Ex - 4(B)

① Find the cube root of :-

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

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

$= \sqrt[3]{2^3} \times \sqrt[3]{2^3}$ [NOTE: $\sqrt[n]{a^m} = a^{m/n}$]

$= 2 \times 2 = 4$ [$\sqrt[n]{a^n} = a$]

↳ $\sqrt[3]{2^3} = 2$

(ii) 9261

$= \sqrt[3]{9261}$

$= \sqrt[3]{3^3 \times 7^3}$ [$\sqrt[3]{ab} = \sqrt[3]{a} \times \sqrt[3]{b}$] :NOTE

$= \sqrt[3]{3^3} \times \sqrt[3]{7^3}$ NOTE: $\left[\sqrt[3]{\frac{a}{b}} = \frac{\sqrt[3]{a}}{\sqrt[3]{b}}\right]$

$= 3 \times 7 = 21$

② (vii) $\sqrt[3]{3375 \times 512}$

$= \sqrt[3]{15^3 \times 8^3}$

$= \sqrt[3]{15^3} \times \sqrt[3]{8^3}$

$= 15 \times 8 = 120.$

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(2) (ii) $\sqrt[3]{\frac{125}{216}}$

$= \frac{\sqrt[3]{125}}{\sqrt[3]{216}} = \frac{\sqrt[3]{5^3}}{\sqrt[3]{6^3}} = \frac{5}{6}$.

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

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

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

$= \sqrt[3]{(-14)^3} \times \sqrt[3]{10^3}$

$= -14 \times 10 = -140$

(4) (i) $\sqrt[3]{2.744}$

$= \sqrt[3]{\frac{2744}{1000}} = \frac{\sqrt[3]{2744}}{\sqrt[3]{1000}} = \frac{\sqrt[3]{14^3}}{\sqrt[3]{10^3}}$

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

(iii) 0.000027

$= \sqrt[3]{\frac{27}{1000000}} = \frac{\sqrt[3]{27}}{\sqrt[3]{1000000}} = \frac{\sqrt[3]{3^3}}{\sqrt[3]{(100)^3}}$

$= \frac{3}{100} = 0.03$

→

Exercise - 4(B)

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(1) Find the cube - roots of :-

(ii) 343

=

7	343
7	49
7	7
	1

$90 = 7 \times 7 \times 7 = 7^3$

$\sqrt[3]{343} = 7$

(iii) 729

=

3	729
3	243
3	81
3	27
3	9
	3

$90 = (3 \times 3 \times 3) \times (3 \times 3 \times 3) = 3^3 \times 3^3$

$= 3 \times 3$

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

(iv) 1728

=

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

$90 = (2 \times 2 \times 2) \times (2 \times 2 \times 2) \times (3 \times 3 \times 3)$

$= 2^3 \times 2^3 \times 3^3$

$= 2 \times 2 \times 3$

$= 12.$

→

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(vi) 4096

2	4096
2	2048
2	1024
2	512
2	256
2	128
2	64
2	32
2	16
2	8
2	4
2	2
	1

So = (2×2×2) × (2×2×2) × (2×2×2) × (2×2×2)

$= 2^3 \times 2^3 \times 2^3 \times 2^3$

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

3 | 4096 = 16

(vii) 8000

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

So = (2×2×2) × (2×2×2) × (5×5×5)

$= 2^3 \times 2^3 \times 5^3$

$= 2 \times 2 \times 5$

$= 20$

(viii) 3375 =

3	3375
3	1125
3	375
5	125
5	25
	5

= (3×3×3) × (5×5×5)

$= 3^3 \times 5^3$

$= 3 \times 5$

$= 15$

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(2) Find the cube - roots of :-

(i) $\frac{27}{64}$

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

$= \frac{\sqrt[3]{3^3}}{\sqrt[3]{4^3}} = \frac{3}{4}$.

(iii) $\frac{343}{512}$

$= \sqrt[3]{\frac{343}{512}} = \frac{\sqrt[3]{7^3}}{\sqrt[3]{8^3}}$

$= \frac{7}{8}$

(iv) 64×729

$= \sqrt[3]{4^3 \times 9^3}$

$= \sqrt[3]{4^3} \times \sqrt[3]{9^3}$

$= 4 \times 9$

$= 36$.

(v) 64×27

$= \sqrt[3]{4^3 \times 3^3}$

$= \sqrt[3]{4^3} \times \sqrt[3]{3^3} = 4 \times 3 = 12$.

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(vi) 729×8000

$= \sqrt[3]{9^3 \times 20^3}$

$= \sqrt[3]{9^3} \times \sqrt[3]{20^3}$

$= 9 \times 20 = 180$

(3) Find the cube-roots of :-

(i) -216

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

$= (-6)^3$

$= -6$

-6	-216
-6	36
-6	-6
	1

(ii) -512

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

$= (-8)^3$

$= -8$

-8	-512
-8	64
-8	-8
	1

(iii) -1331

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

$= -11$

(iv) $-\frac{27}{125}$

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

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

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

(ii) $-\frac{64}{343}$

$= \sqrt[3]{\frac{-64}{343}} = \frac{\sqrt[3]{-64}}{\sqrt[3]{343}}$

$= \frac{\sqrt[3]{(-4)^3}}{\sqrt[3]{(7)^3}} = \frac{-4}{7}$

(iii) $-\frac{512}{343}$

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

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

→

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(vii) -2197

$= \begin{array}{c|c} 13 & 2197 \\ \hline 13 & 169 \\ \hline & 13 \end{array}$

$= -2197 = \sqrt[3]{-2197}$

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

(viii) -5832

$= -5832 = \sqrt[3]{-5832}$

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

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

$= -18.$

(4) Find the cube roots of:-

(ii) 9.261

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

$= 9.261 = \sqrt[3]{\frac{9261}{1000}}$

$= \sqrt[3]{\frac{3\times3\times3\times7\times7\times7}{10\times10\times10}} = \frac{3\times7}{10} = \frac{21}{10}$

$= 2.1$

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(iv) -0.512.

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

$= \frac{-8}{10} = -0.8$.

(v) -15.625

$= \frac{15625}{1000}$

5	15625
5	3125
5	625
5	125
5	25
	5

$= \sqrt[3]{\frac{-(5\times5\times5)\times(5\times5\times5)}{10\times10\times10}} = \frac{-5\times5}{10}$

$= \frac{-25}{10} = -2.5$.

(vi) -125×1000

$= (-125 \times 1000)^{1/3} = \sqrt[3]{-125\times1000}$

$= \sqrt[3]{-(5\times5\times5)\times(10\times10\times10)}$

$= -5 \times 10 = -50$

(5) Find the smallest number by which 26244 should be divided so that the quotient must be a perfect square.

=

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2	26244
2	13122
3	6561
3	2187
3	729
3	243
3	81
3	27
3	9
3	3
	1

Not in triplet

$= (2\times2) \times (3\times3) \times (3\times3\times3) \times (3\times3\times3)$

$= (2)^2 \times (3)^2 \times (3)^3 \times (3)^3$

(36)

∴ So, 36 must be divided with 26244 to make it a perfect cube number.

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

=

3	30375
3	10125
3	3375
3	1125
3	375
5	125
5	25
5	5
	1

Not in triplet

$= (5\times5\times5) \times (3\times3\times3) \times (3\times3)$

$= 5^3 \times 3^3 \times 3^2$

∴ So, 3 should be multiplied to 30375 to make it a perfect square.

(7) Find the cube roots of:-

(i) $100 \times 2 \times 49 \times 5$

$= \sqrt[3]{100\times2\times49\times5} = \sqrt[3]{7\times100\times10\times49}$

$= 7\times10 = 70$

Ex 1.05 [2]

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

$= \sqrt[3]{-216} \times \sqrt[3]{1728}$

$= \sqrt[3]{(-6)^3} \times \sqrt[3]{(12)^3}$

$= -6 \times 12 = -72$

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

$= \sqrt[3]{-64} \times \sqrt[3]{-125}$

$= \sqrt[3]{(-4)^3} \times \sqrt[3]{(-5)^3}$

$= -4 \times -5$

$= 20$

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

$= \sqrt[3]{\frac{-27}{343}}$

$= \sqrt[3]{\frac{(-3)^3}{(7)^3}} = \frac{\sqrt[3]{(-3)^3}}{\sqrt[3]{(7)^3}} = \frac{(-3) \times (-3) \times (-3)}{7 \times 7 \times 7} = \frac{-3}{7}$

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

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

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

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

$= \sqrt[3]{\frac{250047}{1000}} = \frac{\sqrt[3]{63^3}}{\sqrt[3]{10^3}} = \frac{63}{10} = 6.3$

(vii) -175616

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

$= (-8 \times -8 \times -8) \times (7 \times 7 \times 7)$

$= -8^3 \times 7^3$

$= \sqrt[3]{-8^3 \times 7^3} = -8 \times 7 = -56$