

CUBE AND CUBEROOTS

Exercise - 4 (A)

1) Find cube of

i) 7

$$\Rightarrow 7^3 = 7 \times 7 \times 7 = 343$$

$$\begin{array}{r} 7 \\ \times 7 \\ \hline 343 \end{array}$$

ii) 11

$$\Rightarrow 11^3 = 11 \times 11 \times 11 = 1331$$

(iii) 16

$$16^3 = 16 \times 16 \times 16 = 4096$$

iv) 23

$$23^3 = 23 \times 23 \times 23 = 12167$$

$$\begin{array}{r} 23 \\ \times 23 \\ \hline 69 \\ + 460 \\ \hline 529 \\ \times 23 \\ \hline 1587 \\ + 10580 \\ \hline 12167 \end{array}$$

v) 31

$$31^3 = 31 \times 31 \times 31$$
$$\Rightarrow 29791$$

vi) 42

$$42^3 = 42 \times 42 \times 42$$
$$\Rightarrow 74088$$

$$\begin{array}{r} 42 \\ \times 42 \\ \hline 84 \\ + 840 \\ \hline 1764 \\ \times 42 \\ \hline 3528 \\ + 70560 \\ \hline 74088 \end{array}$$

$$54^3 = 54 \times 54 \times 54 = 157464$$

(i) 243

$$\overline{3 \times 3 \times 3 \times 3 \times 3}$$

So, 3 is not paired it is not a perfect cube.

$$\begin{array}{r|l} 3 & 243 \\ \hline 3 & 81 \\ \hline 3 & 27 \\ \hline 3 & 9 \\ \hline 3 & 3 \\ \hline & 1 \end{array}$$

588

$$\overline{2 \times 2 \times 3 \times 7 \times 7}$$

So, 3 is not paired so, it is not a perfect cube.

$$\begin{array}{r|l} 2 & 588 \\ \hline 2 & 294 \\ \hline 3 & 147 \\ \hline 7 & 49 \\ \hline 7 & 7 \\ \hline & 1 \end{array}$$

(ii) 1331

$$\overline{11 \times 11 \times 11}$$

So, 11 is not paired so it is not a perfect cube.

$$\begin{array}{r|l} 11 & 1331 \\ \hline 11 & 121 \\ \hline 11 & 11 \\ \hline & 1 \end{array}$$

24000

$$\overline{2 \times 2 \times 2 \times 2 \times 3 \times 2 \times 2 \times 5 \times 5 \times 5}$$

So, 3 and 2 is not paired it is not a perfect cube.

$$\begin{array}{r|l} 2 & 24000 \\ \hline 2 & 12000 \\ \hline 2 & 6000 \\ \hline 2 & 3000 \\ \hline 3 & 1500 \\ \hline 5 & 500 \\ \hline 2 & 100 \\ \hline 2 & 50 \\ \hline 5 & 25 \\ \hline & 5 \end{array}$$

1) 2.1

$$2.1^3 = 2.1 \times 2.1 \times 2.1 = 9.261 + \begin{array}{r} 21 \\ \times 21 \\ \hline 420 \\ 441 \\ \hline \end{array}$$

0.4

$0.4^3 = 0.4 \times 0.4 \times 0.4$
 $\Rightarrow 0.064$

$$\begin{array}{r} 441 \\ \times 21 \\ \hline 8820 \\ 441 \\ \hline 9.261 \end{array}$$

1.6

$1.6^3 = 1.6 \times 1.6 \times 1.6$
 $= 4.096$

$$\begin{array}{r} 16 \\ \times 16 \\ \hline 256 \\ \times 16 \\ \hline 1536 \\ 2560 \\ \hline 4096 \end{array}$$

2.5

$2.5^3 = 2.5 \times 2.5 \times 2.5$
 $\Rightarrow 15.625$

0.12

0.12^3

$0.12 \times 0.12 \times 0.12$
 0.001728

$$6) 0.02$$

$$\Rightarrow 0.02^3$$

$$\Rightarrow 0.02 \times 0.02 \times 0.02$$

$$\Rightarrow 0.000008$$

$$7) 0.8$$

$$\Rightarrow 0.8^3$$

$$\Rightarrow 0.8 \times 0.8 \times 0.8$$

$$\Rightarrow 0.512$$

1) Find the cube of :-

$$i) \frac{3}{7} = \left[\frac{3}{7} \right]^3$$

$$\Rightarrow \frac{3^3}{7^3} = \frac{3 \times 3 \times 3}{7 \times 7 \times 7} = \frac{27}{343}$$

$$ii) \frac{8}{9}$$

$$\Rightarrow \left[\frac{8}{9} \right]^3$$

$$\Rightarrow \frac{8^3}{9^3} = \frac{8 \times 8 \times 8}{9 \times 9 \times 9} = \frac{512}{729}$$

$$(iii) \frac{10}{13}$$

$$\Rightarrow \left[\frac{10}{13} \right]^3$$

$$\Rightarrow \frac{10^3}{13^3} = \frac{10 \times 10 \times 10}{13 \times 13 \times 13} = \frac{1000}{2197}$$

iv) $\sqrt[3]{\frac{9}{7}}$

$$\Rightarrow \frac{9}{7} = \frac{9^3}{7^3}$$

$$\Rightarrow \frac{9 \times 9 \times 9}{7 \times 7 \times 7} = \frac{729}{343} = 2 \frac{43}{343}$$

(v) $2 \frac{1}{2}$

$$\Rightarrow \frac{5}{2} = \frac{5^3}{2^3} = \frac{5 \times 5 \times 5}{2 \times 2 \times 2}$$

$$\Rightarrow \frac{125}{8} = 15 \frac{5}{8}$$

5. i) -3

$$\Rightarrow -3^3 = -3 \times -3 \times -3 = -27$$

ii) -7

$$\Rightarrow -7^3 = -7 \times -7 \times -7 = -343$$

(iii) -12

$$\Rightarrow -12^3 = -12 \times -12 \times -12 = -1728$$

iv) -18

$$\Rightarrow -18^3 = -18 \times -18 \times -18 = -5832$$

v) -25

$$\Rightarrow -25^3 = -25 \times -25 \times -25 = -15625$$

vi) -30

$$\Rightarrow -30^3 = -30 \times -30 \times -30 = -27000$$

vii) -50

$$\Rightarrow -50^3 = -50 \times -50 \times -50 = -125000$$

6.59) An even numbers are
216, 8000, and 4096

ii) sol:- An odd numbers are
27, 3375, 125, 343 and 9261

7) Find least number ^{by which} must be multiplied so that product is a perfect cube?

sol:- On finding prime factors of 1323 is
 $(3 \times 3 \times 3) \times 7 \times 7$
So, 7 is multiplied so that the product is a perfect cube

3	1323
3	441
3	147
7	49
7	7
	x

8. sol:- On finding prime factors of 8768 is

$$(2 \times 2 \times 2) \times (2 \times 2 \times 2) \times 137$$

So, 137 is divided so that the quotient is a perfect cube.

2	8768
2	4384
2	2192
2	1096
2	548
2	274
137	137
	1

9. Sol:- On finding the prime factors of 27783

3	27783
3	9261
3	3087
3	1029
7	343
7	49
7	7
	+

$\Rightarrow (3 \times 3 \times 3) \times 3 \times (7 \times 7 \times 7)$
 $\Rightarrow 3 \times 3 = 9$

$\therefore 9$ be multiplied to get a perfect cube

10. sol:- The prime factors of 8640 are

2	8640
2	4320
2	2160
2	1080
2	540
2	270
3	135
3	45
3	15
5	5
	+

$\Rightarrow (2 \times 2 \times 2) \times (2 \times 2 \times 2) \times (3 \times 3 \times 3) \times 5$

\Rightarrow Clearly, 8640 must be divided by 5

11. sol:- The prime factors of 77175 are

3	77175
3	25725
5	8575
5	1715
7	343
7	49
7	7
	+

2	8640
2	4320
2	2160
2	1080
2	540
2	270
3	135
3	45
3	15
5	5
	+

$\Rightarrow 3 \times 3 \times 5 \times 5 \times (7 \times 7 \times 7)$

\Rightarrow Clearly 77175 must be multiplied by $3 \times 5 = 15$

4th B³

1) Find cube root of

i) 64
Prime factorization
 $(2 \times 2 \times 2) \times (2 \times 2 \times 2)$
 $2 \times 2 = 4$

$$\begin{array}{r|l} 2 & 64 \\ \hline 2 & 32 \\ \hline 2 & 16 \\ \hline 2 & 8 \\ \hline 2 & 4 \\ \hline 2 & 2 \\ \hline & 1 \end{array}$$

ii) 343
Prime factor
 $(7 \times 7 \times 7) = 7$

$$\begin{array}{r|l} 7 & 343 \\ \hline 7 & 49 \\ \hline 7 & 7 \\ \hline & 1 \end{array}$$

iii) 729
Prime factor
 $(3 \times 3 \times 3) \times (3 \times 3 \times 3)$
 $3 \times 3 = 9$

$$\begin{array}{r|l} 3 & 729 \\ \hline 3 & 243 \\ \hline 3 & 81 \\ \hline 3 & 27 \\ \hline 3 & 9 \\ \hline 3 & 3 \\ \hline & 1 \end{array}$$

iv) 1728
Prime factor
 $(2 \times 2 \times 2) \times (2 \times 2 \times 2) \times 3 \times 3$
 $2 \times 2 \times 3 = 12$
~~36~~ 12

$$\begin{array}{r|l} 2 & 1728 \\ \hline 2 & 864 \\ \hline 2 & 432 \\ \hline 2 & 216 \\ \hline 2 & 108 \\ \hline 2 & 54 \\ \hline 3 & 27 \\ \hline 3 & 9 \\ \hline & 1 \end{array}$$

v) 9261
 $(3 \times 3 \times 3) \times (7 \times 7 \times 7)$
 $3 \times 7 = 21$

$$\begin{array}{r|l} 3 & 9261 \\ \hline 3 & 3087 \\ \hline 3 & 1029 \\ \hline 7 & 343 \\ \hline 7 & 49 \\ \hline 7 & 7 \\ \hline & 1 \end{array}$$

vi) 4096

$2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2$
 $2 \times 2 \times 2 \times 2$
 16

Vii) 8000

prime factorization

$$\Rightarrow 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 5 \times 5 \times 5$$

$$\Rightarrow 2 \times 2 \times 5 = 20$$

$$\begin{array}{r|l} 2 & 8000 \\ 2 & 4000 \\ 2 & 2000 \\ 2 & 1000 \\ 2 & 500 \end{array}$$

Viii) 3375

$$\Rightarrow 5 \times 5 \times 5 \times 3 \times 3 \times 3$$

$$\Rightarrow 5 \times 3 = 15$$

$$\begin{array}{r|l} 5 & 3375 \\ 5 & 675 \\ 5 & 135 \\ 3 & 27 \\ 3 & 9 \\ 3 & 3 \end{array}$$

$$\begin{array}{r|l} 2 & 500 \\ 2 & 250 \\ 5 & 125 \\ 5 & 25 \\ 5 & 5 \end{array}$$

Q. Find cube root of :-

Q. i) $\frac{27}{64}$

$$\Rightarrow \sqrt[3]{\frac{27}{64}} = \frac{\sqrt[3]{27}}{\sqrt[3]{64}}$$

$$\Rightarrow \frac{\sqrt[3]{3 \times 3 \times 3}}{\sqrt[3]{4 \times 4 \times 4}} = \frac{3}{4}$$

$$\begin{array}{r|l} 4 & 64 \\ 4 & 16 \\ 4 & 4 \end{array}$$

$$\begin{array}{r|l} 3 & 27 \\ 3 & 9 \\ 3 & 3 \end{array}$$

ii) $\frac{125}{126}$

$$\Rightarrow \frac{\sqrt[3]{125}}{\sqrt[3]{126}} = \frac{\sqrt[3]{5 \times 5 \times 5}}{\sqrt[3]{2 \times 2 \times 2 \times 3 \times 3 \times 3}}$$

$$\begin{array}{r|l} 2 & 1216 \\ 2 & 108 \\ 2 & 54 \\ 2 & 27 \\ 3 & 9 \\ 3 & 3 \end{array}$$

$$\begin{array}{r|l} 5 & 125 \\ 5 & 25 \\ 5 & 5 \end{array}$$

$$\Rightarrow \frac{\sqrt[3]{5}}{\sqrt[3]{2 \times 3}} = \frac{5}{6}$$

$$\begin{array}{r|l} 2 & 512 \\ 2 & 256 \\ 2 & 128 \\ 2 & 64 \\ 2 & 32 \\ 2 & 16 \\ 2 & 8 \\ 2 & 4 \end{array}$$

$$\begin{array}{r|l} 7 & 343 \\ 7 & 49 \\ 7 & 7 \end{array}$$

viii) $\frac{343}{512} = \frac{\sqrt[3]{512343}}{\sqrt[3]{512}}$

$$\Rightarrow \frac{\sqrt[3]{7 \times 7 \times 7}}{\sqrt[3]{2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2}}$$

$$\begin{array}{r|l} 2 & 64 \\ 2 & 32 \\ 2 & 16 \\ 2 & 8 \\ 2 & 4 \end{array}$$

Important Notes

$$\sqrt[3]{7} = \sqrt[3]{2 \times 2 \times 2} = 2$$

(iv) 64×729

$$\sqrt[3]{64 \times 729} = \sqrt[3]{64} \times \sqrt[3]{729}$$

$$\Rightarrow \sqrt[3]{4 \times 4 \times 4} \times \sqrt[3]{3 \times 3 \times 3 \times 3 \times 3 \times 3}$$

$$\Rightarrow \sqrt[3]{4} \times \sqrt[3]{3 \times 3}$$

$$\Rightarrow 4 \times 9 = 36$$

(v) 64×27

$$\Rightarrow \sqrt[3]{4 \times 4 \times 4} \times \sqrt[3]{3 \times 3 \times 3}$$

$$\Rightarrow 4 \times 3 = 12$$

(vi) 729×8000

$$\Rightarrow \sqrt[3]{3 \times 3 \times 3 \times 3 \times 3 \times 3} \times \sqrt[3]{2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 5 \times 5 \times 5}$$

$$\Rightarrow \sqrt[3]{3} \times \sqrt[3]{2 \times 2 \times 5} = 60$$

$$\Rightarrow \sqrt{9 \times 9 \times 9} \times \sqrt{5 \times 5 \times 5 \times 4 \times 4 \times 4}$$

$$\Rightarrow \sqrt{9 \times 20} = 180$$

(vii) 3375×512

$$\Rightarrow \sqrt{5 \times 5 \times 5 \times 3 \times 3 \times 3} \times \sqrt{2 \times 2 \times 2 \times 4 \times 4 \times 4}$$

$$\Rightarrow \sqrt{5 \times 3} \times \sqrt{2 \times 4}$$

$$\Rightarrow 15 \times 8 = 120$$

3) Find cube root of

i) -216

$$\Rightarrow -6 \times -6 \times -6$$

$$\Rightarrow -6$$

Important Notes

$$\text{ii)} -512$$

$$\Rightarrow -8 \times -8 \times -8$$

$$\Rightarrow -8$$

$$\text{iii)} -1331$$

$$\Rightarrow -11 \times -11 \times -11$$

$$\Rightarrow -11$$

$$\text{iv)} \frac{27}{125} = \frac{-3 \times -3 \times -3}{-5 \times -5 \times -5} = \frac{-3}{5}$$

$$\text{v)} \frac{-64}{343} = \frac{-4 \times -4 \times -4}{7 \times 7 \times 7} = \frac{-4}{7}$$

$$\text{vi)} \frac{-512}{343} = \frac{-8 \times -8 \times -8}{7 \times 7 \times 7} = \frac{-8}{7}$$

$$\text{vii)} -2197 = -13 \times -13 \times -13 = -13$$

$$\text{viii)} -5832 = -18 \times -18 \times -18 = -18$$

$$\text{ix)} \frac{274400}{2744000} = \frac{-140 \times -140 \times -140}{-140} = -140$$

4. Find the cube roots of :-

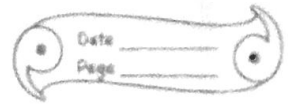
$$\text{i)} 2.744$$

$$\Rightarrow \frac{2.744}{1000} = \frac{24 \times 24 \times 24}{10 \times 10 \times 10} = \frac{24}{10} = 2.4$$

$$\text{ii)} 9.261$$

$$\Rightarrow \frac{9.261}{1000} = \frac{21 \times 21 \times 21}{10 \times 10 \times 10} = \frac{21}{10} = 2.1$$

CHAPTER-4



4'B'

Q4. Find cube roots of:-

iii) 0.000027

$$\Rightarrow \frac{27}{10,000,000} = \frac{3 \times 3 \times 3}{100 \times 100 \times 100} = \frac{0.03}{100} = 0.03$$

iv) -0.512

$$\Rightarrow \frac{-512}{1000} = \frac{-8 \times -8 \times -8}{10 \times 10 \times 10} = \frac{-8}{10} = -0.8$$

v) -15.625

$$\Rightarrow \frac{-15625}{1000} = \frac{-25 \times -25 \times -25}{10 \times 10 \times 10} = \frac{-25}{10} = -2.5$$

vi) -125×1000

$$\Rightarrow (-5 \times -5 \times -5) \times (-10 \times -10 \times -10)$$

$$\Rightarrow -5 \times -10 = -50$$

5. Find the smallest number by which 96244 should be divided so that the quotient is a perfect cube.

Given number is 96244

To find smallest number to be divided so that quotient is a perfect cube.

$$2 \mid 26244$$

$$2 \mid 13122$$

$$3 \mid 6561$$

$$3 \mid 2187$$

$$3 \mid 729$$

$$3 \mid 243$$

$$3 \mid 81$$

$$3 \mid 27$$

$$3 \mid 9$$

$$3 \mid 3$$

X

$$\Rightarrow 2 \times 2 \times (3 \times 3 \times 3) \times (3 \times 3 \times 3) \times 3 \times 3$$

$$\Rightarrow 3 \times 3 \times 2 \times 2 = 36$$

6. What is the least number by which 30375 should be multiplied to get a perfect cube?

$$3 \mid 30375$$

$$3 \mid 10125$$

$$3 \mid 3375$$

$$3 \mid 1125$$

$$3 \mid 375$$

$$5 \mid 125$$

$$5 \mid 25$$

$$5 \mid 5$$

X

$$(3 \times 3 \times 3 \times 3 \times 3 \times 5 \times 5 \times 5)$$

So, 3 should be multiplied to 30375 to get a perfect cube.

7) i) $700 \times 2 \times 49 \times 5$

$$\begin{array}{r|l} 2 & 700 \\ \hline 2 & 350 \\ 5 & 175 \\ 5 & 35 \\ 7 & 7 \\ \hline \end{array}$$

$\Rightarrow 2 \times 2 \times 5 \times 5 \times 7 \times 2 \times 7 \times 7 \times 5$

$\Rightarrow (2 \times 2 \times 2) \times (5 \times 5 \times 5) \times (7 \times 7 \times 7)$

$\Rightarrow 2 \times 5 \times 7 = 70$

ii) -216×1728

$\Rightarrow - (2 \times 2 \times 2 \times 3 \times 3 \times 3) \times$

$\Rightarrow - (2 \times 2 \times 2 \times 3 \times 3 \times 3) \times (2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 3 \times 3 \times 3)$

$\Rightarrow - (2 \times 3) \times (2 \times 2 \times 3)$

$\Rightarrow -6 \times 12$

$\Rightarrow -72$

iii) -64×-125

$\Rightarrow - (2 \times 2 \times 2 \times 2 \times 2 \times 2) \times - (5 \times 5 \times 5)$

$\Rightarrow - (2 \times 2) \times - (5)$

$\Rightarrow -4 \times -5 = 20$

iv) $\frac{-27}{343}$

$\Rightarrow \frac{-3 \times 3 \times 3}{7 \times 7 \times 7} = \frac{-3}{7}$

v) $\frac{729}{-1331}$

$\Rightarrow \frac{3 \times 3 \times 3 \times 3 \times 3 \times 3}{-11 \times -11 \times -11} = \frac{3 \times 3}{-11} = \frac{9}{-11}$

vi) $250047 \ 250047$

$\Rightarrow \frac{250047}{1000}$

$\Rightarrow \frac{(3 \times 3 \times 3) \times (3 \times 3 \times 3) \times (7 \times 7 \times 7)}{(5 \times 5 \times 5) \times (2 \times 2 \times 2)}$

$\Rightarrow \frac{(3 \times 3 \times 7)}{(5 \times 2)} = \frac{63}{10} = 6.3$

3	250047
3	83349
3	27783
3	9261
3	3087
3	1029
7	343
7	49
7	7
	+

vii) -175616

$\Rightarrow -(2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2) \times (7 \times 7 \times 7)$

$\Rightarrow -(2 \times 2 \times 2 \times 7)$

$\Rightarrow -56$

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