

Number Systems (Math)

Exercise 1.6 Page 26

Question 1:

Find:

(i) $64^{\frac{1}{2}}$ (ii) $32^{\frac{1}{5}}$ (iii) $125^{\frac{1}{3}}$

Answer:

(i)

$$\begin{aligned} 64^{\frac{1}{2}} &= (2^6)^{\frac{1}{2}} \\ &= 2^{6 \times \frac{1}{2}} & \left[(a^m)^n = a^{mn} \right] \\ &= 2^3 = 8 \end{aligned}$$

(ii)

$$\begin{aligned} 32^{\frac{1}{5}} &= (2^5)^{\frac{1}{5}} \\ &= (2)^{5 \times \frac{1}{5}} & \left[(a^m)^n = a^{mn} \right] \\ &= 2^1 = 2 \end{aligned}$$

(iii)

$$\begin{aligned} (125)^{\frac{1}{3}} &= (5^3)^{\frac{1}{3}} \\ &= 5^{3 \times \frac{1}{3}} & \left[(a^m)^n = a^{mn} \right] \\ &= 5^1 = 5 \end{aligned}$$

Question 2:

Find:

(i) $9^{\frac{3}{2}}$ (ii) $32^{\frac{2}{5}}$ (iii) $16^{\frac{3}{4}}$

(iv) $125^{\frac{-1}{3}}$

Answer:

(i)

$$\begin{aligned} 9^{\frac{3}{2}} &= (3^2)^{\frac{3}{2}} \\ &= 3^{2 \times \frac{3}{2}} & \left[(a^m)^n = a^{mn} \right] \\ &= 3^3 = 27 \end{aligned}$$

(ii)

$$\begin{aligned} (32)^{\frac{2}{5}} &= (2^5)^{\frac{2}{5}} \\ &= 2^{5 \times \frac{2}{5}} & \left[(a^m)^n = a^{mn} \right] \\ &= 2^2 = 4 \end{aligned}$$

(iii)

$$\begin{aligned} (16)^{\frac{3}{4}} &= (2^4)^{\frac{3}{4}} \\ &= 2^{4 \times \frac{3}{4}} & \left[(a^m)^n = a^{mn} \right] \\ &= 2^3 = 8 \end{aligned}$$

(iv)

$$\begin{aligned}(125)^{\frac{-1}{3}} &= \frac{1}{(125)^{\frac{1}{3}}} \\ &= \frac{1}{(5^3)^{\frac{1}{3}}} \\ &= \frac{1}{5^{3 \times \frac{1}{3}}} \\ &= \frac{1}{5}\end{aligned}$$

$$\left[a^{-m} = \frac{1}{a^m} \right]$$

$$\left[\left(a^m \right)^n = a^{mn} \right]$$

Question 3:

Simplify:

$$(i) 2^{\frac{2}{3}}.2^{\frac{1}{5}} \quad (ii) \left(\frac{1}{3^3}\right)^7 \quad (iii) \frac{11^{\frac{1}{2}}}{11^{\frac{1}{4}}}$$

$$(iv) 7^{\frac{1}{2}}.8^{\frac{1}{2}}$$

Answer:

(i)

$$\begin{aligned} 2^{\frac{2}{3}}.2^{\frac{1}{5}} &= 2^{\frac{2}{3}+\frac{1}{5}} & [a^m.a^n = a^{m+n}] \\ &= 2^{\frac{10+3}{15}} = 2^{\frac{13}{15}} \end{aligned}$$

(ii)

$$\begin{aligned} \left(\frac{1}{3^3}\right)^7 &= \frac{1}{3^{3 \times 7}} & [(a^m)^n = a^{mn}] \\ &= \frac{1}{3^{21}} \\ &= 3^{-21} & \left[\frac{1}{a^m} = a^{-m}\right] \end{aligned}$$

(iii)

$$\begin{aligned} \frac{11^{\frac{1}{2}}}{11^{\frac{1}{4}}} &= 11^{\frac{1}{2}-\frac{1}{4}} & \left[\frac{a^m}{a^n} = a^{m-n}\right] \\ &= 11^{\frac{2-1}{4}} = 11^{\frac{1}{4}} \end{aligned}$$

(iv)

$$\begin{aligned} 7^{\frac{1}{2}}.8^{\frac{1}{2}} &= (7 \times 8)^{\frac{1}{2}} & [a^m.b^m = (ab)^m] \\ &= (56)^{\frac{1}{2}} \end{aligned}$$