5	5
	1

Question 3:

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

Answer 3:

(i) 81

Prime factors of 81 = 3 x 3 x 3 x 3

Here one factor 3 is not grouped in triplets.

Therefore 81 must be divided by 3 to make it a perfect cube.

3	**81**
3	27
3	9
3	3
	1

(ii) 128

Prime factors of 128 = 2 x 2 x 2 x 2 x 2 x 2 x 2

Here one factor 2 does not appear in a 3's group.

Therefore, 128 must be divided by 2 to make it a perfect cube.

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

(iii) 135

Prime factors of 135 = 3 x 3 x 3 x 5

Here one factor 5 does not appear in a triplet.

Therefore, 135 must be divided by 5 to make it a perfect cube.

3	135
3	45
3	15
5	5
	1

(iv) 192

Prime factors of 192 = 2 x 2 x 2 x 2 x 2 x 2 x 3

Here one factor 3 does not appear in a triplet.

Therefore, 192 must be divided by 3 to make it a perfect cube.

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

(v) 704

Prime factors of 704 = 2 x 2 x 2 x 2 x 2 x 2 x 11

Here one factor 11 does not appear in a triplet.

Therefore, 704 must be divided by 11 to make it a perfect cube.

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

Question 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?

Answer 4:

Given numbers = 5 x 2 x 5

Since, Factors of 5 and 2 both are not in group of three.

Therefore, the number must be multiplied by 2 x 2 x 5 = 20 to make it a perfect cube.

Hence he needs 20 cuboids.

Exercise 7.2

Question 1:

Find the cube root of each of the following numbers by prime factorization method:

(i)	64	(ii)	512
(iii)	10648	(iv)	27000
(v)	15625	(vi)	13824
(vii)	110592	(viii)	46656
(ix)	175616	(x)	91125

Answer 1:

(i) 64

$\sqrt[3]{64} = \sqrt[3]{2\times2\times2\times2\times2\times2}$

$\sqrt[3]{64}$ = 2 x 2

= 4

2	**64**
2	32
2	16
2	8
2	4
2	2
	1

(ii) 512

$\sqrt[3]{512} = \sqrt[3]{2\times2\times2\times2\times2\times2\times2\times2\times2}$

= 2 x 2 x 2

= 8

2	**512**
2	256
2	128
2	64
2	32
2	16
2	8
2	4
2	2
	1

(iii) 10648

$$\sqrt[3]{10648} = \sqrt[3]{2\times2\times2\times11\times11\times11}$$

= 2 x 11

= 22

2	**10648**
2	5324
2	2662
11	1331
11	121
11	11
	1

(iv) 27000

$$\sqrt[3]{27000} = \sqrt[3]{2\times2\times2\times3\times3\times3\times5\times5\times5}$$

= 2 x 3 x 5

= 30

2	**27000**
2	13500
2	6750
3	3375
3	1125
3	375
5	125
5	25
5	5
	1

(v) 15625

$$\sqrt[3]{15625} = \sqrt[3]{5\times5\times5\times5\times5\times5}$$

= 5 x 5

= 25

5	**15625**
5	3125
5	625
5	125
5	25
5	5
	1

(vi) 13824

$$\sqrt[3]{13824}=\sqrt[3]{2\times2\times2\times2\times2\times2\times2\times2\times2\times3\times3\times3}$$

= 2 x 2 x 2 x 3

= 24

2	**13824**
2	6912
2	3456
2	1728
2	864
2	432
2	216
2	108
2	54
3	27
3	9
3	3
	1

(vii) 110592

$$\sqrt[3]{110592}=\sqrt[3]{2\times2\times2\times2\times2\times2\times2\times2\times2\times2\times2\times2\times3\times3\times3}$$

= 2 x 2 x 2 x 2 x 3

= 48

2	**110592**
2	55296
2	27648
2	13824
2	6912
2	3456
2	1728
2	864
2	432
2	216
2	108

2	54
3	27
3	9
3	3
	1

(viii) 46656

$\sqrt[3]{46656} = \sqrt[3]{2\times2\times2\times2\times2\times2\times3\times3\times3\times3\times3\times3}$

= 2 x 2 x 3 x 3

= 36

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

(ix) 175616

$\sqrt[3]{175616} = \sqrt[3]{2\times2\times2\times2\times2\times2\times2\times2\times2\times7\times7\times7}$

= 2 x 2 x 2 x 7

= 56

2	**175616**
2	87808
2	43904
2	21952
2	10976

2	5488
2	2744
2	1372
2	686
7	343
7	49
7	7
	1

(x) 91125

$\sqrt[3]{91125} = \sqrt[3]{3\times3\times3\times3\times3\times3\times5\times5\times5}$

= 3 x 3 x 5

= 45

3	**91125**
3	30375
3	10125
3	3375
3	1125
3	375
5	125
5	25
5	5
	1

Question 2:

State true or false:

(i) Cube of any odd number is even.

(ii) A perfect cube does not end with two zeroes.

(iii) If square of a number ends with 5, then its cube ends with 25.

(iv) There is no perfect cube which ends with 8.

(v) The cube of a two digit number may be a three digit number.

(vi) The cube of a two digit number may have seven or more digits.

(vii) The cube of a single digit number may be a single digit number.

Answer 2:

(i) False

Since, $1^3 = 1, 3^3 = 27, 5^3 = 125, \ldots\ldots\ldots\ldots$ are all odd.

(ii) True

Since, a perfect cube ends with three zeroes.

e.g. $10^3 = 1000, 20^3 = 8000, 30^3 = 27000, \ldots\ldots.$ so on

(iii) False

Since, $5^2 = 25, 5^3 = 125, 15^2 = 225, 15^3 = 3375$ (Did not end with 25)

(iv) False

Since $12^3 = 1728$ [Ends with 8]

And $22^3 = 10648$ [Ends with 8]

(v) False

Since $10^3 = 1000$ [Four digit number]

And $11^3 = 1331$ [Four digit number]

(vi) False

Since $99^3 = 970299$ [Six digit number]

(vii) True

$1^3 = 1$ [Single digit number]

$2^3 = 8$ [Single digit number]

Question 3:

You are told that 1,331 is a perfect cube. Can you guess with factorization what is its cube root? Similarly guess the cube roots of 4913, 12167, 32768.

Answer 3:

We know that $10^3 = 1000$ and Possible cube of $11^3 = 1331$

Since, cube of unit's digit $1^3 = 1$

Therefore, cube root of 1331 is 11.

4913

We know that $7^3 = 343$

Next number comes with 7 as unit place $17^3 = 4913$

Hence, cube root of 4913 is 17.

12167

We know that $3^3 = 27$

Here in cube, ones digit is 7

Now next number with 3 as ones digit $13^3 = 2197$

And next number with 3 as ones digit $23^3 = 12167$

Hence cube root of 12167 is 23.

32768

We know that $2^3 = 8$

Here in cube, ones digit is 8

Now next number with 2 as ones digit $12^3 = 1728$

And next number with 2 as ones digit $22^3 = 10648$

And next number with 2 as ones digit $32^3 = 32768$

Hence cube root of 32768 is 32.