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NCERT Class 9 Solutions: Number Systems (Chapter 1) Exercise 1.6

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Q-1 Find:

1. $64^{\frac{1}{2}}$

2. $32^{\frac{1}{5}}$

3. $125^{\frac{1}{3}}$

Solution:

$$\left(\frac{x}{y}\right)^m = \frac{x^m}{y^m}$$

$a^{-n} = \frac{1}{a^n}$
 $a^{\frac{m}{n}} = \sqrt[n]{a^m} \text{ OR } (\sqrt[n]{a})^m$

Exponents II

$$3^{-\frac{4}{3}} = \frac{1}{3^{\frac{4}{3}}} = \frac{1}{(\sqrt[3]{3})^4}$$

$$\begin{aligned}1. \quad 64^{\frac{1}{2}} &= (8^2)^{\frac{1}{2}} \\&= 8^{2 \times \frac{1}{2}} \\&= 8^1 \\&= 8\end{aligned}$$

$$\begin{aligned}1. \quad 32^{\frac{1}{5}} &= (2^5)^{\frac{1}{5}} \\&= 2^{5 \times \frac{1}{5}} \\&= 2^1 \\&= 2\end{aligned}$$

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

Q-2 Find:

$$1. \quad 9^{\frac{3}{2}}$$

$$2. \quad 32^{\frac{2}{5}}$$

$$3. \quad 16^{\frac{3}{4}}$$

$$4. \quad 125^{\frac{-1}{3}}$$

Solution:

How to Expand Power of Power

$$(2^3)^4$$

The Power of "4" outside the brackets, tells us to multiply out what is contained in the brackets four times.

$$(2^3)^4 = \underbrace{2^3 \times 2^3 \times 2^3 \times 2^3}_{\text{Multiply four lots of what is in the brackets}}$$

Multiply four lots of what is in the brackets

Now apply the "Add Rule" for Multiplication

$$= 2^{3+3+3+3} = 2^{12} \checkmark$$

$$1. 9^{\frac{3}{2}} = (3^2)^{\frac{3}{2}}$$

$$= 3^{2 \times \frac{3}{2}}$$

$$= 3^3$$

$$= 27$$

$$1. 32^{\frac{2}{5}} = (2^5)^{\frac{2}{5}}$$

$$= 2^{5 \times \frac{2}{5}}$$

$$= 2^2$$

$$= 4$$

$$\begin{aligned}
 1. \quad 16^{\frac{3}{4}} &= (2^4)^{\frac{3}{4}} \\
 &= 2^{4 \times \frac{3}{4}} \\
 &= 2^3 \\
 &= 8
 \end{aligned}$$

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

Q-3 Find:

$$1. \quad 2^{\frac{2}{3}} \times 2^{\frac{1}{5}}$$

$$2. \quad \left(\frac{1}{3^3}\right)^7$$

$$3. \quad \frac{11^{\frac{1}{2}}}{11^{\frac{1}{4}}}$$

$$4. \quad 7^{\frac{1}{2}} \times 8^{\frac{1}{2}}$$

Solution:

$$\begin{aligned}
 1. \quad 2^{\frac{2}{3}} \times 2^{\frac{1}{5}} &= 2^{\left(\frac{2}{3} + \frac{1}{5}\right)} \\
 &= 2^{\frac{10+3}{15}} \\
 &= 2^{\frac{13}{15}}
 \end{aligned}$$

$$\begin{aligned}
 1. \quad \left(\frac{1}{3^3}\right)^7 &= \frac{1}{3^{3 \times 7}} \\
 &= \frac{1}{3^{21}} \\
 &= 3^{-21}
 \end{aligned}$$

$$\begin{aligned}
 1. \quad \frac{11^{\frac{1}{2}}}{11^{\frac{1}{4}}} &= 11^{\frac{1}{2} - \frac{1}{4}} \\
 &= 11^{\frac{2-1}{4}} \\
 &= 11^{\frac{1}{4}}
 \end{aligned}$$

$$\begin{aligned}
 1. \quad 7^{\frac{1}{2}} \times 8^{\frac{1}{2}} &= (7 \times 8)^{\frac{1}{2}} \\
 &= 56^{\frac{1}{2}}
 \end{aligned}$$