CBSE Worksheet
Class 8 Maths
Chapter 7: Maths Cube and Cube Roots

1. What is the volume of a cube whose each side is 4 cm?

(a) 48 cubic cm.
(b) 24 cubic cm.
(c) 125 cubic cm.
(d) 64 cubic cm.

2. What is the value of $\sqrt[3]{512}$.

(a) 8
(b) 6
(c) 7
(d) 9

3. The value of $\sqrt[3]{343} \times \sqrt[3]{64}$ is

(a) 28
(b) -28
(c) 18
(d) -18

4. Which of the following is a perfect cube?

(a) 294
(b) 496
(c) 216
(d) 141

5. Find the cube root of 64 by the prime factorisation method.

(a) 4
(b) 2
(c) 6
(d) 8

6. What is the value of $\sqrt[3]{\frac{-729}{512}}$

(a) $\frac{-9}{8}$

(b) $\frac{9}{8}$

(c) $\frac{-9}{7}$

(d) $\frac{9}{7}$

7. Fill in the Blanks.

(a) $\sqrt[3]{1728} = 4 \times$ _____

(b) $\sqrt[3]{8 \times \ldots\ldots\ldots\ldots} = 8$

(c) The cube root of the number n is denoted by _____

8. Match the column:

Column (A)	Column (B)
4^3 is equal to	$\frac{5}{3}$
The value of $\sqrt[3]{\frac{125}{27}}$	1729
The smallest Hardy- Ramanujan Number is	5
The Smallest number by which 675 must be multiplied to obtain a perfect cube is	64

9. Find the cube of $\frac{2}{7}$

10. If a cube has a volume of 343 cubic meters, calculate the length of each side.

11. If one side of a cube is 1.21 meters in length, find its volume.

12. Evaluate: $\sqrt[3]{216} + \sqrt[3]{343} - \sqrt[3]{1321}$

13. Three numbers in the ratio 4: 3: 2. The sum of their cubes is 334125. Find the numbers.

14. Find the cube of the rational number 4.01.

15. 6859 is the perfect cube or not?

16. Find the cube root of (-729)

17. Find the volume of a cube whose surface area is 216 square cm.

18. What should we multiply in the "108"number so that it becomes a perfect cube?

19. What should we divide in the "135" number so that it becomes a perfect cube?

20. What minimal multiplier should be used to multiply 3600 so that the result is a perfect cube? Additionally, determine a quotient's cube root.

21. Find the cube root of 512 by the prime factorisation method.

22. Find the smallest number by which 243 must be multiplied to obtain a perfect cube.

23. Find the smallest number by which 81 must be divided to obtain a perfect cube.

24. Find the smallest number by which 128 must be divided to obtain a perfect cube.

25. 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?

Answers to the Worksheet:

1. (d) 64 cubic cm.

Volume of cube = $(\text{side})^3 = (4)^3 = 64$cubic cm.

2. (a) 8

Step 1: Find the prime factors of 512

$512 = 2\times2\times2\times2\times2\times2\times2\times2\times2$

Step 2: Pair the factors of 512 in a group of three, such that they form cubes.

$512 = (2\times2\times2)\times(2\times2\times2)\times(2\times2\times2)$

$512 = 2^3\times2^3\times2^3$

$512 = 8^3$

Step 3: Now, we will apply cube root on both sides to take out the factor (in cubes) as a single term.

$\sqrt[3]{512} = \sqrt[3]{\left(8^3\right)}$

So, here the cube root is eliminated by the cube of 8.

Hence, $\sqrt[3]{512} = 8$

3. (a) 28

$\sqrt[3]{343}\times\sqrt[3]{64} = \sqrt[3]{343\times64}\left(\because a^m\times b^n = (a\times b)^n\right)$

$= \sqrt[3]{7\times7\times7\times4\times4\times4}$

$= \left(7^3\times4^3\right)^{\frac{1}{3}}$

$= \left((7\times4)^3\right)^{\frac{1}{3}} \quad \because \left(a^m\right)^n = (a)^{m\times n}$

$= (7\times4)^{3\times\frac{1}{3}}$

$= 28$

4. (c) 216

Factors of 141 = 3 × 47

Factors of 294 = 2 × 7 × 7 × 3

Factors of 216 = 2 × 2 × 2 × 3 × 3 × 3 = $2^3 \times 3^3$

Factors of 496 = 2 × 2 × 2 × 2 × 31

We see that 216 is a perfect cube. Hence, option c is correct.

5. (a) 4

Prime factorisation of 64 is

$64 = 2 \times 2 \times 2 \times 2 \times 2 \times 2$

Therefore,

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

6. (a) $\frac{-9}{8}$

7.

(a) $\sqrt[3]{1728} = \sqrt[3]{12^3} = 12 = 4 \times \underline{3}$

(b) $\sqrt[3]{8 \times \underline{8 \times 8}}$ = **8**

(c) The cube root of the number n is denoted by $\sqrt[3]{\underline{n}}$

8. Match the column:

Column (A)	Column (B)
4^3 is equal to	64
The Value of $\sqrt[3]{\frac{125}{27}}$	$\frac{5}{3}$
The Smallest Hardy- Ramanujan Number is	1729
The Smallest number by which 675 must be multiplied to obtain a perfect cube is	5

Explanation:

(a) 4^3 is equal to: $4\times4\times4 = 64$

(b) The value of $\sqrt[3]{\frac{125}{27}}$:

$\sqrt[3]{\frac{125}{27}}$

$=\sqrt[3]{\frac{5^3}{3^3}}$

$=\frac{5}{3}$

Hence the value of $\sqrt[3]{\frac{125}{27}}$ is $=\frac{5}{3}$.

(c) The Hardy- Ramanujan Number is the smallest number which can be expressed as the sum of two different cubes in two different ways. And it is 1729

$1729=1728+1=12^3+1^3$

$1729=1000+729=10^3+9^3$

(d) 675 = 3 × 3 × 3 × 5 × 5

By grouping the factors in triplets of equal factors,

675 = (3 × 3 × 3) × 5 × 5

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

∴ We will multiply 675 by 5 to get perfect cube.

9. Cube of $\frac{2}{7}$

$\Rightarrow\left(\frac{2}{7}\right)^3$

$\Rightarrow\frac{2\times2\times2}{7\times7\times7}$

$\Rightarrow\frac{8}{343}$

10. We know that,

Volume $=(\text{ Side })^3$

$343 = (\text{ Side })^3$

$\text{Side } = \sqrt[3]{343}$

$\text{Side } = \sqrt[3]{7 \times 7 \times 7}$

$\text{Side } = 7 \text{ meter.}$

11. We know that,

$\text{Volume } = (\text{ Side })^3$

$\text{Volume } = (1.21)^3$

$\text{Volume } = 1.21 \times 1.21 \times 1.21$

$\text{Volume } = 1.7715 \text{ cubic meter}$

12. $\sqrt[3]{216} + \sqrt[3]{343} - \sqrt[3]{1321}$

$\Rightarrow \sqrt[3]{6 \times 6 \times 6} + \sqrt[3]{7 \times 7 \times 7} - \sqrt[3]{11 \times 11 \times 11}$

$= 6 + 7 - 11$

$= 13 - 11$

$= 2$

13. Let the three numbers be 4x, 3x and 2x

According to the question,

$\Rightarrow (4x)^3 + (3x)^3 + (2x)^3 = 334125$

$\Rightarrow 64x^3 + 27x^3 + 8x^3 = 334125$

$\Rightarrow 99x^3 = 334125$

$\Rightarrow x^3 = \dfrac{334125}{99}$

$\Rightarrow x^3 = 3375$

$\Rightarrow x = 15$

Numbers are

$\Rightarrow 4x = 4 \times 15 = 60$

$\Rightarrow 3x = 3 \times 15 = 45$

$\Rightarrow 2x = 2 \times 15 = 30$

14. $(4.01)^3$

$\Rightarrow 4.01\times 4.01\times 4.01$

$=\frac{401}{100}\times\frac{401}{100}\times\frac{401}{100}$

$=\frac{644812}{1000000}$

$\Rightarrow 64.4812$

15. Using Prime factorisation method:

19	**6859**
19	**361**
19	**19**
	1

So,

$6859=19\times 19\times 19$

Then, there are no factors left behind when the prime factors of 6859 are arranged into triples.

Therefore, 6859 is a perfect cube.

16. $\sqrt[3]{-729}$

3	-729
3	-243
3	-81
3	-27
3	-9
3	-3
-1	-1
	1

$\Rightarrow \sqrt[3]{-729}=\sqrt{3\times 3\times 3\times 3\times 3\times 3\times -1}$

$\Rightarrow \sqrt[3]{-729}=\sqrt{-9\times 9\times 9}$

$\Rightarrow \sqrt[3]{-729} = -9$

17. Surface area of the cube is 216 square cm.
Let the length of each edge is x
The surface area of a cube is $6x^2$
According to the question,
$\Rightarrow 6x^2 = 216$
$\Rightarrow x^2 = \frac{216}{6}$
$\Rightarrow x^2 = 36$
$\Rightarrow x = 6\text{cm}$
We know that,
Volume of cube $= x^3$ cubic cm.
The volume of cube $= 6^3$
Volume of cube $= 6 \times 6 \times 6$
Volume of cube $= 216$ cubic cm.

18. Using Prime Factorisation method:

2	**108**
2	**54**
3	**27**
3	**9**
3	**3**
	1

$108 = 2 \times 2 \times 3 \times 3 \times 3$
Factoring in this number shows that the pair of 3 is being formed in the given number but the pair of 2 is not being formed, so we have to multiply by 2.
$108 \times 2 = 216$

19. Using Prime Factorisation method:

3	**135**

3	**45**
3	**15**
5	**5**
	1

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

Factoring in this number shows that the pair of 3 is being formed in the given number, but the pair of 5 is not being formed, so we have to divide by 5.

$135 \div 5 = 27$

20. $3600 = 2 \times 2 \times 2 \times 2 \times 3 \times 3 \times 5 \times 5$

There are no pairs of 2, 3, and 5 in this factorisation, so to make it a triplet, we need to multiply two times 2 and one times 3 and 5.

$= 3600 \times 2 \times 2 \times 3 \times 5$

$= 3600 \times 60$

$= 216000$

So, $\sqrt[3]{21600} = 60$

This way, we can multiply the given number by 60 to make a perfect cube.

21. Prime factorisation of 512 is

$512 = \underline{2 \times 2 \times 2} \times \underline{2 \times 2 \times 2} \times \underline{2 \times 2 \times 2}$

$\therefore \sqrt[3]{512} = 2 \times 2 \times 2 = 8$

22. The prime factorisation of 243 is

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

Here, two \$3’s\$ are extra which are not in a triplet. To make 243 a cube, one more 3 is required.

In that case, $243 \times 3 = 3 \times 3 \times 3 \times 3 \times 3 \times 3 = 729$ is a perfect cube.

Therefore, the smallest natural number by which 243 should be multiplied to make it a perfect cube is 3.

23. $81 = 3 \times 3 \times 3 \times 3$.

Here, one 3 is extra which is not in a triplet. Dividing 81 by 3, will make it a perfect cube.

Thus, $81 \div 3 = 27 = 3 \times 3 \times 3$ is a perfect cube.
Hence, the smallest number by which 81 should be divided to make it a perfect cube is 3.

24. $128 = 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2$.
Here, one 2 is extra which is not in a triplet. If we divide 128 by 2, then it will become a perfect cube.
Thus, $128 \div 2 = 64 = (2 \times 2 \times 2) \times (2 \times 2 \times 2)$ is a perfect cube.
Hence, the smallest number by which 128 should be divided to make it a perfect cube is 2.

25. Some cuboids of size $5 \times 2 \times 5$ are given.
These cuboids, when arranged to form a cube, the side of this cube is so formed that it will be a common multiple of the sides (i.e., 5, 2, and 5) of the given cuboid.
Finding the LCM of 5, 2 and 5, we get 10. Thus, a cube of $10\,\text{cm}$ side needs to be made.
For this arrangement, we have to put 2 cuboids along with their length, 5 along with its width, and 2 along with their height.
Therefore, the total cuboids required according to this arrangement $= 2 \times 5 \times 2 = 20$
With the help of 20 cuboids of such measures, the required cube is formed.
Otherwise,
Volume of the cube of sides $5\,\text{cm}, 2\,\text{cm}, 5\,\text{cm} = 5\,\text{cm} \times 2\,\text{cm} \times 5\,\text{cm} = (5 \times 5 \times 2)\,\text{cm}^3$
Here, two 5 s and one 2 are extra which are not in a triplet. If we multiply this expression by $2 \times 2 \times 5 = 20$, then it will become a perfect cube.
Thus, $(5 \times 5 \times 2 \times 2 \times 2 \times 5) = (5 \times 5 \times 5 \times 2 \times 2 \times 2) = 1000$ is a perfect cube.
Hence, 20 cuboids of $5\,\text{cm}, 2\,\text{cm}, 5\,\text{cm}$ are required to form a cube.