

## 4. Cubes and Cube-Roots

(Including use of tables for natural numbers)

### EXERCISE 4(A)

#### Question 1.

Find the cube of :

- (i) 7
- (ii) 11
- (iii) 16
- (iv) 23
- (v) 31
- (vi) 42
- (vii) 54

#### Solution:

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

#### Question 2.

Find which of the following are perfect cubes :

- (i) 243
- (ii) 588
- (iii) 1331
- (iv) 24000
- (v) 1728
- (vi) 1938

#### Solution:

(i) 243

$$\begin{array}{r|l} 3 & 243 \\ \hline 3 & 81 \\ \hline 3 & 27 \\ \hline 3 & 9 \\ \hline 3 & 3 \\ \hline & 1 \end{array}$$

$$\therefore 243 = 3 \times 3 \times 3 \times 3$$

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

$$= 3^3 \times 3$$

$\therefore$  297 is not a perfect cube.

(ii) 588

$$\begin{array}{r|l} 2 & 588 \\ \hline 2 & 294 \\ \hline 7 & 147 \\ \hline 7 & 21 \\ \hline 3 & 3 \\ \hline & 1 \end{array}$$

$$588 = 2 \times 2 \times 7 \times 7 \times 3$$

$\therefore$  588 is not a perfect cube.

(iii) 1331

$$\begin{array}{r|l} 11 & 1331 \\ \hline 11 & 121 \\ \hline 11 & 11 \\ \hline & 1 \end{array}$$

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

$\therefore$  1331 is a perfect cube.

(iv) 24000

$$\therefore 24000 = 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 3 \times 5 \times 5 \times 5$$

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

$\therefore$  24000 is not a perfect cube.

(v) 1728

$$\begin{array}{r|l} 2 & 1728 \\ \hline 2 & 864 \\ \hline 2 & 432 \\ \hline 2 & 216 \\ \hline 2 & 108 \\ \hline 2 & 54 \\ \hline 3 & 27 \\ \hline 3 & 9 \\ \hline 3 & 3 \\ \hline & 1 \end{array}$$

$$\begin{aligned} \therefore 1728 &= 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 3 \times 3 \times 3 \\ &= (2)^3 \times (2)^3 \times (3)^3 \end{aligned}$$

$\therefore$  1728 is a perfect cube.

(vi) 1938

$$\begin{array}{r|l} 2 & 1938 \\ \hline 3 & 936 \\ \hline 17 & 323 \\ \hline 19 & 19 \\ \hline & 1 \end{array}$$

$$1938 = 2 \times 3 \times 17 \times 19$$

1938 is not a perfect cube.

### Question 3.

Find the cubes of :

(i) 2.1

(ii) 0.4

(iii) 1.6

(iv) 2.5

(v) 0.12

(vi) 0.02

(vii) 0.8

**Solution:**

$$(i) \ 2.1 = (2.1)^3 = \left(\frac{21}{10}\right)^3 = \frac{21 \times 21 \times 21}{10 \times 10 \times 10}$$

$$= \frac{9261}{1000} = 9.261$$

$$(ii) \ 0.4 = (0.4)^3 = \left(\frac{4}{10}\right)^3 = \frac{4 \times 4 \times 4}{10 \times 10 \times 10}$$

$$= \frac{64}{1000} = 0.064$$

$$(iii) \ 1.6 = (1.6)^3 = \left(\frac{16}{10}\right)^3 = \frac{16 \times 16 \times 16}{10 \times 10 \times 10}$$

$$= \frac{4096}{1000} = 4.096$$

$$(iv) \ 2.5 = (2.5)^3 = \left(\frac{25}{10}\right)^3 = \frac{25 \times 25 \times 25}{10 \times 10 \times 10}$$

$$= \frac{15625}{1000} = 15.625$$

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

$$= \frac{1728}{1000000} = 0.001728$$

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

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

$$\begin{aligned} \text{(vii) } 0.8 &= (0.8)^3 = \left(\frac{8}{10}\right)^3 = \frac{8 \times 8 \times 8}{10 \times 10 \times 10} \\ &= \frac{512}{1000} = 0.512 \end{aligned}$$

#### Question 4.

Find the cubes of :

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

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

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

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

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

**Solution:**

$$\text{(i) } \frac{3}{7} = \left(\frac{3}{7}\right)^3 = \frac{3 \times 3 \times 3}{7 \times 7 \times 7} = \frac{27}{343}$$

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

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

$$\begin{aligned} \text{(iv) } 1\frac{2}{7} &= \left(1\frac{2}{7}\right)^3 = \left(\frac{1 \times 7 + 2}{7}\right)^3 = \left(\frac{9}{7}\right)^3 \\ &= \frac{9 \times 9 \times 9}{7 \times 7 \times 7} = \frac{729}{343} = 2\frac{43}{343} \end{aligned}$$

$$\begin{aligned} \text{(v) } 2\frac{1}{2} &= \left(2\frac{1}{2}\right)^3 = \left(\frac{5}{2}\right)^3 \\ &= \frac{5 \times 5 \times 5}{2 \times 2 \times 2} = \frac{125}{8} = 15\frac{5}{8} \end{aligned}$$

#### Question 5.

Find the cubes of :

(i) -3

- (ii) -7
- (iii) -12
- (iv) -18
- (v) -25
- (vi) -30
- (vii) -50

**Solution:**

$$\begin{aligned}(i) \quad -3 &= (-3)^3 = -3 \times -3 \times -3 \\ &= -(3 \times 3 \times 3) = -27\end{aligned}$$

$$\begin{aligned}(ii) \quad -7 &= (-7)^3 = -7 \times -7 \times -7 \\ &= -(7 \times 7 \times 7) = -343\end{aligned}$$

$$\begin{aligned}(iii) \quad -12 &= (-12)^3 = -12 \times -12 \times -12 \\ &= -(12 \times 12 \times 12) = -1728\end{aligned}$$

$$\begin{aligned}(iv) \quad -18 &= (-18)^3 = -18 \times -18 \times -18 \\ &= -(18 \times 18 \times 18) = -5832\end{aligned}$$

$$\begin{aligned}(v) \quad -25 &= (-25)^3 = -25 \times -25 \times -25 \\ &= -(25 \times 25 \times 25) = -15625\end{aligned}$$

$$\begin{aligned}(vi) \quad -30 &= (-30)^3 = -30 \times -30 \times -30 \\ &= -(30 \times 30 \times 30) = -27000\end{aligned}$$

$$\begin{aligned}(vii) \quad -50 &= (-50)^3 = -50 \times -50 \times -50 \\ &= -(50 \times 50 \times 50) = -125000\end{aligned}$$

### **Question 6.**

Which of the following are cubes of:

- (i) an even number
- (ii) an odd number

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

**Solution:**

$$\therefore 216 = 2 \times 2 \times 2 \times 3 \times 3 \times 3$$

$$\begin{array}{r|l} 2 & 216 \\ \hline 2 & 108 \\ \hline 2 & 54 \\ \hline 3 & 27 \\ \hline 3 & 9 \\ \hline 3 & 3 \\ \hline & 1 \end{array}$$

$$= (2)^3 \times (3)^3 = (6)^3$$

$$\therefore 729 = 3 \times 3 \times 3 \times 3 \times 3 \times 3$$

$$\begin{array}{r|l} 3 & 729 \\ \hline 3 & 243 \\ \hline 3 & 81 \\ \hline 3 & 27 \\ \hline 3 & 9 \\ \hline 3 & 3 \\ \hline & 1 \end{array}$$

$$= (3)^3 \times (3)^3 = (9)^3$$

$$\therefore 3375 = 5 \times 5 \times 5 \times 3 \times 3 \times 3$$

$$\begin{array}{r|l} 5 & 3375 \\ \hline 5 & 675 \\ \hline 5 & 135 \\ \hline 3 & 27 \\ \hline 3 & 9 \\ \hline 3 & 3 \\ \hline & 1 \end{array}$$

$$= (5)^3 \times (3)^3 = (15)^3$$

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

$$\begin{array}{r|l} 20 & 8000 \\ \hline 20 & 400 \\ \hline 20 & 20 \\ \hline & 1 \end{array}$$

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

$$\begin{array}{r|l} 5 & 125 \\ \hline 5 & 25 \\ \hline 5 & 5 \\ \hline & 1 \end{array}$$

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

$$\begin{array}{r|l} 7 & 343 \\ \hline 7 & 49 \\ \hline 7 & 7 \\ \hline & 1 \end{array}$$

$$\therefore 4096 = 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2$$

$$\begin{array}{r|l} 2 & 4096 \\ \hline 2 & 2048 \\ \hline 2 & 1024 \\ \hline 2 & 512 \\ \hline 2 & 256 \\ \hline 2 & 128 \\ \hline 2 & 64 \\ \hline 2 & 32 \\ \hline 2 & 16 \\ \hline 2 & 8 \\ \hline 2 & 4 \\ \hline 2 & 2 \\ \hline & 1 \end{array}$$

$$= (2)^3 \times (2)^3 \times (2)^3 \times (2)^3 = (16)^3$$

(i) Cubes of an even number are 216, 8000, 4096.

(ii) Cubes of an odd number are 729, 3375, 125, 343, 9261.

### Question 7.

Find the least number by which 1323 must be multiplied so that the product is a perfect

cube.

**Solution:**

The prime factor of 1323 are  $= 3 \times 3 \times 3 \times 7 \times 7$

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

Clearly, 1323 must be multiplied by 7.

**Question 8.**

Find the smallest number by which 8768 must be divided so that the quotient is a perfect cube.

**Solution:**

The prime factor of 8768 are

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

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

Clearly, 8768 must be divided by 137.

**Question 9.**

Find the smallest number by which 27783 be multiplied to get a perfect square number.

**Solution:**

|   |       |
|---|-------|
| 3 | 27783 |
| 3 | 9261  |
| 3 | 3087  |
| 3 | 1029  |
| 7 | 343   |
| 7 | 49    |
| 7 | 7     |
|   | 1     |

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

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

Clearly, 27783 must be multiplied by  $3 \times 3$

$$= 9$$

**Question 10.**

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

**Solution:**

The prime factors of 8640 are

$$\begin{array}{r|l} 2 & 8640 \\ \hline 2 & 4320 \\ \hline 2 & 2160 \\ \hline 2 & 540 \\ \hline 2 & 270 \\ \hline 3 & 135 \\ \hline 3 & 45 \\ \hline 3 & 15 \\ \hline 5 & 5 \\ \hline & 1 \end{array}$$

$$\begin{aligned} &= 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 3 \times 3 \times 3 \times 5 \\ &= (2 \times 2 \times 2) \times (2 \times 2 \times 2) \times (3 \times 3 \times 3) \\ &\times 5 \end{aligned}$$

Clearly, 8640 must be divided by 5.

**Question 11.**

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

**Solution:**

The prime factors of 77175 are

$$\begin{array}{r|l} 3 & 77175 \\ \hline 3 & 25725 \\ \hline 5 & 8575 \\ \hline 5 & 1715 \\ \hline 7 & 343 \\ \hline 7 & 49 \\ \hline 7 & 7 \\ \hline & 1 \end{array}$$

$$\begin{aligned} &= 3 \times 3 \times 5 \times 5 \times 7 \times 7 \times 7 \\ &= (7 \times 7 \times 7) \times 3 \times 3 \times 5 \times 5 \end{aligned}$$

Clearly, 77175 must be multiplied by  $3 \times 5$   
 $= 15$

## EXERCISE 4(B)

### Question 1.

Find the cube-roots of :

(i) 64

(ii) 343

(iii) 729

(iv) 1728

(v) 9261

(vi) 4096

(vii) 8000

(viii) 3375

**Solution:**

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

$$\begin{array}{r|l} 2 & 64 \\ \hline 2 & 32 \\ \hline 2 & 16 \\ \hline 2 & 8 \\ \hline 2 & 4 \\ \hline 2 & 2 \\ \hline & 1 \end{array}$$

$$(ii) 343 = \sqrt[3]{343} = 7 \times 7 \times 7 = 7$$

$$\begin{array}{r|l} 7 & 343 \\ \hline 7 & 49 \\ \hline 7 & 7 \\ \hline & 1 \end{array}$$

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

$$\begin{array}{r|l} 3 & 729 \\ \hline 3 & 243 \\ \hline 3 & 81 \\ \hline 3 & 27 \\ \hline 3 & 9 \\ \hline 3 & 3 \\ \hline & 1 \end{array}$$

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

$$\begin{array}{r|l} 2 & 1728 \\ \hline 2 & 864 \\ \hline 2 & 432 \\ \hline 2 & 216 \\ \hline 2 & 108 \\ \hline 2 & 54 \\ \hline 3 & 27 \\ \hline 3 & 9 \\ \hline 3 & 3 \\ \hline & 1 \end{array}$$

$$(v) 9261 = \sqrt[3]{9261} = (3 \times 3 \times 3) \times (7 \times 7 \times 7) \\ = 3 \times 7 = 21$$

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

$$(vi) 4096 = \sqrt[3]{4096} = (2 \times 2 \times 2) \times (2 \times 2 \times 2) \\ \times (2 \times 2 \times 2) \times (2 \times 2 \times 2) \\ = 2 \times 2 \times 2 \times 2 = 16$$

$$\begin{array}{r|l} 2 & 4096 \\ \hline 2 & 2048 \\ \hline 2 & 1024 \\ \hline 2 & 512 \\ \hline 2 & 256 \\ \hline 2 & 128 \\ \hline 2 & 64 \\ \hline 2 & 32 \\ \hline 2 & 16 \\ \hline 2 & 8 \\ \hline 2 & 4 \\ \hline 2 & 2 \\ \hline & 1 \end{array}$$

$$(vii) 8000 = \sqrt[3]{8000} = (4 \times 4 \times 4) \times (5 \times 5 \times 5) \\ = 4 \times 5 = 20$$

$$\begin{array}{r|l} 4 & 8000 \\ \hline 4 & 2000 \\ \hline 4 & 500 \\ \hline 5 & 125 \\ \hline 5 & 25 \\ \hline 5 & 5 \\ \hline & 1 \end{array}$$

$$\begin{aligned} \text{(viii)} \quad \sqrt[3]{3375} &= \sqrt[3]{(5 \times 5 \times 5) \times (3 \times 3 \times 3)} \\ &= 5 \times 3 = 15 \end{aligned}$$

$$\begin{array}{r|l} 5 & 3375 \\ \hline 5 & 675 \\ \hline 5 & 135 \\ \hline 3 & 27 \\ \hline 3 & 9 \\ \hline 3 & 3 \\ \hline & 1 \end{array}$$

### Question 2.

Find the cube-roots of :

- (i)  $\frac{27}{64}$
- (ii)  $\frac{125}{216}$
- (iii)  $\frac{343}{512}$
- (iv)  $64 \times 729$
- (v)  $64 \times 27$
- (vi)  $729 \times 8000$
- (vii)  $3375 \times 512$

**Solution:**

$$(i) \frac{27}{64} = \sqrt[3]{\frac{27}{64}} = \frac{\sqrt{3 \times 3 \times 3}}{\sqrt{4 \times 4 \times 4}} = \frac{3}{4}$$

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

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

$$(iv) 64 \times 729 = \sqrt[3]{64 \times 729} \\ = \sqrt{4 \times 4 \times 4 \times 9 \times 9 \times 9} = 4 \times 9 = 36$$

$$(v) 64 \times 27 = \sqrt[3]{64 \times 27} \\ = \sqrt{4 \times 4 \times 4 \times 3 \times 3 \times 3} = 4 \times 3 = 12$$

$$(vi) 729 \times 8000 = \sqrt[3]{729 \times 8000} \\ = \sqrt{9 \times 9 \times 9 \times 20 \times 20 \times 20} \\ = 9 \times 20 = 180$$

$$(vii) 3375 \times 512 = \sqrt[3]{3375 \times 512} \\ = \sqrt{15 \times 15 \times 15 \times 8 \times 8 \times 8} \\ = 15 \times 8 = 120$$

**Question 3.**

Find the cube-roots of :

(i) -216

(ii) -512

(iii) -1331

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

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

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

(vii) -2197

(viii) -5832

(ix) -2744000

**Solution:**

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

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

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

$$(iv) -\frac{27}{125} = -\frac{\sqrt{27}}{\sqrt{125}} = -\sqrt{\frac{3 \times 3 \times 3}{5 \times 5 \times 5}} = -\frac{3}{5}$$

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

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

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

$$\begin{array}{r|l} 13 & 2197 \\ 13 & 169 \\ 13 & 13 \\ \hline & 1 \end{array}$$

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

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

$$\begin{array}{r|l}
 2 & 5832 \\
 \hline
 2 & 2916 \\
 \hline
 2 & 1458 \\
 \hline
 3 & 729 \\
 \hline
 3 & 243 \\
 \hline
 3 & 81 \\
 \hline
 3 & 27 \\
 \hline
 3 & 9 \\
 \hline
 3 & 3 \\
 \hline
 & 1
 \end{array}$$

$$\begin{aligned}
 &= \sqrt{-2 \times -2 \times -2 \times -3 \times -3 \times -3 \times -3 \times -3 \times -3} \\
 &= -2 \times -3 \times -3 = -18
 \end{aligned}$$

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

$$\begin{array}{r|l}
 2 & 2744000 \\
 \hline
 2 & 1372000 \\
 \hline
 2 & 686000 \\
 \hline
 7 & 343000 \\
 \hline
 7 & 49000 \\
 \hline
 7 & 7000 \\
 \hline
 10 & 1000 \\
 \hline
 10 & 100 \\
 \hline
 10 & 10 \\
 \hline
 & 1
 \end{array}$$

$$\begin{aligned}
 &= \sqrt{-2 \times -2 \times -2 \times -7 \times -7 \times -7} \\
 &\quad \sqrt{-10 \times -10 \times -10} \\
 &= -2 \times -7 \times -10 = -140
 \end{aligned}$$

#### Question 4.

Find the cube-roots of :

- (i) 2.744
- (ii) 9.261
- (iii) 0.000027
- (iv) -0.512
- (v) -15.625
- (vi) -125 x 1000

**Solution:**

$$(i) 2.744 = \sqrt[3]{\frac{2744}{1000}}$$

$$\begin{array}{r|l} 2 & 2744 \\ \hline 2 & 1372 \\ \hline 2 & 686 \\ \hline 7 & 343 \\ \hline 7 & 49 \\ \hline 7 & 7 \\ \hline & 1 \end{array}$$

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

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

$$(ii) 9.261 = \sqrt[3]{\frac{9261}{1000}} = \sqrt{\frac{3 \times 3 \times 3 \times 7 \times 7 \times 7}{10 \times 10 \times 10}}$$

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

$$= \frac{3 \times 7}{10} = \frac{21}{10} = 2.1$$

$$(iii) 0.000027 = \sqrt[3]{\frac{27}{1000000}}$$

$$= \sqrt[3]{\frac{3 \times 3 \times 3}{100 \times 100 \times 100}} = \frac{3}{100} = 0.03$$

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

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

$$(v) -15.625 = \sqrt[3]{\frac{-15625}{1000}}$$

$$\begin{array}{r|l} 5 & 15625 \\ \hline 5 & 3125 \\ \hline 5 & 625 \\ \hline 5 & 125 \\ \hline 5 & 25 \\ \hline 5 & 5 \\ \hline & 1 \end{array}$$

$$\sqrt{\frac{-(5 \times 5 \times 5) \times (5 \times 5 \times 5)}{10 \times 10 \times 10}}$$

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

$$(vi) -125 \times 1000 = \sqrt{-125 \times 1000}$$

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

$$= -5 \times 10 = -50$$

### Question 5.

Find the smallest number by which 26244 may be divided so that the quotient is a perfect cube.

### Solution:

The prime factors of 26244 are

$$\begin{array}{r|l}
 2 & 26244 \\
 \hline
 2 & 13122 \\
 \hline
 3 & 6561 \\
 \hline
 3 & 2187 \\
 \hline
 3 & 729 \\
 \hline
 3 & 243 \\
 \hline
 3 & 81 \\
 \hline
 3 & 27 \\
 \hline
 3 & 9 \\
 \hline
 3 & 3 \\
 \hline
 & 1
 \end{array}$$

$$\begin{aligned}
 &= 2 \times 2 \times 3 \times 3 \times 3 \times 3 \times 3 \times 3 \times 3 \times 3 \\
 &= (3 \times 3 \times 3) \times (3 \times 3 \times 3) \times 3 \times 3 \times 2 \times 2
 \end{aligned}$$

Clearly, 26244 must be divided by  
 $3 \times 3 \times 2 \times 2 = 36$

### Question 6.

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

**Solution:**

The prime factors of 30375 are

$$\begin{array}{r|l}
 3 & 30375 \\
 \hline
 3 & 10125 \\
 \hline
 3 & 3375 \\
 \hline
 3 & 1125 \\
 \hline
 3 & 375 \\
 \hline
 5 & 125 \\
 \hline
 5 & 25 \\
 \hline
 5 & 5 \\
 \hline
 & 1
 \end{array}$$

$$\begin{aligned}
 &= 3 \times 3 \times 3 \times 3 \times 3 \times 5 \times 5 \times 5 \\
 &= (3 \times 3 \times 3) \times (5 \times 5 \times 5) \times 3 \times 3
 \end{aligned}$$

Clearly, 30375 must be multiplied with 3

### Question 7.

Find the cube-roots of :

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

(ii)  $-216 \times 1728$

(iii)  $-64 \times -125$

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

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

(vi) 250.047

(vii) -175616

**Solution:**

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

$$\begin{array}{r|l} 2 & 700 \\ \hline 2 & 350 \\ \hline 5 & 175 \\ \hline 5 & 35 \\ \hline 7 & 7 \\ \hline & 1 \end{array}$$

$$\begin{aligned} &= 2 \times 2 \times 5 \times 5 \times 7 \times 2 \times 7 \times 7 \times 5 \\ &= (2 \times 2 \times 2) \times (5 \times 5 \times 5) \times (7 \times 7 \times 7) \\ &= 2 \times 5 \times 10 = 70 \end{aligned}$$

(ii)  $-216 \times 1728$

$$\begin{array}{r|l} 2 & 216 \\ \hline 2 & 108 \\ \hline 2 & 54 \\ \hline 3 & 27 \\ \hline 3 & 9 \\ \hline 3 & 3 \\ \hline & 1 \end{array} \quad \begin{array}{r|l} 2 & 1728 \\ \hline 2 & 864 \\ \hline 2 & 432 \\ \hline & 216 \end{array}$$

$$\begin{aligned} &= -(2 \times 2 \times 2 \times 3 \times 3 \times 3) \times (2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 3 \times 3 \times 3) \\ &= -2 \times 3 \times 2 \times 2 \times 3 = -72 \end{aligned}$$

(iii)  $-64 \times -125$

$$\begin{aligned} &= -(4 \times 4 \times 4) \times -(5 \times 5 \times 5) \\ &= -4 \times -5 = 20 \end{aligned}$$

(iv)  $-\frac{27}{343} = \frac{3 \times 3 \times 3}{7 \times 7 \times 7} = -\frac{3}{7}$

(v)  $\frac{729}{-1331} = \frac{(9 \times 9 \times 9)}{-(11 \times 11 \times 11)} = -\frac{9}{11}$

(vi)  $250.047 = \frac{250047}{1000}$

$$\begin{array}{r|l} 3 & 250047 \\ \hline 3 & 83349 \\ \hline 3 & 27783 \\ \hline 3 & 9261 \\ \hline 3 & 3087 \\ \hline 3 & 1029 \\ \hline 7 & 343 \\ \hline 7 & 49 \\ \hline 7 & 7 \\ \hline & 1 \end{array}$$

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

$$= \frac{3 \times 3 \times 7}{10} = \frac{63}{10} = 6.3$$

(vii) -175616

$$\begin{array}{r|l}
 2 & 175616 \\
 \hline
 2 & 27808 \\
 \hline
 2 & 43904 \\
 \hline
 2 & 21952 \\
 \hline
 2 & 10976 \\
 \hline
 2 & 5488 \\
 \hline
 2 & 2744 \\
 \hline
 2 & 1372 \\
 \hline
 2 & 686 \\
 \hline
 7 & 343 \\
 \hline
 7 & 49 \\
 \hline
 7 & 7 \\
 \hline
 & 1
 \end{array}$$

$$= -[(2 \times 2 \times 2) \times (2 \times 2 \times 2) \times (2 \times 2 \times 2) \times (7 \times 7 \times 7)]$$

$$= -[2 \times 2 \times 2 \times 7] = -56$$