

## Exercise - 4(B)

① Find the cube-roots of :

$$\begin{array}{l} i) \ 64 \\ \hline = \sqrt[3]{64} \end{array}$$

$$\begin{array}{r} 2 \overline{)64} \\ \underline{2 \overline{)32}} \\ 2 \overline{)16} \\ \underline{2 \overline{)8}} \\ 2 \overline{)4} \\ \underline{2 \overline{)2}} \\ 1 \end{array}$$

$$\begin{aligned} \Rightarrow \sqrt[3]{64} &= (2 \times 2 \times 2) \times (2 \times 2 \times 2) \\ &= 2 \times 2 \\ &= 4 \end{aligned}$$

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

$$\begin{array}{r} 7 \overline{)343} \\ \underline{7 \overline{)49}} \\ 7 \overline{)7} \\ \underline{7 \overline{)7}} \\ 1 \end{array}$$

$$\begin{aligned} \sqrt[3]{343} &= (7 \times 7 \times 7) \\ &= 7 \end{aligned}$$

iii)  $\sqrt[3]{729}$

$$\begin{array}{r} 3 \overline{) 729} \\ \underline{324} \phantom{3} \\ 381 \\ \underline{327} \phantom{3} \\ 39 \\ \underline{33} \\ 6 \end{array}$$

$$\begin{aligned} \sqrt[3]{729} &= (3 \times 3 \times 3) \times (3 \times 3 \times 3) \\ &= 3 \times 3 = 9 \end{aligned}$$

iv)  $\sqrt[3]{1728}$

$$\begin{array}{r} 2 \overline{) 1728} \\ \underline{286} \phantom{4} \\ 2432 \\ \underline{2216} \phantom{4} \\ 2108 \\ \underline{2054} \phantom{4} \\ 327 \\ \underline{327} \\ 39 \\ \underline{33} \\ 6 \end{array}$$

$$\begin{aligned} \sqrt[3]{1728} &= (2 \times 2 \times 2) \times (2 \times 2 \times 2) \times (3 \times 3 \times 3) \\ &= 2 \times 2 \times 3 \\ &= 12 \end{aligned}$$

$$v) \sqrt[3]{9261}$$

$$\begin{array}{r} 3 \overline{) 9261} \\ \underline{3 \ 3087} \\ 3 \overline{) 1029} \\ \underline{7 \ 343} \\ 7 \overline{) 49} \\ \underline{7 \ 7} \\ 1 \end{array}$$

$$\begin{aligned} \sqrt[3]{9261} &= (3 \times 3 \times 3) \times (7 \times 7 \times 7) \\ &= 3 \times 7 = 21 \end{aligned}$$

$$vi) \sqrt[3]{4096}$$

$$\begin{array}{r} 2 \overline{) 4096} \\ \underline{2 \ 2048} \\ 2 \overline{) 1024} \\ \underline{2 \ 512} \\ 2 \overline{) 256} \\ \underline{2 \ 128} \\ 2 \overline{) 64} \\ \underline{2 \ 32} \\ 2 \overline{) 16} \\ \underline{2 \ 8} \\ 2 \overline{) 4} \\ \underline{2 \ 2} \\ 1 \end{array}$$

$$\begin{aligned} \sqrt[3]{4096} &= (2 \times 2 \times 2) \times (2 \times 2 \times 2) \times (2 \times 2 \times 2) \times \\ &\quad (2 \times 2 \times 2) \times (2 \times 2 \times 2) \\ &= 2 \times 2 \times 2 \times 2 = 16 \end{aligned}$$

vii) 8000

$$\begin{array}{r} 4 \overline{) 8000} \\ \underline{4 \overline{) 2000}} \\ 4 \overline{) 500} \\ \underline{5 \overline{) 25}} \\ 5 \overline{) 25} \\ \underline{5 \overline{) 5}} \\ 1 \end{array}$$

$$\begin{aligned} \sqrt[2]{8000} &= (4 \times 4 \times 4) \times (5 \times 5 \times 5) \\ &= 4 \times 5 = 20 \end{aligned}$$

viii) 3375

$$\begin{array}{r} 5 \overline{) 3375} \\ \underline{5 \overline{) 675}} \\ 5 \overline{) 135} \\ \underline{3 \overline{) 27}} \\ 3 \overline{) 9} \\ \underline{3 \overline{) 3}} \\ 1 \end{array}$$

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

Q Find the cube-roots of :

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

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

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

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

$$= \sqrt{4 \times 4 \times 4 \times 9 \times 9 \times 9} = 4 \times 9 \\ = 36$$

$$\text{v) } 64 \times 27$$

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

$$= \sqrt{4 \times 4 \times 4 \times 3 \times 3 \times 3} = 4 \times 3 \\ = 12$$

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

$$= \sqrt{9 \times 9 \times 9 \times 20 \times 20 \times 20}$$

$$= 9 \times 20$$

$$= 180$$

$$\text{vii) } 3375 \times 512$$

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

$$= \sqrt{15 \times 15 \times 15 \times 8 \times 8 \times 8}$$

$$= 15 \times 8$$

$$= 120$$

③ Find the cube-roots of:

i)  $-216$

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

ii)  $-512$

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

iii)  $-1331$

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

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

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

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

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

vii)  $-2197$

$$= \sqrt[3]{-2197}$$

$$\begin{array}{r} 13 \overline{) 2197} \\ \underline{13} \phantom{00} \\ 169 \\ \underline{13} \phantom{00} \\ 13 \\ \underline{13} \\ 0 \end{array}$$

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

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

$$\begin{array}{r} 2 \overline{) 5832} \\ 2 \overline{) 2916} \\ 2 \overline{) 1458} \\ 3 \overline{) 429} \\ 3 \overline{) 243} \\ 3 \overline{) 81} \\ 3 \overline{) 27} \\ 3 \overline{) 9} \\ 3 \overline{) 3} \\ \hline 1 \end{array}$$

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

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

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

$$= \sqrt{-2x - 2x - 2x - 7x - 7x - 7x - 10x - 10x - 10}$$

$$\begin{aligned} &= -2x - 7x - 10 \\ &= -140 \end{aligned}$$





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

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

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

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

$$\text{v) } -15.625$$

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

$$\begin{array}{r} 5 \overline{) 15625} \\ \underline{5 \phantom{0} 3125} \\ 5 \phantom{0} \overline{) 625} \\ \underline{5 \phantom{0} 25} \\ 5 \phantom{0} \overline{) 25} \\ \underline{5 \phantom{0} 5} \\ 1 \end{array}$$

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

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

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

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

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

5) Find the smallest number by which 26244 should be divided so that the quotient is a perfect cube

$$\begin{array}{r} \rightarrow \\ 2 \overline{) 26244} \\ \underline{2} \phantom{0} \phantom{0} \phantom{0} \\ 0 \phantom{0} \phantom{0} \phantom{0} \\ 2 \phantom{0} \phantom{0} \phantom{0} \\ \underline{2} \phantom{0} \phantom{0} \phantom{0} \\ 0 \phantom{0} \phantom{0} \phantom{0} \\ 6 \phantom{0} \phantom{0} \phantom{0} \\ \underline{6} \phantom{0} \phantom{0} \phantom{0} \\ 0 \phantom{0} \phantom{0} \phantom{0} \\ 3 \phantom{0} \phantom{0} \phantom{0} \\ \underline{3} \phantom{0} \phantom{0} \phantom{0} \\ 0 \phantom{0} \phantom{0} \phantom{0} \\ 2 \phantom{0} \phantom{0} \phantom{0} \\ \underline{2} \phantom{0} \phantom{0} \phantom{0} \\ 0 \phantom{0} \phantom{0} \phantom{0} \\ 4 \phantom{0} \phantom{0} \phantom{0} \\ \underline{4} \phantom{0} \phantom{0} \phantom{0} \\ 0 \phantom{0} \phantom{0} \phantom{0} \\ 2 \phantom{0} \phantom{0} \phantom{0} \\ \underline{2} \phantom{0} \phantom{0} \phantom{0} \\ 0 \phantom{0} \phantom{0} \phantom{0} \\ 8 \phantom{0} \phantom{0} \phantom{0} \\ \underline{8} \phantom{0} \phantom{0} \phantom{0} \\ 0 \phantom{0} \phantom{0} \phantom{0} \\ 2 \phantom{0} \phantom{0} \phantom{0} \\ \underline{2} \phantom{0} \phantom{0} \phantom{0} \\ 0 \phantom{0} \phantom{0} \phantom{0} \\ 9 \phantom{0} \phantom{0} \phantom{0} \\ \underline{9} \phantom{0} \phantom{0} \phantom{0} \\ 0 \phantom{0} \phantom{0} \phantom{0} \\ 3 \phantom{0} \phantom{0} \phantom{0} \\ \underline{3} \phantom{0} \phantom{0} \phantom{0} \\ 0 \phantom{0} \phantom{0} \phantom{0} \\ 1 \phantom{0} \phantom{0} \phantom{0} \end{array}$$

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

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

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

→

$$\begin{array}{r} 3 \overline{) 30375} \\ \underline{3 \overline{) 10125}} \\ 3 \overline{) 3375} \\ \underline{3 \overline{) 1125}} \\ 3 \overline{) 375} \\ \underline{5 \overline{) 125}} \\ 5 \overline{) 25} \\ \underline{5 \overline{) 5}} \\ 1 \end{array}$$

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

Hence, 30375 must be multiplied with 3.

(4) Find the cube-roots of :

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

$$\begin{array}{r} 2 \overline{) 700} \\ \underline{2 \overline{) 350}} \\ 5 \overline{) 175} \\ \underline{5 \overline{) 35}} \\ 7 \overline{) 7} \\ 1 \end{array}$$

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

$$ii) -216 \times 1728$$

$$\begin{array}{r} 2 \overline{) 216} \\ \underline{2 \ 108} \\ 2 \ 54 \\ \underline{3 \ 27} \\ 3 \ 9 \\ \underline{3 \ 3} \\ 1 \end{array}$$

$$\begin{array}{r} 2 \overline{) 1728} \\ \underline{2 \ 864} \\ 2 \ 432 \\ \underline{2 \ 216} \\ 2 \ 108 \\ \underline{2 \ 54} \\ 3 \ 27 \\ \underline{3 \ 9} \\ 3 \ 3 \\ 1 \end{array}$$

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

$$iii) -64 \times -125$$

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

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

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

$$\text{vi)} \rightarrow 250.047 = \frac{250047}{1000}$$

$$\begin{array}{r} 3 \overline{) 250047} \\ \underline{3 \overline{) 83349}} \\ \quad 3 \overline{) 27783} \\ \quad \quad 3 \overline{) 9261} \\ \quad \quad \quad 3 \overline{) 3084} \\ \quad \quad \quad \quad 3 \overline{) 1029} \\ \quad \quad \quad \quad \quad 7 \overline{) 343} \\ \quad \quad \quad \quad \quad \quad 7 \overline{) 49} \\ \quad \quad \quad \quad \quad \quad \quad 7 \overline{) 7} \\ \quad \quad \quad \quad \quad \quad \quad \quad 1 \end{array}$$

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

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

$$\text{vii)} \rightarrow -175616$$

$$\begin{array}{r} 2 \overline{) 175616} \\ \underline{2 \overline{) 27808}} \\ \quad 2 \overline{) 43904} \\ \quad \quad 2 \overline{) 21952} \\ \quad \quad \quad 2 \overline{) 10976} \\ \quad \quad \quad \quad 2 \overline{) 5488} \\ \quad \quad \quad \quad \quad 2 \overline{) 2744} \\ \quad \quad \quad \quad \quad \quad 1372 \end{array}$$

$$\text{vii)} \rightarrow -175616$$

$$\begin{array}{r}
 2 \overline{) 175616} \\
 \underline{2 \overline{) 27808}} \\
 2 \overline{) 43904} \\
 \underline{2 \overline{) 21952}} \\
 2 \overline{) 10976} \\
 2 \overline{) 5488} \\
 2 \overline{) 2744} \\
 2 \overline{) 1372} \\
 2 \overline{) 686} \\
 7 \overline{) 343} \\
 7 \overline{) 49} \\
 7 \overline{) 7} \\
 1
 \end{array}$$

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

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