Exercise 4.1

1. (a) Cube of 3 $3 \times 3 \times 3 = 27$ (b) Cube of 12 $12 \times 12 \times 12 = 1728$

(c) Cube of 20 $20 \times 20 \times 20 = 8000$

(d) Cube of 202 $202 \times 202 \times 202 = 8242408$

(e) Cube of 0.1 $0.1 \times 0.1 \times 0.1 = 0.0001$ (f) Cube of 1.2 $= 1.2 \times 1.2 \times 1.2 = 1.728$

(g) Cube of 0.05 $= 0.05 \times 0.05 \times 0.05 = 0.000125$

(h) Cube of 25.1 $25.1 \times 15.1 \times 25.1 = 15813.251$

2. (a) 512

2	512
2	256
2	128
2	64
2	32
2	16
2	8
2	4
2	2
	1

$512 = \overline{2 \times 2 \times 2} \times \overline{2 \times 2 \times 2} \times \overline{2 \times 2 \times 2}$

Since, 512 can be grouped into triplet of equal factors.
Hence, it is a perfect cube.

(b) 2744

2	2744
2	1372
2	686
7	343
7	49
7	7
	1

$2744 = \overline{2 \times 2 \times 2} \times \overline{7 \times 7 \times 7}$

Since, 2744 can be grouped into triplet of equal factors.
Hence, it is a perfect cube.

(c) 3375

5	3375
5	675
5	135
3	27
3	9
3	3
	1

$3375 = \overline{5 \times 5 \times 5} \times \overline{3 \times 3 \times 3}$

Since, 3375 can be grouped into triplet of equal factor.
Hence, it is a perfect cube.

(d) 100000

2	100000
2	50000
2	25000
5	12500
5	2500
5	500

2	100
2	50
5	25
5	5
	1

$100000 = 2 \times 2 \times \overline{2 \times 2 \times 2} \times 5 \times \overline{5 \times 5 \times 5}$

Since, there are not triplets of 2 and 5.
Hence, 100000 is not perfect cube.

(e) 46656

2	46656
2	23328
2	11664
2	5832
2	2916
2	1458
3	729

3	243
3	81
3	27
3	9
3	3
	1

46656 $\overline{2\ 2\ 2}$ $\overline{2\ 2\ 2}$ $\overline{3\ 3\ 3}$ $\overline{3\ 3\ 3}$

Since 46656 can be grouped two triplets of equal factors.
Hence, it is a perfect cube.

3. (a) 6859 $9 \times 9 \times 9 = 9^3$; Yes, it is cube odd number.

(b) 4913 $3 \times 3 \times 3 = 3^3$; Yes, it is cube of odd number.

(c) 10648 $8 \times 8 \times 8 = 8^3$; No, it is not cube of odd number.

(d) 2197 $7 \times 7 \times 7 = 7^3$; Yes, it is cube of odd number.

(e) 2744 $4 \times 4 \times 4 = 4^3$; No, it is not cube of odd number.

(f) 35937 $7 \times 7 \times 7 = 7^3$; Yes, it is cube of odd number.

4. (a) 1728

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

1728 $2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 3 \times 3 \times 3$
1728 is perfect cube

(b) 3840

2	3840
2	1920
2	960
2	480
2	240
2	120
2	60
2	30
3	15
5	5
	1

3840 $2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 3 \times 5$
3840 is not perfect cube.

(c) 12167

23	12167
23	529
23	23
	1

12167 23 23 23
12167 is perfect cube.

(d) 11109

3	11109
7	3703
23	529
23	23
	1

11109 3 7 23 23
11109 is not perfect cube.

(e) 85184

2	85184
2	42592
2	21296
2	10648
2	5324
2	2662
11	1331
11	121
11	11
	1

85184 2 2 2 2 2 2 11 11 11
85184 is perfect cube.

(f) 2048383

127	2048383
127	16129
127	127
	1

2048383 127 127 127
2048383 is a perfect cube.

5. (a) 13,824 4 4 4 4^3 ; yes it is cube of even number.

(b) 42875 5 5 5 5^3 ; No it is not cube of even number.

(c) 8000 0 $(0)^3$; yes it is cube of even number.

(d) 636056 6 6 6 6^3 ; yes it is cube of even number.

(e) 9261 1 1 1 $(1)^3$; not it is not cube of even number.

(f) 32768 8 8 8 8^3 ; yes it is cube of even number.

6. (a) 392

The prime factors of
392 2 2 2 7 7
After grouping together,
the triplets of 2 are left with factors 7 7

If we multiply 392 7 by the product will be perfect cube $(14)^3$
392 7 2744
2744 are perfect cube of 14.
Hence, the required number = 7.

2	392
2	196
2	98
7	49
7	7
	1

(b) 675

The prime factor of 675 $\overline{3\ 3\ 3}\ \overline{5\ 5}$

After grouping together,
the triplets of 3 are left with factors 5 5.
If we multiply 675 by 5 it will be a perfect cube.

675 5 3375 (it is a perfect cube of 15)

Hence, the required number is 5.

5	675
5	135
3	27
3	9
	1

(c) 2560

The prime factors of
2560 $\overline{2\ 2\ 2}\ \overline{2\ 2\ 2}\ \overline{2\ 2\ 2}\ 5$
After grouping together the triplets of 2
are left with factor 5.
If we multiply 2560 by $(5)^2$, it will be a perfect cube.

2560 25 64000

It is a perfect cube of 40.
Hence, the required numbers 5 5 25.

2	2560
2	1280
2	640
2	320
2	160
2	80
2	40
2	20
2	10
5	5
	1

(d) 8788

The prime factors of
8788 2 2 $\overline{13\ 13\ 13}$
After the grouping together
the triplets
of 13 are left with factor 2 2.
If we multiply 8788 by, 2 it will be a perfect cube.
8788 2 17576.
It is a perfect cube of 26.
Hence, the required number = 2.

2	8788
2	4394
13	2197
13	169
13	13
	1

7. (a) 540

The prime factor of
540 2 2 5 $\overline{3\ 3\ 3}$
After grouping together,
the triplets of 3 are left with factors 2 2 5
If we divide 540 by 2 2 5,
the quotient will be a perfect cube.

$\frac{540}{20}$ 27 (It is cube of 3.)

Hence, required number = 20.

2	540
2	270
5	135
3	27
3	9
3	3
	1

(b) 2000

The prime factor of

2000 2 2 2 2 5 5 5

After grouping together,

the triplets of 2 and 5 are left with factor 2.

If we divide 2000 by 2 × 2

the quotient will be a perfect cube.

$\frac{2000}{2}$ 1000 (It is cube of 10.)

Hence, the required number is 10.

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

(c) 8640

The prime factor of 8640

8640 2 2 2 2 2 2 3 3 3 5

After grouping together,

the triplets of 12 are left with 5.

If we divide 8640 by 5,

the quotient will be a perfect cube.

$\frac{8640}{5}$ 1728

(It is cube of 12.)

Hence, the required number is 5.

2	8640
2	4320
2	2160
2	1080
2	540
3	270
3	90
3	30
5	10
2	2
	1

(d) 27648

The prime factors of 27648

27648 2 2 2 2 2 2 2 2 2 2 3 3 3

After grouping together,

the triplets of 24 are left with 2.

If we divide 27648 by 2,

the quotient will be a perfect cube.

$\frac{27648}{2}$ 13824 (It is a cube of 24.)

Hence, required number is 2.

2	27648
2	13824
2	6912
2	3456
2	1728
2	864
2	432
2	216
2	108
2	54
3	27
3	9
3	3
	1

Exercise 4.2

1. (a) 512

2	512
2	256
2	128
2	64
2	32
2	16
2	8
2	4
2	2
	1

Prime factors of
512 2 2 2 2 2 2 2 2 2
Then $\sqrt[3]{512}$ 2 2 2 8

(b) 8000

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

Prime factors of
8000 2 2 2 2 2 2 5 5 5
Then, $\sqrt[3]{8000}$ 2 2 5 20

(c) 13824

2	13824
2	6912
2	3456
2	1728
2	864
2	432
2	216
2	108
2	54
3	27
3	9
3	3
	1

Prime factors of 13824
$\overline{2\ 2\ 2}\ \overline{2\ 2\ 2}\ \overline{3\ 3\ 3}$
then $\sqrt[3]{13824}$ 2 2 2 3 24

(d) 15625

5	15625
5	3125
5	625
5	125
5	25
5	5
	1

Prime factors of 15625
$\overline{5\ 5\ 5}\ \overline{5\ 5\ 5}$
then $\sqrt[3]{15625}$ 5 5 25

(e) 74088

2	74088
2	37044
2	18522
3	9261
3	3087
3	1029
7	343
7	49
7	7
	1

Prime factors of
74088 $\overline{2\ \ 2\ \ 2}$ $\overline{3\ \ 3\ \ 3}$ $\overline{7\ \ 7\ \ 7}$
Then $\sqrt[3]{74088}$ 2 3 7 42

(f) 35937

3	35937
3	11979
3	3993
11	1331
11	121
11	11
	1

Prime factors of
35937 $\overline{3\ \ 3\ \ 3}$ $\overline{11\ \ 11\ \ 11}$
Then $\sqrt[3]{35937}$ 3 11 33

(g) 10^6

2	1000000
2	500000
2	250000
2	125000
2	62500
2	31250
5	15625
5	3125
5	625
5	125
5	25
5	5
	1

Prime factors of 10000000
$\overline{2\ \ 2\ \ 2}$ $\overline{2\ \ 2\ \ 2}$ $\overline{5\ \ 5\ \ 5}$ $\overline{5\ \ 5\ \ 5}$
then $\sqrt[3]{10^6}$ 2 2 5 5 100

(h) 42875

5	42875
5	8575
5	1715
7	343
7	49
7	7
	1

Prime factors of 42875
$\overline{5\ \ 5\ \ 5}$ $\overline{7\ \ 7\ \ 7}$
then $\sqrt[3]{42845}$ 5 7 35

2. (a) $\frac{343}{729}$ $\frac{7\ \ 7\ \ 7}{3\ \ 3\ \ 3\ \ 3\ \ 3\ \ 3}$

$\sqrt[3]{\frac{343}{729}}$ $\sqrt[3]{\frac{7\ \ 7\ \ 7}{3\ \ 3\ \ 3\ \ 3\ \ 3\ \ 3}}$

$\sqrt[3]{\frac{343}{729}}$ $\frac{7}{3\ \ 3}$ $\frac{7}{9}$.

7	343
7	49
7	7
	1

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

(b) $\frac{3375}{5832}$ $\frac{\overline{5\ \ 5\ \ 5}\ \ \overline{3\ \ 3\ \ 3}}{2\ \ 2\ \ 2\ \ 3\ \ 3\ \ 3\ \ 3\ \ 3\ \ 3}$

$\sqrt[3]{\frac{3375}{5832}}$ $\frac{15}{18}$.

5	3375
5	675
5	135
3	27
3	9
3	3
	1

5 3 15

2	5832
2	2916
2	1458
3	729
3	243
3	81
3	27
3	9
3	3
	1

2 3 3 18

(c) $\frac{4913}{2197}$ $\frac{17\ \ 17\ \ 17}{13\ \ 13\ \ 13}$

$\sqrt[3]{\frac{4913}{2197}}$ $\sqrt[3]{\frac{17\ \ 17\ \ 17}{13\ \ 13\ \ 13}}$

$\frac{17}{13}$ $\frac{17}{13}$.

17	4913
17	289
17	17
	1

13	2197
13	169
13	13
	1

(d) $10\frac{81}{125}$ $\frac{1331}{125}$

$\frac{11\ \ 11\ \ 11}{5\ \ 5\ \ 5}$

$\sqrt[3]{\frac{1331}{125}}$ $\sqrt[3]{\frac{11\ \ 11\ \ 11}{5\ \ 5\ \ 5}}$ $\frac{11}{5}$

$2\frac{1}{5}$

11	1331
11	121
11	11
	1

5	125
5	25
5	5
	1

3. (a) $\sqrt[3]{29791}$ $\quad \sqrt[3]{31 \quad 31 \quad 31}$

31

31	29791
31	961
31	31
	1

(b) 0.000512

$\frac{0.000512}{1000000} \quad \frac{512}{1000000}$

$\frac{512}{1000000} \quad 2\ 2\ 2\ 2\ 2\ 2\ 2\ 2\ 2\ 2$

$2\ 2\ 2\ 2\ 2\ 2\ 5\ 5\ 5\ 5\ 5\ 5$

$\sqrt[3]{\frac{512}{1000000}} \quad \sqrt[3]{2\ 2\ 2\ 2\ 2\ 2\ 2\ 2\ 2\ 2\ 2\ 2\ 5\ 5\ 5\ 5\ 5\ 5}$

$\frac{8}{100} \quad \frac{8}{100} \quad 0.08$

Hence 0.08 is cube root of 0.000512

2	1000000
2	500000
2	250000
2	125000
2	62500
2	31250
5	15625
5	3125
5	625
5	125
5	25
5	5
	1

(c) $(6)^3 \quad (3)^3 \quad (6 \quad 6 \quad 6) \quad (3 \quad 3 \quad 3)$

$216 \quad 27 \quad 5832$

$5832 \quad 2\ 2\ 2\ 3\ 3\ 3\ 3\ 3\ 3$

$\sqrt[3]{5832} \quad \sqrt{2\ 2\ 2\ 3\ 3\ 3\ 3\ 3\ 3}$

$2 \quad 3 \quad 3 \quad 18$

2	5832
2	2916
2	1458
3	729
3	243
3	81
3	27
3	9
3	3
	1

(d) 0.002197

$\frac{0.002197}{1.000000} \quad \frac{2197}{1000000}$

$\sqrt[3]{\frac{2197}{1000000}} \quad \sqrt[3]{2\ 2\ 2\ 2\ 2\ 2\ 5\ 5\ 5\ 5\ 5\ 5 \quad 13\ 13\ 13}$

$\sqrt[3]{\frac{2197}{1000000}}$ $\quad$ $\frac{13}{2\ \ 2\ \ 5\ \ 5}$

$\frac{13}{100}$ $\quad$ 0.13

13	2197
13	169
13	13
	1

2	1000000
2	500000
2	250000
2	125000
2	62500
2	31250
5	15625
5	3125
5	625
5	125
5	25
5	5
	1

4. (a) 13824 cm^3 g

edge $\quad \sqrt[3]{\text{Volume}}$

edge of a cuboidal box $\quad \sqrt[3]{13824}$

edge of a cuboidal box

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

$2\ \ 2\ \ 2\ \ 3$

24 cm.

Hence, edge of the cuboidal box is 24 cm.

2	13824
2	6912
2	3456
2	1728
2	864
2	432
2	216
2	108
2	54
3	27
3	9
3	3
	1

(b) 32.768 cm^3

edge of a cuboid box $\quad \sqrt[3]{32.768} \quad \sqrt[3]{\frac{32768}{1000}}$

2	32768
2	16384
2	8192
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

2	1000
2	500
2	250
5	125
5	25
5	5
	1

$$\sqrt[3]{\frac{32768}{1000}} \quad \sqrt[3]{\frac{\underline{2\ 2\ 2}\ \underline{2\ 2\ 2}\ \underline{2\ 2\ 2}\ \underline{2\ 2\ 2}\ \underline{2\ 2\ 2}}{\underline{2\ 2\ 2}\ \underline{5\ 5\ 5}}}$$

$$\frac{2\ 2\ 2\ 2\ 2}{2\ 5}$$

$$\frac{32}{10}$$

3.2

Hence, the edge of cuboidal box is 3.2 m.

5. Ratio of the volumes of two cube $125 : 725$

Ratio of the edge $\sqrt[3]{\text{Ratio of volumes}}$

$$\sqrt[3]{\frac{125}{729}}$$

$$\sqrt[3]{\frac{5\ 5\ 5}{3\ 3\ 3\ 3\ 3\ 3}}$$

$$\frac{5}{9}$$

Hence, the ratio of the edges of two cubes is 5 : 9.

5	125
5	25
5	5
	1

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

MCQ's

1. (c) **2.** (c) **3.** (b) **4.** (c)

5. (d) **6.** (b) **7.** (b)