EXERCISE 7.1

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

(i) 216 (ii) 128

(iii) 1000 (iv) 100

(v) 46656

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

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

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?

TEST YOURSELF - CCR1

1. Find the one's digit of the cube of each of the following numbers.

(i) 3331 (ii) 8888

(iii) 149 (iv) 1005

(v) 1024 (vi) 77

(vii) 5022 (viii) 53

2. Following is the pattern of sums of odd numbers.

$$1 = 1 = 1^3$$
$$3 + 5 = 8 = 2^3$$
$$7 + 9 + 11 = 27 = 3^3$$
$$13 + 15 + 17 + 19 = 64 = 4^3$$
$$21 + 23 + 25 + 27 + 29 = 125 = 5^3$$

Express the following numbers as the sum of odd numbers using the above pattern?

(i) 6^3 (ii) 8^3

(iii) 7^3

3. Which of the following are perfect cubes?

(i) 400 (ii) 3375
(iii) 8000 (iv) 15625
(v) 9000 (vi) 6859
(vii) 2025 (viii) 10648

EXERCISE 7.2

1. Find the cube root of each of the following numbers by prime factorisation method.

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

2. State true or false.

(i) Cube of any odd number is even.
(ii) A perfect cube does not end with two zeros.
(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.

3. You are told that 1,331 is a perfect cube. Can you guess without factorisation what is its cube root? Similarly, guess the cube roots of 4913, 12167, 32768.

TEST YOURSELF - CCR2

1. Find the cube root of following by estimation method.

(i) 125000 (ii) 1331
(iii) 4913 (iv) 24389

2. Find the cube root of following by prime factorization method.

(i) 729 (ii) 1728
(iii) 19683 (iv) $\frac{729}{1000}$

ANSWERS

NCERT Textual Exercises and Assignments

Exercise – 7.1

1. (i) 216

Prime factors of 216 = $\underline{2 \times 2 \times 2} \times \underline{3 \times 3 \times 3}$

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 = $\underline{2 \times 2 \times 2} \times \underline{2 \times 2 \times 2} \times 2$

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 = $\underline{2 \times 2 \times 2} \times \underline{5 \times 5 \times 5}$

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 × 2 × 5 × 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

= $\underline{2 \times 2 \times 2} \times \underline{2 \times 2 \times 2} \times \underline{3 \times 3 \times 3} \times \underline{3 \times 3 \times 3}$

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

2. (i) 243

Prime factors of 243 = $\underline{3 \times 3 \times 3} \times 3 \times 3$

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 = $\underline{2 \times 2 \times 2} \times \underline{2 \times 2 \times 2} \times 2 \times 2$

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 = $\underline{2 \times 2 \times 2} \times 3 \times 3$

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 = $\underline{3 \times 3 \times 3} \times 5 \times 5$

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

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

Therefore, 100 must be multiplied by $2 \times 5 = 10$ to make it a perfect cube.

2	100
2	50
5	25
5	5
	1

3. (i) 81

Prime factors of 81 = $\underline{3 \times 3 \times 3} \times 3$

Here, factor 3 does not appear in triplet.

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 = $\underline{2 \times 2 \times 2} \times \underline{2 \times 2 \times 2} \times 2$

Here factor 2 does not appear in 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 = $\underline{3 \times 3 \times 3} \times 5$

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 = $\underline{2 \times 2 \times 2} \times \underline{2 \times 2 \times 2} \times 3$

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 = $\underline{2 \times 2 \times 2} \times \underline{2 \times 2 \times 2} \times 11$

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
11	11
	1

4. Given numbers = $5 \times 2 \times 5$

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

Therefore, the number must be multiplied by $2 \times 2 \times 5 = 20$ to make it a perfect cube

Hence, he needs 20 cuboids.

Test Yourself - CCR1

1. (i) 1 (ii) 2

(iii) 9 (iv) 5

(v) 4 (vi) 3

(vii) 8 (viii) 7

2. (i) 31 + 33 + 35 + 37 + 39 + 41

(ii) 57 + 59 + 61 + 63 + 65 + 67 + 69 + 71

(iii) 43 + 45 + 47 + 49 + 51 + 53 + 55

3. (ii), (iii), (iv), (vi) and (viii) are perfect cubes.

Exercise – 7.2

1. (i) 64

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

$\sqrt[3]{64} = 2\times2 = 4$

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

(ii) 512

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

$= 2 \times 2 \times 2$

$= 8$

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

(iii) 10648

$\sqrt[3]{10648} = \sqrt[3]{\underline{2\times2\times2}\times\underline{11\times11\times11}}$

$= 2 \times 11$

$= 22$

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

(iv) 27000

$\sqrt[3]{27000} = \sqrt[3]{\underline{2\times2\times2}\times\underline{3\times3\times3}\times\underline{5\times5\times5}}$

$= 2 \times 3 \times 5$

$= 30$

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

(v) 15625

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

$= 5 \times 5$

$= 25$

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

(vi) 13824

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

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

$= 24$

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

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

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

$= 48$

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

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

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

$= 36$

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

$\sqrt[3]{175616} = \sqrt[3]{\underline{2\times2\times2}\times\underline{2\times2\times2}\times\underline{2\times2\times2}\times\underline{7\times7\times7}}$

$= 2 \times 2 \times 2 \times 7$

$= 56$

2	175616
2	87808
2	43904
2	21952
2	10976
2	5488
3	2744
3	1372
3	686
7	343
7	49
7	7
	1

(x) 91125

$\sqrt[3]{91125} = \sqrt[3]{\underline{3\times3\times3}\times\underline{3\times3\times3}\times\underline{5\times5\times5}}$

$= 3 \times 3 \times 5$

$= 45$

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

2. (i) False

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

(ii) True

Since, a perfect cube ends with certain number of zeroes that are a multiple of 3.

e.g. $10^3 = 1000$, $20^3 = 8000$, $30^3 = 27000$, ... 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]

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 $7^3 = 343$

Here, in cube, one's digit is 3.

Now next number with 7 as one's digit is $17^3 = 4913$.

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 wit 2 as ones digit $32^3 = 32768$

Hence cube root of 32768 is 32.

Test Yourself - CCR2

1. (i) 50 (ii) 11

(iii) 17 (iv) 29

2. (i) 9 (ii) 12

(iii) 27 (iv) $\frac{9}{10}$