Ex - 4 (A)

② (iv) 24000 , (v) 1728

=

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

(So, $(2)^3 \times (2)^3 \times (5)^3 \times 3$)

As, 3 is not in triplet ∴ 24000 is not a perfect cube.

2	1728
2	864
2	432
2	216
2	108
2	54
3	27
3	9
3	3
	1

So, $(2 \times 2 \times 2) \times (2 \times 2 \times 2) \times (3 \times 3 \times 3)$

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

∴ 1728 is a perfect cube nomber.

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③ → (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

$= (2.5)^3$

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

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

→

3	1323
3	441
3	147
7	49
	7

So, $3 \times 3 \times 3 \times 7 \times 7 = (3)^3 \times (7)^2$

∴ Thus, 7 is not in triplet, so 7 must be multiplied to 1323 to make it a perfect cube number.

(8) Find the smallest number by which ~~27783~~ 8768 must be divided so that the quotient is a perfect cube.

→

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

So, $(2 \times 2 \times 2) \times (2 \times 2 \times 2) \times 137$

$= (2)^3 \times (2)^3 \times 137$

∴ Thus, 137 is not in a triple. So, 137 must be divided to make 8768 a perfect cube numb-er.

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(9) Find the smallest number by which 27783 be multiplied to get a perfect cube number.

=

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

So, $3 \times 3 \times 3 \times 3 \times 7 \times 7 \times 7 = (3)^3 \times (7)^3 \times 3$.

∴ Thus, 3 is not in triplet, so, 3×3 must be multiplied from 27783 to make it a perfect cube number.

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

=

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

So, $(2 \times 2 \times 2) \times (2 \times 2 \times 2) \times (3 \times 3 \times 3) \times 5 = (2)^3 \times (2)^3 \times (3)^3 \times 5$

∴ Thus, 5 is not in a triplet, so, 5 must be divided to make 8640 a cube (perfect) number.

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Exercise – 4(A)

(1) Find the cube of :-

(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

$= (23)^3 = 23 \times 23 \times 23$

$= 12167$

(v) 31

$= (31)^3 = 31 \times 31 \times 31$

$= 29791$

(vi) 42

$= (42)^3 = 42 \times 42 \times 42$

$= 74088$

(vii) 54

$= (54)^3$

$= 54 \times 54 \times 54$

$= 157464$

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(2) Find, which of the following are perfect ~~squa~~ cube no.?

(i) 243

=
3	243
3	81
3	27
3	9
	3

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

∴ Thus, 3 is not in a triplet form,
So, 243 isn't a cube number.

(ii) 588

=
2	588
2	294
3	147
7	49
	7

So, $2 \times 2 \times 3 \times 7 \times 7 = (2)^2 \times 3 \times (7)^2$

None of the numbers are in triplet
∴ Thus, This isn't a cube number.

(iii) 1331

=
11	1331
11	121
	11

So, $11 \times 11 \times 11 = (11)^3$

These are in triplet.
∴ Thus, this is a cube number.

(vi) 1938

=
2	1938
3	969
17	323
19	19
	1

So, $2 \times 3 \times 17 \times 19$
None of the triplets are there.
∴ Thus, This is not a cube no..

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(3) Find the cubes of:-

(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

$= (0.02)^3$

$= \left[\frac{2}{100}\right]^3 = \frac{2 \times 2 \times 2}{100 \times 100 \times 100}$

$= \frac{8}{1000000} = \cancel{0.00000008}$ 0.000008

(vii) 0.8

$= (0.8)^3$

$= \left[\frac{8}{10}\right]^3 = \frac{8 \times 8 \times 8}{10 \times 10 \times 10}$

$= \frac{512}{1000} = 0.512$

→

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(4) Find the cube of:-

(i) $\frac{3}{7}$

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

$= \frac{(3)^3}{(7)^3} = \frac{3 \times 3 \times 3}{7 \times 7 \times 7} = \frac{27}{243}$

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

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

$= \frac{(8)^3}{(9)^3} = \frac{8 \times 8 \times 8}{9 \times 9 \times 9}$

$= \frac{512}{729}$

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

$= \left(\frac{10}{13}\right)^3$

$= \frac{(10)^3}{(13)^3} = \frac{10 \times 10 \times 10}{13 \times 13 \times 13}$

$= \frac{1000}{2197}$

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(iv) $1\frac{2}{7}$

$= \left[\frac{9}{7}\right]^3$

$= \frac{(9)^3}{(7)^3} = \frac{9 \times 9 \times 9}{7 \times 7 \times 7}$

$= \frac{729}{343} = 2\frac{43}{343}$

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

$= \left[\frac{5}{2}\right]^3$

$= \frac{(5)^3}{(2)^3} = \frac{5 \times 5 \times 5}{2 \times 2 \times 2}$

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

(5) Find the cubes of :-

(i) -5

$= (-5)^3 = (-5) \times (-5) \times (-5)$

$= -125$

(ii) -7

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

$= -343$

(iii) -12

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

(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 following are cubes of:-

a) an even number → 216, 8000, 4096, ... done
b) a odd number → 729, 3375, 125, 343, 9261.

216, 729, 3375, 8000, 125, 343, 4096, 9261.

→

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

5	77175
5	15435
3	3087
3	1029
7	343
7	49
7	7
	1

So, $5 \times 5 \times 3 \times 3 \times (7 \times 7 \times 7)$

$= (5)^2 \times (3)^2 \times (7)^3$

So, 5 & 3 are not in triplet.

$\therefore$ Thus, 5×3 must be multiplied to 77175 to make it a perfect square.

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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: $\sqrt[n]{a^m} = a^{m/n}$]

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

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

(v) 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 :- [$\sqrt[3]{\frac{a}{b}} = \frac{\sqrt[3]{a}}{\sqrt[3]{b}}$]

$= 3 \times 7 = 21$

(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

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

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

$\longrightarrow$

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Exercise - 4 (B)

(1) Find the cube-roots of :-

(ii) 343

7	343
7	49
7	7
	1

So $= 7 \times 7 \times 7 = 7^3$

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

(iii) 729

3	729
3	243
3	81
3	27
3	9
	3

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

$= 3 \times 3$

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

(iv) 1728

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

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

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

$= 2 \times 2 \times 3$

$= 12.$

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

$= 2^3\times2^3\times2^3\times2^3$

$= 2\times2\times2\times2$

$\sqrt[3]{4096} = 16$

(vii) 8000

=

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

So $= (2\times2\times2)\times(2\times2\times2)\times(5\times5\times5)$

$= 2^3\times2^3\times5^3$

$= 2\times2\times5$

$= 20$

(viii) 3375 =

3	3375
3	1125
3	375
5	125
5	25
	5

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

$= 3^3\times5^3$

$= 3\times5$

$= 15$

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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

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

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

$= (-6)^3$

$= -6$

(ii) -512

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

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

$= (-8)^3$

$= -8$

(iii) -1331

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

$= -11$

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

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$= \sqrt{\frac{-27}{125}}$

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

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

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

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

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

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

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

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

$\longrightarrow$

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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

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

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

$= \sqrt[3]{\frac{3 \times 3 \times 3 \times 7 \times 7 \times 7}{10 \times 10 \times 10}} = \frac{3 \times 7}{10} = \frac{21}{10}$

$= 2.1$

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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

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

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

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

$= -5\times10 = -50$

(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

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

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

$\underline{\quad 36 \quad}$

$\therefore$ 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

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

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

$\therefore$ So, 3 should be multiplied to 30375 to make it a perfect square.

(7) Find the cube roots of :-

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

$= \sqrt[3]{700 \times 2 \times 49 \times 5} = \sqrt[3]{7 \times 100 \times 10 \times 49}$

$7 \times 10 = 70$

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(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

$=$

$\sqrt[3]{-175616}$

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

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

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