Ch-4

Cube And Cube Roots

Ex-4(A)

1) i) $7 = 7^3 = 7 \times 7 \times 7 = 343$
ii) $11 = 11^3 = 11 \times 11 \times 11 = 1331$
iii) $16 = 16^3 = 16 \times 16 \times 16 = 4096$
iv) $23 = 23^3 = 23 \times 23 \times 23 = 12,167$
v) $31 = 31^3 = 31 \times 31 \times 31 = 29791$
vi) $54 = 54^3 = 54 \times 54 \times 54 = 157464$

2) i) 243 = No
ii) 588 = No
iii) 1331 = Yes
iv) 24000 = No
v) 1728 = Yes
vi) 1958 = No

3) i) $2.1 = 2.1^3 = 2.1 \times 2.1 \times 2.1 = 9.261$
ii) $0.4 = 0.4^3 = 0.4 \times 0.4 \times 0.4 = 0.064$
iii) $1.6 = 1.6^3 = 1.6 \times 1.6 \times 1.6 = 4.096$
iv) $2.5 = 2.5^3 = 2.5 \times 2.5 \times 2.5 = 15.625$
v) $0.12 = 0.12^3 = 0.12 \times 0.12 \times 0.12 = 0.001728$
vi) $0.02 = 0.02^3 = 0.02 \times 0.02 \times 0.02 = 0.000004$
vii) $0.8 = 0.8^3 = 0.8 \times 0.8 \times 0.8 = 0.512$

4) i) $\frac{3}{7} = \frac{3}{7} \times \frac{3}{7} \times \frac{3}{7} = \frac{27}{343}$

ii) $\frac{8}{9} = \frac{8}{9} \times \frac{8}{9} \times \frac{8}{9} = \frac{512}{729}$

iii) $\frac{10}{13} = \frac{10}{13} \times \frac{10}{13} \times \frac{10}{13} = \frac{1000}{2197}$

iv) $1\frac{2}{7} = \frac{9}{7} = \frac{9}{7} \times \frac{9}{7} \times \frac{9}{7} = \frac{729}{343} = 2\frac{43}{343}$

v) $2\frac{1}{2} = \frac{5}{2} = \frac{5}{2} \times \frac{5}{2} \times \frac{5}{2} = \frac{125}{8} = 15\frac{5}{8}$

5) i) $-3^3 = -3 \times -3 \times -3 = -27$

ii) $-7^3 = -7 \times -7 \times -7 = -343$

iii) $-18^3 = -18 \times -18 \times -18 = -5832$

iv) $-25^3 = -25 \times -25 \times -25 = -15625$

v) $-30^3 = -30 \times -30 \times -30 = -27000$

vi) $-12^3 = -12 \times -12 \times -12 = -1728$

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

6) i) An even number $\rightarrow$ 216, 8000, 4096

ii) An odd number $\rightarrow$ 729, 3375, 125, 343, 9261

7) 1323

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

$1323 = 3 \times 3 \times 3 \times 7 \times 7$

$= 3^3$

8) 8768

2 | 8768
2 | 4384
2 | 2192
2 | 1096
2 | 548
2 | 274
2 | 137
2 | 68
2 | 34
17

$8768 = \underline{2\times2\times2\times2\times2\times2\times2}\times137$

$= 2\times2\times137$

∴ 8768 must be divided by 137.

9) 27783

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

$\underline{3\times3\times3\times3\times7\times7}$

$= 3\times7\times$

$=$

Smallest number to be multiplied is $3\times3 = 9$

$(3\times3\times3)\times 7\times7\times7\times7$

$= 3\times7\times7\times7$

$= 3\times7$

10) 8640

2 | 8640
2 | 4320
2 | 2160
2 | 1080
2 | 540
2 | 270
3 | 135
3 | 45
3 | 15
5 | 5
1

8640 = 2×2×2×2×2×2×3×3×5

= 5×3

Smallest number to be divided is 5

11) 7 | 9261
7 | 1323
7 | 189
3 | 27
3 | 9
3

3√9261 = 3√7×7×7×3×3×3

= 7×3

= 21

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

$$\sqrt[3]{64\times27} = \sqrt[3]{4\times4\times4\times3\times3\times3} = 4\times3 = 12$$

$$\sqrt[3]{-125} = \sqrt[3]{-5\times-5\times-5}$$
$$= -5$$

$1^3 = 1$
$2^3 = 8$
$3^3 = 27$
$4^3 = 64$
$5^3 = 125$
$6^3 = 216 \rightarrow = 343$
$8^3 = 512$
$9^3 = 729$
$10^3 = 1000$
$11^3 = 1331$
$12^3 = 1728$
$13^3 = 2197$
$14^3 = 2744$
$15^3 = 3375$

Ex 4(B)

1) (ii) 4096

2 | 4096	$4096 = \underline{2\times2\times2\times2\times2\times2\times2\times2}\times\underline{2\times2\times2\times2\times2\times2}$
2 | 2048	
2 | 1024	$= 2\times2\times2\times2$
2 | 512	$= 16$
2 | 256	
2 | 128	
2 | 64	
2 | 32	
16	

2 | 16
2 | 8
2 | 4
2

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

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

$= 15$

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

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

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

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

$= 120$

3) v) $\sqrt[3]{\frac{-64}{343}} = \frac{\sqrt[3]{-64}}{\sqrt[3]{343}} = \frac{\sqrt[3]{4\times-4\times4}}{\sqrt[3]{7\times7\times7}} = \frac{-4}{7}$

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

viii) $-5832 = \sqrt[3]{5832} = \sqrt[3]{18\times18\times18} = 18$

ix) $-2744000 = \sqrt[3]{-2744000} = \sqrt[3]{-140\times-140\times-140}$
$= -140$

4) i) $2.744 = \sqrt[3]{\frac{2744}{1000}} = \frac{\sqrt[3]{2744}}{\sqrt[3]{1000}} = \frac{14}{10} = 1.4$

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

iv) $\sqrt[3]{-15.625} = \sqrt[3]{-\frac{15625}{1000}} = \frac{\sqrt[3]{-15625}}{\sqrt[3]{-1000}}$

$= \frac{\sqrt[3]{-5\times-5\times-5\times5\times5\times5}}{\sqrt[3]{-10\times-10\times-10}} = \frac{-5\times-5}{-10} = \frac{25}{-10}$

$= -2.5$

5) 26244

2 | 26244
2 | 13122
3 | 6561
3 | 2187
3 | 729
3 | 243
3 | 81
3 | 27
3 | 9
3

26244 = 2×2×3×3×3×3×3×3×3×3

∴ Smallest number to be divided is 2×2×3×3 = 36

6) 30375

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

30375 = 3×3×3×3×3×5×5×5

∴ Smallest number to be multiplied is 3

Ex - 4(B)

1) i) $64 = \sqrt[3]{64} = \sqrt[3]{4\times4\times4} = 4$

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

iii) $729 = \sqrt[3]{729} = \sqrt[3]{9\times9\times9} = 9$

iv) $1728 = \sqrt[3]{1728} = \sqrt[3]{12\times12\times12} = 12$

v) $9261 = \sqrt[3]{9261} = \sqrt[3]{21\times21\times21} = 21$

vi) $8000 = \sqrt[3]{8000} = \sqrt[3]{20\times20\times20} = 20$

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

iv) $64\times729 = \sqrt[3]{64\times729} = \sqrt[3]{4\times4\times4\times9\times9\times9} = 4\times9 = 3$

v) $64\times27 = \sqrt[3]{64\times27} = \sqrt[3]{4\times4\times4\times3\times3\times3} = 4\times3 = 1$

vi) $729\times8000 = \sqrt[3]{729\times8000} = \sqrt[3]{9\times9\times9\times20\times20\times20}$

$= 9\times20 = 180$

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

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

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

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

4) iii) $0.000027 = \sqrt[3]{\frac{27}{1000000}} = \sqrt[3]{\frac{3\times3\times3}{10\times10\times10\times10\times10\times10}}$

$= \sqrt[3]{\frac{3}{10\times10}} = 0.3\,\frac{3}{100} = 0.03$

iv) $-0.512 = \sqrt[3]{\frac{512}{1000}} = \frac{\sqrt[3]{512}}{\sqrt[3]{1000}} = \frac{\sqrt[3]{8\times8\times8}}{\sqrt[3]{10\times10\times10}}$

$= \sqrt[3]{\frac{8}{10}} = -0.8$

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

$= -5\times10 = -50$

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

$= \sqrt[3]{2\times2\times2\times5\times5\times5\times7\times7\times7}$

$= 2\times5\times7$

$= 2\times35$

$= 70$

2 | 700
2 | 350
5 | 175
5 | 35
7

ii) $-216\times1728 = \sqrt[3]{-216\times1728} = \sqrt[3]{-6\times-6\times-6\times12\times12\times12}$

$= -6\times12 = -72$

iii) $-64x-125 = \sqrt[3]{-64x-125} = \sqrt[3]{-4x-4x-4x-5x-5x-5}$

$= -4x-5 = 20$

iv) $\frac{-27}{343} = \sqrt[3]{\frac{-27}{343}} = \sqrt[3]{\frac{3x3x3}{7x7x7}} = -\frac{3}{7}$

v) $\frac{729}{-1331} = \sqrt[3]{\frac{729}{-1331}} = \frac{\sqrt[3]{729}}{\sqrt[3]{-1331}} = \sqrt[3]{\frac{9x9x9}{-11x-11x-11}}$

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

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

$= \sqrt[3]{-2x-2x-2x-2x-2x-2x-2x\cdot 2x-2}$
$x-7x-7x-7$

$= -2x-2x-2x-7$

$= -8x^{3}7$

$= 56$

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