Exercise 4(A)

1) i) 7^3

$= 7 \times 7 \times 7$

$= 343$

ii) 11^3

$= 11 \times 11 \times 11$

$= 1331$

iii) 16^3

$= 16 \times 16 \times 16$

$= 4096$

iv) 23^3

$= 23 \times 23 \times 3$

$= 12167$

v) 31^3

$= 31 \times 31 \times 31$

$= 29791$

vi) 42^3

$= 42 \times 42 \times 42$

$= 74088$

vii) 54^3

$= 54 \times 54 \times 5$

$= 157464$

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2) i) 243

= 3×3×3×3×3

= No, it is not a perfect cube.

3	243
3	81
3	27
3	9
	3

ii) 588

= 2×2×7×7×3

= No; it is not a perfect cube

2	588
2	294
7	147
7	21
	3

iii) 1331

= 11×11×11

= 11

Yes, it is a perfect cube.

iv) 24000

= 2×2×2×2×2×2×3×5×5×5

= Yes, it is a perfect cube.

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

v) 1728

= 2×2×2×2×2×2×3×3×3

= Yes, it is a perfect cube.

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

vi) 1938

= No, it is not a perfect cube

iii) 2.1^3

$= 2.1 \times 2.1 \times 2.1$

$= 9.261$

iv) 0.4^3

$= 0.4 \times 0.4 \times 0.4$

$= 0.064$

v) 1.6^3

$= 1.6 \times 1.6 \times 1.6$

$= 4.096$

vi) 2.5^3

$= 2.5 \times 2.5 \times 2.5$

$= 15.625$

vii) 0.12^3

$= 0.12 \times 0.12 \times 0.12$

$= 0.001728$

viii) 0.02^3

$= 0.02 \times 0.02 \times 0.02$

$= 0.000008$

ix) 0.8^3

$= 0.8 \times 0.8 \times 0.8$

$= 0.512$

x) $\left(\frac{3}{7}\right)^3$

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

$= \frac{27}{343}$

10) $\left(\frac{8}{9}\right)^3$

$= \frac{8}{9} \times \frac{8}{9} \times \frac{8}{9}$

$= \frac{512}{729}$

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

$= \frac{10}{13} \times \frac{10}{13} \times \frac{10}{13}$

$= \frac{1000}{2197}$

12) $\left(1\frac{2}{7}\right)^3 = \frac{9}{7}^3$

$= \frac{9}{7} \times \frac{9}{7} \times \frac{9}{7}$

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

13) $\left(2\frac{1}{2}\right)^3 = \left(\frac{5}{2}\right)^3$

$= \frac{5 \times 5 \times 5}{2 \times 2 \times 2}$

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

5) i) $(-3)^3$

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

$= -27$

ii) $(-7)^3$

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

$= -343$

iii) $(-12)^3$

$= (-12) \times (-12) \times (-12)$

$= -1728$

iv) $(-18)^3$

$= (-18) \times (-18) \times (-18)$

$= -5832$

v) $(-25)^3$

$= (-25) \times (-25) \times (-25)$

$= -15625$

vi) $(-30)^3$

$= (-30) \times (-30) \times (-30)$

$= -27000$

vii) $(-50)^3$

$= (-50) \times (-50) \times (-50)$

$= -125000$

6) i) 216, 8000, 4096

ii) 729, 3375, 125, 343, 261

Exercise 2.4 (A)

7) 1323

Prime factor of 1323

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

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

∴ 1323 must be multiplied by 7.

3	1323
3	441
3	147
7	49
7	7
	1

8) 8768

Prime factor of 8768

$= 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 137$

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

∴ 8768 must be divided by 137.

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

9) 27783

Prime factor of 27783

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

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

∴ 27783 must be multiplied by $3 \times 3 = 9$.

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

10) -8640

Prime factor of 8640

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

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

∴ 8640 must be multiplied by 5.

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

11) 77175

Prime factor of 77175

$= 3 \times 3 \times 5 \times 5 \times 7 \times 7 \times 7$

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

∴ 77175 must be multiplied by $3 \times 5 = 15$.

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

Exercise 4(B)

1) i) 64
= (4 x 4 x 4)
= 4

ii) 343
= (7 x 7 x 7)
= 7

iii) 729
= (9 x 9 x 9)
= 9

iv) 1728
= 2x2x2x2x2x2x3x3x3
= (2x2x2) x (2x2x2) x (3x3x3)
= 2 x 2 x 3
= 12

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

v) 9261
= 21 x 21 x 21
= 21

vi) 4096
= 2x2x2x2x2x2x2x2x2x2x2x2
= (2x2x2) x (2x2x2) x (2x2x2) x (2x2x2)
= 2 x 2 x 2 x 2
= 16

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

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vi) 8000

$= 2\times2\times2\times2\times2\times2\times5\times5\times5$

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

$= 2\times2\times5$

$= 20$

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

vii) 3375

$= 3\times3\times3\times5\times5\times5$

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

$= 3\times5$

$= 15$

3	3375
3	1125
3	375
5	125
5	25
	5

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

$= \frac{3\times3\times3}{4\times4\times4}$

$= \frac{3}{4}$

ii) $\frac{125}{216}$

$= \frac{5\times5\times5}{6\times6\times6}$

$= \frac{5}{6}$

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

$= \frac{7\times7\times7}{8\times8\times8}$

$= \frac{7}{8}$

iv) 64×729

$= \frac{4\times4\times4 \times 9\times9\times9}{4\times9}$

$= 4\times9$

$= 36$

v) 64×27

$= \frac{4\times4\times4 \times 3\times3\times3}{4\times3}$

$= 4\times3$

$= 12$

vi) 729×8000

$= \frac{9\times9\times9 \times 20\times20\times20}{9 \times 20}$

$= 9 \times 20$

$= 180$

vii) 3375×512

$= \frac{15\times15\times15 \times 8\times8\times8}{15\times8}$

$= 15\times8$

$= 120$

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

$= \sqrt[3]{\frac{3\times3\times3}{5\times5\times5}}$

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

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

$= \sqrt[3]{\frac{4\times-4\times-4}{7\times7\times7}}$

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

vi) $\sqrt[3]{-\frac{512}{343}}$

$= \sqrt[3]{-\frac{8\times8\times8}{7\times7\times7}}$

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

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

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

$= -13$

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

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

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

$= -18$

3 | 5832
2 | 1944
2 | 486
2 | 243
3 | 81
3 | 27
3 | 9
3

Px) $\sqrt[3]{-2744000}$

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

$= -140$

Q) i) $\sqrt[3]{2.744}$

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

$= \sqrt[3]{\frac{2 \times 2 \times 2 \times 7 \times 7 \times 7}{10 \times 10 \times 10}}$

$= \frac{2 \times 7}{10} = \frac{14}{10} = 1.4$

ii) $\sqrt[3]{9.261}$

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

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

$= \frac{21}{10} = 2.1$

iii) $\sqrt[3]{0.000027}$

$= \sqrt[3]{\frac{27}{1000000}}$

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

$= \frac{3}{10 \times 100} = \frac{3}{100} = 0.03$

iv) $\sqrt[3]{0.512}$

$= \sqrt[3]{\frac{512}{1000}}$

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

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

v) $\sqrt[3]{15.625}$

$= \sqrt[3]{\frac{15625}{1000}}$

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

$= \frac{5 \times 5}{10} = \frac{25}{10} = 2.5$

5	15625
5	3125
5	625
5	125
5	25
	5

vi) $\sqrt[3]{125 \times 1000}$

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

$= -5 \times -10$

$= 50$

5) 26244

$= 2 \times 2 \times 3$

Prime factors of 26244

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

$= 2^2 \times 3^2$

$= 9 \times 4 = 36$

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

∴ 26244 must be devided by 36.

6) 30375

Prime factor of 30375

$= \underline{3\times3\times3}\times3\times3\times\underline{5\times5\times5}$

$= 3$

∴ 30375 must be multiplied by 3 to get a perfect cube.

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

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

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

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

$= 2\times5\times7$

$= 70$

2	700
2	350
5	175
5	35
	7

ii) $\sqrt[3]{-216\times1728}$

$= \sqrt[3]{(-6)\times(-6)\times(-6)\times\underline{2\times2\times2\times2\times2\times2\times3\times3\times3}}$

$= -6\times2\times2\times3$

$= -72$

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

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

$= -4\times-5$

$= 20$

iv) $\sqrt[3]{\frac{27}{343}}$

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

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

v) $\sqrt[3]{\frac{729}{-1331}}$

$= \sqrt[3]{\frac{9 \times 9 \times 9}{-11 \times -11 \times -11}}$

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

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

$= \sqrt[3]{\frac{250047}{1000}}$

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

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

$= \frac{63}{10} = 6.3$

viii) $\sqrt[3]{-175616}$

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

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

$= -56$