Ch-4

CUBES AND CUBE-ROOT

Exercise - 4(A)

1. Find the cube of:

(i) $7^3 = 7 \times 7 \times 7$
$= 343$

(ii) $11^3 = 11 \times 11 \times 11$
$= 1,331$

(iii) $16^3 = 16 \times 16 \times 16$
$= 4,096$

(iv) $23^3 = 23 \times 23 \times 23$
$= 12,167$

(v) $31^3 = 31 \times 31 \times 31$
$= 29,791$

(vi) $42^3 = 42 \times 42 \times 42$
$= 74,088$

(vii) $54^3 = 54 \times 54 \times 54$
$= 1,57,464$

2. Find which of the following are perfect cubes?

(i) $243 = 3 \times 3 \times 3 \times 3 \times 3$
∴ Not a perfect cubes.

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

(ii) $588 = 2 \times 2 \times 3 \times 7 \times 7$

Not a perfect cube.

2 | 588
2 | 294
3 | 147
7 | 49
7

(iii) $1331 = 11 \times 11 \times 11$

$= 11$

So, it is a perfect cube.

3 | 1331
11 | 121
11

(iv) $24000 = 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 3 \times 5 \times 5$

Not a perfect cube.

2 | 24000
2 | 12000
2 | 6000
2 | 3000
2 | 1500
2 | 750
3 | 375
5 | 125
5 | 25
5

(v) ~~10880~~ $1728 = 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 3 \times 3 \times 3$

$= 2 \times 2 \times 3$

$= 12$

So, it is a perfect cube.

2 | 1728
2 | 864
2 | 432
2 | 216
2 | 108
2 | 54
3 | 27
3 | 9
3

(vi) $1938 = 2 \times 3 \times 17 \times 19$

Not a perfect cube

$$\begin{array}{r|l} 2 & 1938 \\ 3 & 969 \\ 17 & 323 \\ & 19 \end{array}$$

3. Find cube of:

(i) $2.1 = (2.1)^3$

$= \left(\frac{21}{10}\right)^3 = \frac{21 \times 21 \times 21}{10 \times 10 \times 10}$

$= \frac{9261}{1000} = 9.261$

(ii) $0.4 = (0.4)^3$

$= \left(\frac{4}{10}\right)^3 = \frac{4 \times 4 \times 4}{10 \times 10 \times 10} = \frac{64}{1000} = 0.064$

(iii) $1.6 = (1.6)^3$

$= \left(\frac{16}{10}\right)^3 = \frac{16 \times 16 \times 16}{10 \times 10 \times 10} = \frac{4096}{1000} = 4.096$

(iv) $2.5 = (2.5)^3$

$= \left(\frac{25}{10}\right)^3 = \frac{25 \times 25 \times 25}{10 \times 10 \times 10} = \frac{15625}{1000} = 15.625$

(v) $0.12 = (0.12)^3$

$= \left(\frac{12}{100}\right)^3 = \frac{12 \times 12 \times 12}{100 \times 100 \times 100} = \frac{1728}{1000000} = 0.001728$

(vi) $0.02 = (0.02)^3$

$= \left(\frac{2}{100}\right)^3 = \frac{2 \times 2 \times 2}{100 \times 100 \times 100} = \frac{8}{1000000} = 0.000008$

(vii) $0.8 = (0.8)^3$

$= \left(\frac{8}{10}\right)^3 = \frac{8 \times 8 \times 8}{10 \times 10 \times 10} = \frac{512}{1000} = 0.512$

4. Find the cubes of

(i) $\frac{3}{7} = \left(\frac{3}{7}\right)^3 = \frac{3 \times 3 \times 3}{7 \times 7 \times 7} = \frac{27}{343}$

(ii) $\frac{8}{9} = \left(\frac{8}{9}\right)^3 = \frac{8\times8\times8}{9\times9\times9} = \frac{512}{729}$

(iii) $\frac{10}{13} = \left(\frac{10}{13}\right)^3 = \frac{10\times10\times10}{13\times13\times13} = \frac{1000}{2197}$

(iv) $1\frac{2}{7} = \left(1\frac{2}{7}\right)^3$

$= \left(\frac{9}{7}\right)^3 = \frac{9\times9\times9}{7\times7\times7} = \frac{729}{343}$

$= 2\frac{43}{343}$

(v) $2\frac{1}{2} = \left(2\frac{1}{2}\right)^3$

$= \left(\frac{5}{2}\right)^3 = \frac{5\times5\times5}{2\times2\times2} = \frac{125}{8}$

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

5. Find the cubes of:

(i) $-3 = (-3)^3 = -3\times-3\times-3$

$= -27$

(ii) $-7 = (-7)^3 = -7\times-7\times-7$

$= -343$

(iii) $-12 = (-12)^3 = -12\times-12\times-12$

$= -1728$

(iv) $-18 = (-18)^3 = -18 \times -18 \times -18$
$= -5832$

(v) $-25 = (-25)^3 = -25 \times -25 \times -25$
$= -15625$

(vi) $-30 = (-30)^3 = -30 \times -30 \times -30$
$= -27000$

(vii) $-50 = (-50)^3 = -50 \times -50 \times -50$
$= -125000$

6. Which of the following are cubes of :

(i) an even number - 216, 8000, 4096

(ii) an odd number - 729, 3375, 125, 343, 9261

219, 729, 3375, 8000, 125, 343, 4096 and 9261

7. Find the least number by which 1323 must be multiplied so that the product is a perfect cube?

Ans. $1323 = 3 \times 3 \times 3 \times 7 \times 7$

So, 7 is the least number that must be multiplied with 1323.

3 | 1323
3 | 441
3 | 147
7 | 49
7

8. Find the least number by which 8768 must be divided so that the quotient is a perfect cube.

Ans. $8768 = \underline{2 \times 2 \times 2} \times \underline{2 \times 2 \times 2} \times 137$

So, 137 is the least number that must be divided with 8768.

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

9. Find the smallest no by which 27783 be multiplied to get a perfect cube number?

Ans. $27783 = \underline{3 \times 3 \times 3} \times \underline{7 \times 7 \times 7}$
$= 3 \times 3 = 9$

So, 9 is least number that must be multiplied with 27783.

10. With what least number must 8640 be divided so that the quotient is a perfect cube?

Ans- $8640 = \underline{2\times2\times2} \times \underline{2\times2\times2} \times \underline{3\times3\times3} \times 5$

So, 5 is the least number that must be divided with 8640.

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

11. Which is the smallest number that must be multiplied to 77175 to make it a perfect cube?

Ans- $77175 = 5\times5\times3\times3\times \underline{7\times7\times7}$

$5\times3 = 15$ is the smallest number that must be multiplied to 77175.

5	77175
5	15435
3	3087
3	1029
7	343
7	49
	7

Exercise 4(B)

1. Find the cube-roots of:

(i) $\sqrt[3]{64} = \sqrt{2\times2\times2\times2\times2\times2}$

$= 2\times2 = 4$

2	64
2	32
2	16
2	8
2	4
	2

(ii) $\sqrt[3]{343} = \sqrt{7\times7\times7}$

$= 7$

7	343
7	49
	7

(iii) $\sqrt[3]{729} = \sqrt{3\times3\times3\times3\times3\times3}$

$= 3\times3 = 9$

3	729
3	243
3	81
3	27
3	9
	3

(iv) $\sqrt[3]{1728} = \sqrt{2\times2\times2\times2\times2\times2\times3\times3\times3}$

$= 2\times2\times3 = 12$

2	1728
2	864
2	432
2	216
2	108
2	54
3	27
3	9
	3

(v) $\sqrt[3]{9261} = \sqrt{3 \times 3 \times 3 \times 7 \times 7 \times 7}$

$= 3 \times 7 = 21$

3	9261
3	3087
3	1029
7	343
7	49
	7

(vi) $\sqrt[3]{4096} = \sqrt{2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2}$

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

$= 16$

2	4096
2	2048
2	1024
2	512
2	256
2	128
2	64
2	32
2	16
2	8
2	4
	2

(vii) $\sqrt[3]{8000} = \sqrt{2\times2\times2\times2\times2\times2\times5\times5\times5}$

$= 2\times2\times5$

$= 20$

2	8000
2	4000
2	2000
2	1000
2	500
2	250
5	125
5	25
	5

(viii) $\sqrt[3]{3375} = \sqrt{3\times3\times3\times5\times5\times5}$

$= 3\times5 = 15$

3	3375
3	1125
3	375
5	125
5	25
	5

2. Find the cube-roots of:

(i) $\sqrt[3]{\frac{27}{64}} = \frac{\sqrt{3\times3\times3}}{\sqrt{4\times4\times4}}$

$= \frac{3}{4}$

(ii) $\sqrt[3]{\frac{125}{216}} = \frac{\sqrt{5\times5\times5}}{\sqrt{6\times6\times6}}$

$= \frac{5}{6}$

(iii) $\sqrt[3]{\frac{343}{512}} = \frac{\sqrt[3]{7\times7\times7}}{\sqrt[3]{8\times8\times8}}$

$= \frac{7}{8}$

(iv) $\sqrt[3]{64\times729}$

$= \sqrt[3]{4\times4\times4\times9\times9\times9}$

$= 4\times9 = 36$

(v) $\sqrt[3]{64\times27}$

$= \sqrt[3]{4\times4\times4\times3\times3\times3}$

$= 4\times3 = 12$

(vi) $\sqrt[3]{729\times8000}$

$= \sqrt[3]{9\times9\times9\times20\times20\times20}$

$= 9\times20 = 180$

(vii) $\sqrt[3]{3375\times512}$

$= \sqrt[3]{15\times15\times15\times8\times8\times8}$

$= 15\times8 = 120$

3. Find the cube roots of:

(i) $\sqrt[3]{-216} = \sqrt[3]{-6\times-6\times-6}$

$= -6$

(ii) $\sqrt[3]{-512} = \sqrt[3]{-8\times-8\times-8}$

$= -8$

(iii) $\sqrt[3]{-1331} = \sqrt[3]{-11\times-11\times-11}$

$= -11$

(iv) $\sqrt[3]{\frac{-27}{125}} = \frac{\sqrt[3]{-3\times-3\times-3}}{\sqrt[3]{5\times5\times5}}$

$= \frac{-3}{5}$

(v) $\sqrt[3]{\frac{-64}{343}} = \frac{\sqrt{-4 \times -4 \times -4}}{\sqrt{7 \times 7 \times 7}}$

$= -\frac{4}{7}$

(vi) $\sqrt[3]{\frac{-512}{343}} = \frac{\sqrt{-8 \times -8 \times -8}}{\sqrt{7 \times 7 \times 7}}$

$= -\frac{8}{7}$

(vii) $\sqrt[3]{-2197} = \sqrt{-13 \times -13 \times -13}$

$= -13$

(viii) $\sqrt[3]{-5832}$

$= \sqrt{-18 \times -18 \times -18}$

$= -18$

(Ix) $\sqrt[3]{-2744000}$

$= \sqrt[3]{-2744 \times 1000}$

$= \sqrt{(2 \times 2 \times 2) \times 7 \times 7 \times 7 \times 10 \times 10 \times 10}$

$= -2 \times 7 \times 10 = -140$

4. Find the cube roots of:

(i) $\sqrt[3]{2.744} = \sqrt[3]{\frac{2744}{1000}} = \frac{\sqrt{2\times2\times2\times7\times7\times7}}{\sqrt{10\times10\times10}}$

$= \frac{2\times7}{10}$

$= \frac{14}{10} = 1.4$

(ii) $\sqrt[3]{9.261} = \sqrt[3]{\frac{9261}{1000}} = \frac{\sqrt{21\times21\times21}}{\sqrt{10\times10\times10}} = \frac{21}{10} = 2.1$

(iii) $\sqrt[3]{0.000027} = \sqrt[3]{\frac{27}{1000000}} = \frac{\sqrt{3\times3\times3}}{\sqrt{100\times100\times100}} = \frac{3}{100} = 0.03$

(iv) $\sqrt[3]{-0.512} = \sqrt[3]{\frac{-512}{1000}} = \frac{\sqrt{-8\times-8\times-8}}{\sqrt{10\times10\times10}} = \frac{-8}{10} = -0.8$

(v) $\sqrt[3]{-15.625} = \sqrt[3]{\frac{-15625}{1000}} = \frac{\sqrt{-25\times-25\times-25}}{\sqrt{10\times10\times10}} = \frac{-25}{10} =$

$= -2.5$

(vi) $\sqrt[3]{-125\times1000} = \sqrt{-5\times-5\times-5\times10\times10\times10}$

$= -5\times10 = -50$

5. Find the smallest number by which 26244 should be divided so that the quotient is a perfect cube.

Ans- $26244 = 2\times2\times3\times3\times\underline{3\times3\times3}\times\underline{3\times3\times3}$

$2\times2\times3\times3 = 36$ is the smallest number that must be divided with 26244.

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

Ans- $30375 = 3\times3\times\underline{3\times3\times3}\times\underline{5\times5\times5}$

So, 3 is the least number that must be multiplied.

3| 30375
3| 10125
3| 3375
3| 1125
3| 375
5| 125
5| 25
5

7. Find the cube-roots of:

(i) $\sqrt[3]{700\times2\times49\times5}$

$= \sqrt{7\times2\times2\times5\times5\times2\times7\times7\times5}$

$= \sqrt{\underline{7\times7\times7}\times\underline{2\times2\times2}\times\underline{5\times5\times5}}$

$= 7\times2\times5 = 70$

(ii) $\sqrt[3]{-216 \times 1728}$

$= \sqrt{-6 \times -6 \times -6 \times 12 \times 12 \times 12}$

$= -6 \times 12 = -72$

(iii) $\sqrt[3]{-64 \times -125}$

$= \sqrt{-4 \times -4 \times -4 \times -5 \times -5 \times -5}$

$= -4 \times -5 = 20$

(iv) $\sqrt[3]{\frac{-27}{343}} = \frac{\sqrt{-3 \times -3 \times -3}}{\sqrt{7 \times 7 \times 7}}$

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

(v) $\sqrt[3]{\frac{729}{-1331}} = \frac{\sqrt{9 \times 9 \times 9}}{\sqrt{-11 \times -11 \times -11}}$

$= \frac{9}{-11} = \frac{-9}{11}$

(vi) $\sqrt[3]{250.047}$

$= \frac{\sqrt{250047}}{\sqrt{1000}}$

$= \frac{\sqrt{3 \times 3 \times 3 \times 3 \times 3 \times 3 \times 7 \times 7 \times 7}}{\sqrt{10 \times 10 \times 10}}$

$= \frac{3 \times 3 \times 7}{10} = \frac{63}{10} = 6.3$

(vii) $\sqrt[3]{-175616}$

$= \sqrt[3]{2\times2\times2\times2\times2\times2\times2\times2\times2\times-7\times-7\times-7}$

$= 2\times2\times2\times-7$

$= -56$

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VIII (A)