CLASS- VIII
MATHEMATICS
CHAPTER-2
CUBE AND CUBE ROOTS

INTRODUCTION

In the previous chapter, we have studied about the square and square roots of the given numbers and also their applications. In this chapter, we will study about cube and cube root of a number.

The cube of a number is product of a number multiplied by itself three times and is read as the number raised to the power 3.

A number n is a perfect cube if there is an integer m such that n = mxmxm.

PROPERTIES OF CUBE NUMBERS

1. Cube of an even number is an even number. Ex. $4^3 = 64$
2. Cube of an odd number is an odd number. Ex. $3^3 = 27$
3. Cube of a negative number is negative. Ex. $(-5)^3 = -125$
4. The cube of a rational number $\frac{a}{b}$, denoted by $(\frac{a}{b})^3$ is equal to $\frac{a^3}{b^3}$.
5. The sum of the cubes of first natural numbers is equal to the square of their sum.

   $1^3 + 2^3 + 3^3 + \ldots\ldots\ldots\ldots + n^3 = (1+2+3+\ldots\ldots\ldots+n)^2$

   Ex. $1^3 + 2^3 = 1 + 8 = 9 = (1+2)^2 = 3^2$
6. For any positive integer x, we have $\sqrt[3]{-x} = -\sqrt[3]{x}$

Worksheet – 1

Q. 1 Find the cube of :

Ex. $13^3 = 13x13x13 = 2197$

$(0.06)^3 = 0.6x0.6x0.6 = 0.216$

$(2/3)^3 = \frac{2}{3} x \frac{2}{3} x \frac{2}{3} = \frac{8}{27}$

Q. 2 . -27000 = (-30) x (-30) x (-30)

so it is a perfect cube

simillarly you can solve all bits

Q. 3. 2560 = 16 x 16 x 10 = 8 x 8 x 8 x 5

you can solve with prime factorisation

Here 5 is not in group, so we required two more 5 which make it perfect cube

Hence, 5x5 = 25 must be multiplied with 2560 it make perfect cube

Q. 4. Simillarly solve this question with prime factorisation

Q. 5. (i) is not a perfect cube because it having one zero - True

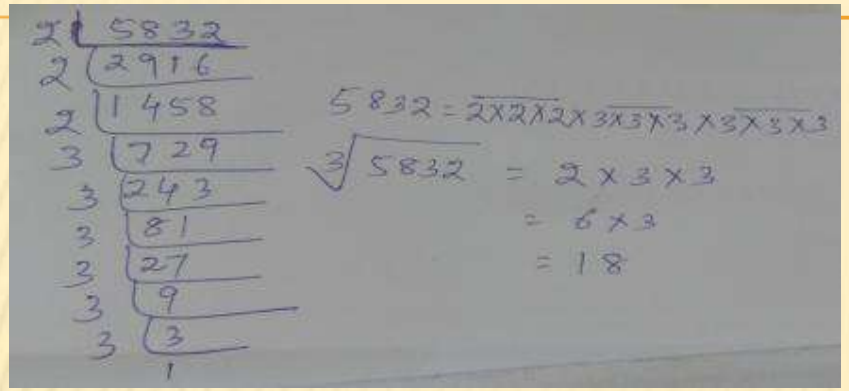
(ii) False, because having three zeros

(ii) False it always odd

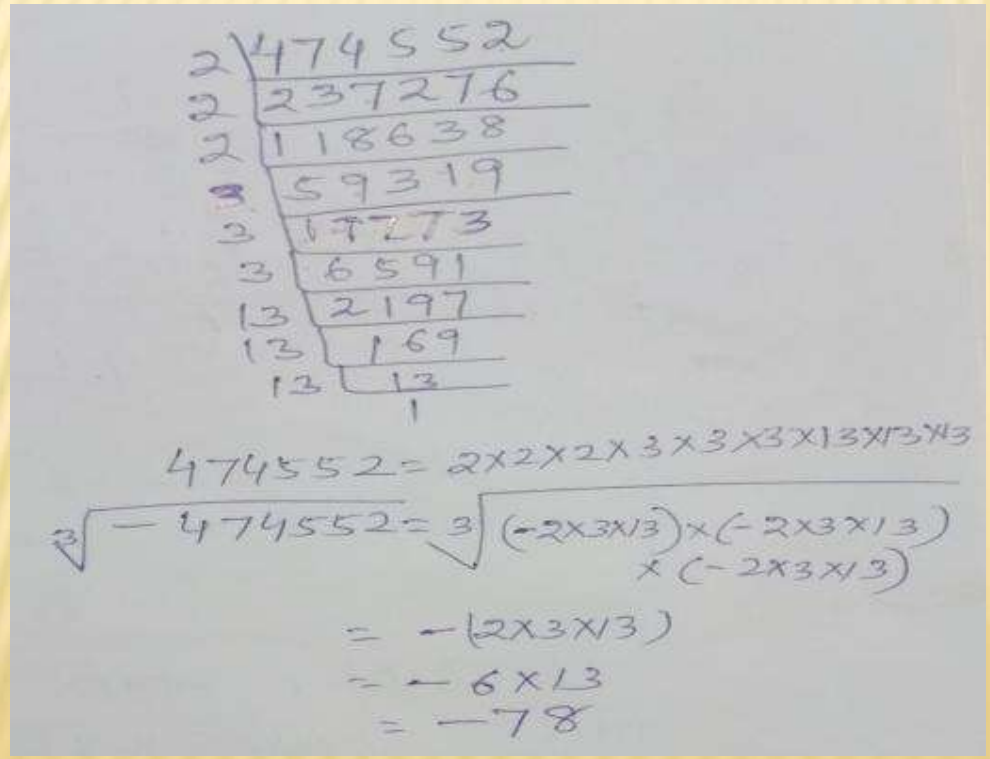
Rest you can solve

Worksheet - 2

Q.1



Q.2



Q. 3. (i) $\sqrt[3]{3375 \times (-729)} = \sqrt[3]{15 \times 15 \times 15 \times (-9) \times (-9) \times (-9)}$

$= 15 \times (-9)$

$= -135$

Q. 4. (iii) $\sqrt[3]{\frac{-686}{-2662}} = \sqrt[3]{\frac{-343}{-1331}} = \sqrt[3]{\frac{-7^3}{-11^3}} = \frac{-7}{-11} = \frac{7}{11}$

Q. 7. (iii) 110592

Let us take 3-digit number from the right of the given number i.e. 592 and consider it as I group and 110 in II group

II	I
110	592

Unit place in 592 is 2

Now $8^3 = 512$ whose one place is also 2

So, unit place of the required number is 8.

Now take the second group 110

$64 < 110 < 125$

$4^3 < 110 < 5^3$

The smallest number between 4 and 5 is 4

$\therefore$ 4 is the second group of the required cube root.

$\therefore$ 48 is the required cube root of the given number.

Rest you can solve

V.B.Q.

Q. 2. The number of students getting prize sin the three categories are in the ratio 1:2:3

Let number of students for discipline is x

number of students for cleanliness of environment is 2x

number of students for regularity in attendance is 3x

Product of their ratio is 162

$x \times 2x \times 3x = 162$

$2x3\ x^3 = 162$

$6\ x^3 = 162$

$x^3 = 162/6 = 27$

$x = \sqrt[3]{27} = 3$

$2x = 3x2 = 6$

$3x = 3x3 = 9$

The number of students getting for discipline award is 3, for cleanliness is 6, for regularity is 9.

BRAIN TEASER

Q. 1. you can solve

Q. 2. Let x be any number.

When it is tripled, it becomes 3x.

$\therefore \quad (3x)^3 = 3x \times 3x \times 3x$

$= 27\,x^3$ which is 27 times the cube of the given number

Q. 7. $\sqrt[3]{\frac{0.027}{0.008}} \div \sqrt{\frac{0.09}{0.04}} - 1 = \sqrt[3]{\frac{27}{8}} \div \sqrt{\frac{9}{4}} - 1 = \frac{3}{2} \div \frac{3}{2} - 1 = 1 - 1 = 0$

HOTS

Q. 1. $\sqrt[3]{288\sqrt[3]{72\sqrt[3]{27}}} = \sqrt[3]{288\sqrt[3]{72\sqrt[3]{3^3}}} = \sqrt[3]{288\sqrt[3]{72 \times 3}} = \sqrt[3]{288\sqrt[3]{216}} = \sqrt[3]{288\sqrt[3]{6^3}} = \sqrt[3]{288 \times 6}$

$= \sqrt[3]{1728} = 12$

Q. 2. Three numbers are in the ratio 2:3:4.

Let the 1st number is 2x

the 2nd number is 3x

the 3rd number is 4x

The sum of their cubes is 33957

$(2x)^3 + (3x)^3 + (4x)^3 = 33957$

$8x^3 + 27x^3 + 64x^3 = 33957$

$99x^3 = 33957$

$x^3 = 33957/99 = 343$

$x = 7$

E.Q.

Q. 1. You can solve by estimation process for taking 632 I group and 47416 II group

Q. 2. The surface area of a cube is 150 m^2

$$6\,l^2 = 150$$

$$l^2 = 150/6 = 25$$

$$l = 5\ m$$

The volume of a cube is $l^3 = 5^3 = 5 \times 5 \times 5 = 125\ m^3$.

Assignment for chapter 2

1. If volume of a cube is 216 cm^3 . What is the length of side of cube.
2. Find the cube root of 17576 through estimation.
3. Find the cube root of -571787.
4. Find the smallest number by which 3087 must be multiplied so that the product is a perfect cube.
5. What will happen to the volume of a cube if its side is halved?
6. Find the approximate length of the side of a cube is equal to a cuboid having dimensions 100 m,11 m and 9 m.
7. A cubical box has a volume of 512000 cubic cm. What is the length of the side of box.
8. Evaluate : $\sqrt[3]{\frac{0.008}{0.027}} \div \sqrt[3]{\frac{729}{512}} \times \frac{27}{16}$
9. Find the value of : $\sqrt[3]{200} \times \sqrt[3]{40}$
10. Find the value of : $\sqrt[3]{-5120} \times \sqrt[3]{100}$