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) $23^3 = 23 \times 23 \times 23 = 12167$

(v) $31^3 = 31 \times 31 \times 31 = 29791$

(vi) $42^3 = 42 \times 42 \times 42 = 74088$

(vii) $54^3 = 54 \times 54 \times 54 = 157464$

2 (i) $\sqrt{243} = (3 \times 3) \times (3 \times 3) \times 3$

Since 3 is not paired.

∴ 243 is not a perfect cube.

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

∴ 588 is not a perfect cube.

(iii) $1331 = (11 \times 11 \times 11) = 11^3$

∴ 1331 is a perfect cube

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

Since 2 is not paired

∴ 24000 is not a perfect square.

iv) $24000 = (2\times2\times2)\times(2\times2\times2)\times2\times(5\times5\times5)$

Since 2 is not paired

$\therefore$ 24000 is not a perfect square.

v) $1728 = (2\times2\times2)\times(2\times2\times2)\times(3\times3\times3)$

$\therefore$ 1728 is a perfect square.

vi) $1938 = 2\times3\times17\times3\times3$

$\therefore$ It is not a perfect square.

3) i) $2.1 = (2.1)^3 = \left(\frac{21}{10}\right)^3 = \frac{21\times21\times21}{10\times10\times10} = \frac{9261}{1000} = 9.261$

ii) $0.4 = (0.4)^3 = \left(\frac{4}{10}\right)^3 = \frac{4\times4\times4}{10\times10\times10} = \frac{64}{1000} = 0.064$

iii) $1.6 = (1.6)^3 = \left(\frac{16}{10}\right)^3 = \frac{16\times16\times16}{10\times10\times10} = \frac{4096}{1000} = 4.096$

iv) $2.5 = (2.5)^3 = \left(\frac{25}{10}\right)^3 = \frac{25\times25\times25}{10\times10\times10} = \frac{15625}{1000} = 15.625$

vi) $0.12 = (0.12)^3 = \left(\frac{12}{100}\right)^3 = \frac{12 \times 12 \times 12}{100 \times 100 \times 100} = \frac{1728}{1000000}$

$= 0.001728$

vii) $0.02 = (0.02)^3 = \left(\frac{2}{100}\right)^3 = \frac{2 \times 2 \times 2}{100 \times 100 \times 100} = \frac{8}{1000000}$

0.000008

viii) $0.8 = (0.8)^3 = \left(\frac{8}{10}\right)^3 = \frac{8 \times 8 \times 8}{10 \times 10 \times 10} = \frac{512}{1000} = 0.512$

4 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) $\frac{8}{9} = \left(\frac{8}{9}\right)^3 = \frac{8 \times 8 \times 8}{9 \times 9 \times 9} = \frac{512}{729}$

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

iv) $2 = (2)^3 = (2)^3 = 2 \times 2 \times 2 = 729 = 343$

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) i) $-3 = (-3)^3 = -(3\times3\times3) = -27$

ii) $-7 = (-7)^3 = -(7\times7\times7) = -343$

iii) $-12 = (-12)^3 = -(12\times12\times12) = -1728$

iv) $-18 = (-18)^3 = -(18\times18\times18) = -5832$

v) $-25 = (-25)^3 = -(25\times25\times25) = -15625$

vi) $-30 = (-30)^3 = -(30\times30\times30) = -27000$

vii) $-50 = (-50)^3 = -(50\times50\times50) = -125000$

~~6) An even number = 216 (cube of 6),~~

6) $216 = (6\times6\times6) = 6^3$

$\therefore$ 216 is an even number

$729 = (9\times9\times9) = 9^3$

$\therefore$ 729 is an odd number

3375 $= (15 \times 15 \times 15) = 15^3$

$\therefore$ 3375 is an odd number

8000 $= (20 \times 20 \times 20) = 20^3$

$\therefore$ 8000 is an even number.

125 $= (5 \times 5 \times 5) = 5^3$

$\therefore$ 125 is an odd number

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

$\therefore$ 343 is an odd number

4096 $= (16 \times 16 \times 16) = 16^3$

$\therefore$ 4096 is an even number

9261 $= (21 \times 21 \times 21) = 21^3$

$\therefore$ 9261 is an odd number.

(i) The cubes of even numbers are 216, 8000, 4096

(ii) The cubes of odd numbers are 729, 3375, 125, 343, 9261

7) Prime factors of 1323 are

$(3\times3\times3)\times7\times7 = 7^2 = 7$

∴ Clearly 1323 must be multiplied by 7.

3	1323
3	441
3	147
7	49
7	7
	1

8) $8768 = (2\times2\times2)\times(2\times2\times2)\times137 = 137$

∴ Clearly 8768 must be divided by 137

9) $27783 = 9\times9\times(7\times7\times7) = 9^2 = 9$

∴ Clearly 27783 must be multiplied by 9

9) $27783 = 9\times9\times(7\times7\times7) = 9^2 = 9$

∴ Clearly 27783 must be multiplied by 9

10) $8640 = (2\times2\times2)\times(2\times2\times2)\times(3\times3\times3)\times5$

∴ Clearly 8640 must be divided by 5.

11) $77175 = (3\times3)\times(5\times5)\times(7\times7\times7) = 3^2\times5^2 = 3\times5 = 15$

∴ Clearly 77175 must be multiplied to 15.

Exercise 4B

ii) $64 = (2 \times 2 \times 2) \times (2 \times 2 \times 2)$

$\sqrt{64} = (2^3) \times (2^3) = (2 \times 2)^3$

$\sqrt[3]{64} = 2 \times 2 = 4$

2	64
2	32
2	16
2	8
2	4
2	2
	1

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

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

7	343
7	49
7	7
	1

iii) $729 = (3 \times 3 \times 3) \times 3 \times 3 \times 3$

$\sqrt{729} = (3^3) \times (3^3) = (3 \times 3)^3$

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

3	729
3	243
3	81
3	27
3	9
3	3
	1

iv) $1728 = (2 \times 2 \times 2) \times (2 \times 2 \times 2) \times (3 \times 3 \times 3)$

$\sqrt{1728} = (2^3) \times (2^3) \times (3^3) = (2 \times 2 \times 3)^3$

$\sqrt[3]{1728} = 2 \times 2 \times 3 = 12$

2	1728
2	864
2	432
2	216
2	108
2	54

3	729
3	243
3	81
3	27
3	9
3	3
	1

iv) $1728 = (2\times2\times2)\times(2\times2\times2)\times(3\times3\times3)$

$\sqrt{1728} = (2^3)\times(2^3)\times(3^3) = (2\times2\times3)^3$

$\sqrt[3]{1728} = 2\times2\times3 = 12$

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

3	9
3	3
	1

v) $9261 = (3\times3\times3)\times(7\times7\times7)$

$\sqrt{9261} = 3^3\times7^3 = (3\times7)^3$

$\sqrt[3]{9261} = 3\times7 = 21$

3	9261
3	3087
3	1029
7	343
7	49
7	7
	1

vi) $4096 = (2\times2\times2)\times(2\times2\times2)\times(2\times2\times2)\times(2\times2\times2)$

$\sqrt{4096} = (2^3)\times(2^3)\times(2^3)\times(2^3)$

$= (2\times2\times2\times2)^3$

$\sqrt[3]{4096} = 2\times2\times2\times2 = 16$

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

vii) $8000 = (2\times2\times2)\times(2\times2\times2)\times(5\times5\times5)$

$\sqrt{8000} = (2^3)\times(2^3)\times(5^3) = (2\times2\times5)^3$

$\sqrt[3]{8000} = 2\times2\times5 = 20$

2	8000
2	4000
2	2000
2	1000
2	500
2	250
5	125
5	25
5	5
	1

vii) $3375 = (3 \times 3 \times 3) \times (5 \times 5 \times 5)$

$\sqrt{3375} = 3^3 \times 5^3 = (3 \times 5)^3$

$\sqrt[3]{3375} = 3 \times 5 = 15$

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

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

$= \frac{\sqrt{3 \times 3 \times 3}}{\sqrt{4 \times 4 \times 4}} = \frac{3}{4}$

3	27
3	9
3	3
	1

2	64
2	32
2	16
2	8
2	4
2	2
	1

ix) $\frac{125}{216} = \sqrt[3]{\frac{125}{216}} = \frac{\sqrt{5 \times 5 \times 5}}{\sqrt{6 \times 6 \times 6}} = \frac{5}{6}$

5	125
5	25
5	5
	1

6	216

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

7	343
7	49
	7

xi) $64 \times 729 = \sqrt[3]{64 \times 729}$

iv) $64 \times 729 = \sqrt[3]{64 \times 729}$

$= \sqrt{4\times4\times4\times9\times9\times9} = 4\times9 = 36$

v) $64 \times 27 = \sqrt[3]{64 \times 27}$

$= \sqrt{4\times4\times4\times3\times3\times3} = 4\times3 = 12$

vi) $729 \times 8000 = \sqrt[3]{729 \times 8000}$

$= \sqrt{9\times9\times9\times20\times20\times20} = 9\times20 = 180$

vii) $3375 \times 512 = \sqrt[3]{3375 \times 512}$

$= \sqrt{15\times15\times15\times8\times8\times8} = 15\times8 = 120$

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

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

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

iv) $\frac{-27}{125} = -\frac{\sqrt{27}}{\sqrt{125}} = -\frac{\sqrt{3\times3\times3}}{\sqrt{5\times5\times5}} = -\frac{3}{5}$

v) $= -\frac{\sqrt{3\times3\times3}}{\sqrt{5\times5\times5}} = -\frac{3}{5}$

7	49	6	216
7	7	6	36
	1	6	6
			1

8	512		1
8	64	9	729
8	8	9	81
	1	9	9
			1

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

~~vi) $\frac{-25}{25} = \frac{\sqrt[3]{-25}}{\sqrt[3]{25}} =$~~

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

~~viii) $\frac{-2197}{2197} = \frac{\sqrt[3]{-2197}}{\sqrt[3]{2197}} =$~~

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

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

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

4) i) $\sqrt[3]{\frac{2.744}{1000}} = \sqrt[3]{\frac{2 \times 2 \times 2 \times 7 \times 7 \times 7}{10 \times 10 \times 10}} = \frac{2 \times 7}{10} = \frac{14}{10} = 1.4$

4) ii) $\sqrt[3]{\frac{2.744}{1000}} = \sqrt[3]{\frac{2\times2\times2\times7\times7\times7}{10\times10\times10}} = \frac{2\times7}{10} = \frac{14}{10} = 1.4$

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

iii) $\sqrt[3]{\frac{027}{1000000}} = \sqrt[3]{\frac{3\times3\times3}{100\times100\times100}} = \frac{3}{100} = 0.03$

iv) $\sqrt[3]{\frac{-512}{1000}} = \sqrt[3]{\frac{-8\times8\times8}{10\times10\times10}} = -\frac{8}{10} = -0.8$

v) $\sqrt[3]{\frac{-15625}{1000}} = \sqrt[3]{-\frac{25\times25\times25}{10\times10\times10}} = -\frac{25}{10} = -2.5$

vi) $\sqrt[3]{-125\times1000} = \sqrt[3]{-5\times5\times5\times10\times10\times10} = -5\times10 = -50$

5) 26244

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

$= 2^2\times3^3\times3^3\times3^2 = 2^2\times3^2 = 4*9 = 36$

$\therefore$ 26244 must be divided by 36.

6) $30375 = 3 \times 3 \times (3 \times 3 \times 3) \times (5 \times 5 \times 5)$

$= 3^2 \times 3^3 \times 5^3 = 3^2 = 83$

$\therefore$ 30375 must be multiplied by 3

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

7) i) $\sqrt[3]{700 \times 2 \times 49 \times 5}$

$= \sqrt[3]{2 \times 2 \times 5 \times 5 \times 7 \times 2 \times 7 \times 7 \times 5}$

$= \sqrt[3]{(2 \times 2 \times 2) \times (5 \times 5 \times 5) \times (7 \times 7 \times 7)}$

$= \sqrt{70 \times 70 \times 70} = 70$

7) ii) $\sqrt[3]{700 \times 2 \times 49 \times 5}$

$= 2 \times 2 \times 5 \times 5 \times 7 \times 2 \times 7 \times 7 \times 5$

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

$= 2 \times 5 \times 7 = 70$

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

$= -(6 \times 6 \times 6) \times (12 \times 12 \times 12)$

7) i) $\sqrt[3]{700 \times 2 \times 49 \times 5}$

$= 2 \times 2 \times 5 \times 5 \times 7 \times 2 \times 7 \times 7 \times 5$

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

$= 2 \times 5 \times 7 = 70$

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

$= -(6 \times 6 \times 6) \times (12 \times 12 \times 12)$

$= -(12 \times 6) = -72$

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

$= (-4) \times (-4) \times (-4) \times (-5) \times (-5) \times (-5) = (-5) \times (-4) = 20$

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

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

vi) $\sqrt[3]{\frac{250047}{1000}} = \sqrt{\frac{63 \times 63 \times 63}{10 \times 10 \times 10}} = \frac{63}{10} = 6.3$

vii) $\sqrt[3]{-175616} = \sqrt{-(56 \times 56 \times 56} = -56$

-x-x-x-x-x-