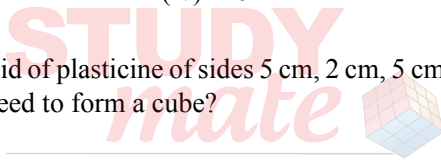


EXERCISE 7.1

- Which of the following numbers are not perfect cubes?
 - 216
 - 128
 - 1000
 - 100
 - 46656
- Find the smallest number by which each of the following numbers must be multiplied to obtain a perfect cube.
 - 243
 - 256
 - 72
 - 675
 - 100
- Find the smallest number by which each of the following numbers must be divided to obtain a perfect cube.
 - 81
 - 128
 - 135
 - 192
 - 704
- 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

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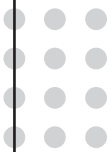
- Find the one's digit of the cube of each of the following numbers.
 - 3331
 - 8888
 - 149
 - 1005
 - 1024
 - 77
 - 5022
 - 53

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

$$\begin{array}{rcccccccc}
 & & & & & & & & 1 & = & 1 & = & 1^3 \\
 & & & & & & & & 3 & + & 5 & = & 8 & = & 2^3 \\
 & & & & & & 7 & + & 9 & + & 11 & = & 27 & = & 3^3 \\
 & & & 13 & + & 15 & + & 17 & + & 19 & = & 64 & = & 4^3 \\
 21 & + & 23 & + & 25 & + & 27 & + & 29 & = & 125 & = & 5^3
 \end{array}$$

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

- 6^3
- 8^3
- 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.
- Cube of any odd number is even.
 - A perfect cube does not end with two zeros.
 - If square of a number ends with 5, then its cube ends with 25.
 - There is no perfect cube which ends with 8.
 - The cube of a two digit number may be a three digit number.
 - The cube of a two digit number may have seven or more digits.
 - 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) $\frac{729}{1000}$ |



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

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

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.

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

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 $675 = 3 \times 3 \times 3 \times 5 \times 5$

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 $81 = 3 \times 3 \times 3 \times 3$

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

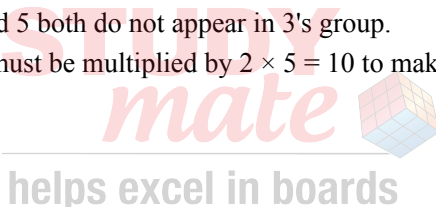
(ii) 128

Prime factors of $128 = 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2$

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 $135 = 3 \times 3 \times 3 \times 5$

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

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

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

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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

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

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

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

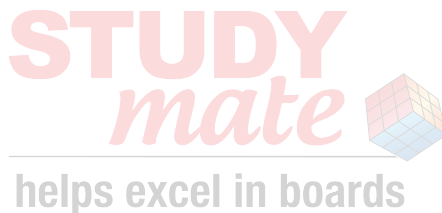
(ii) 512

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

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

$$= 8$$

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



(iii) 10648

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

$$= 2 \times 11$$

$$= 22$$

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

(iv) 27000

$$\begin{aligned}\sqrt[3]{27000} &= \sqrt[3]{\underline{2 \times 2 \times 2} \times \underline{3 \times 3 \times 3} \times \underline{5 \times 5 \times 5}} \\ &= 2 \times 3 \times 5 \\ &= 30\end{aligned}$$

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

(v) 15625

$$\begin{aligned}\sqrt[3]{15625} &= \sqrt[3]{\underline{5 \times 5 \times 5} \times \underline{5 \times 5 \times 5}} \\ &= 5 \times 5 \\ &= 25\end{aligned}$$

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



(vi) 13824

$$\begin{aligned}\sqrt[3]{13824} &= \sqrt[3]{\underline{2 \times 2 \times 2} \times \underline{2 \times 2 \times 2} \times \underline{2 \times 2 \times 2} \times \underline{3 \times 3 \times 3}} \\ &= 2 \times 2 \times 2 \times 3 \\ &= 24\end{aligned}$$

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

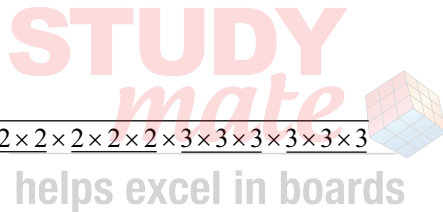
(vii) 110592

$$\begin{aligned} \sqrt[3]{110592} &= \sqrt[3]{\underline{2 \times 2 \times 2} \times \underline{2 \times 2 \times 2} \times \underline{2 \times 2 \times 2} \times \underline{2 \times 2 \times 2} \times \underline{2 \times 2 \times 2} \times \underline{3 \times 3 \times 3}} \\ &= 2 \times 2 \times 2 \times 2 \times 3 \\ &= 48 \end{aligned}$$

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

$$\begin{aligned} \sqrt[3]{46656} &= \sqrt[3]{\underline{2 \times 2 \times 2} \times \underline{2 \times 2 \times 2} \times \underline{2 \times 2 \times 2} \times \underline{3 \times 3 \times 3} \times \underline{3 \times 3 \times 3}} \\ &= 2 \times 2 \times 3 \times 3 \\ &= 36 \end{aligned}$$



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

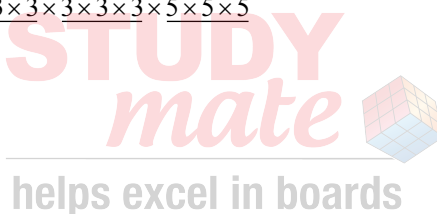
$$\begin{aligned} \sqrt[3]{175616} &= \sqrt[3]{2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 7 \times 7 \times 7} \\ &= 2 \times 2 \times 2 \times 7 \\ &= 56 \end{aligned}$$

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

$$\begin{aligned} \sqrt[3]{91125} &= \sqrt[3]{3 \times 3 \times 3 \times 3 \times 3 \times 3 \times 5 \times 5 \times 5} \\ &= 3 \times 3 \times 5 \\ &= 45 \end{aligned}$$

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 with 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) $\frac{9}{10}$