

Class-VIII

Chapter - 5 (Exponents)

In a^5 :- a is the base, and 5 is the power or exponent.

$$a^5 = a \times a \times a \times a \times a.$$

Laws of Exponents:-

$$1) a^m \times a^n = a^{m+n}$$

$$2) a^m \div a^n = a^{m-n}$$

$$3) (a^m)^n = a^{m \times n}$$

$$4) a^m \times b^m = (ab)^m$$

$$5) a^m \div b^m = \left(\frac{a}{b}\right)^m$$

$$6) a^0 = 1$$

$$7) a^{-1} = \frac{1}{a} \quad \text{or} \quad \left(\frac{a}{b}\right)^{-1} = \left(\frac{b}{a}\right)^1$$

Ex - 5(A)

$$1) \quad ii) (-5)^3 = (-5) \times (-5) \times (-5) = -125$$

$$iv) \left(-\frac{5}{2}\right)^2 = -\frac{5}{2} \times -\frac{5}{2} = \frac{25}{4}$$

$$2) \quad ii) \left(-\frac{8}{3}\right) \times \left(-\frac{8}{3}\right) \times \left(-\frac{8}{3}\right) \times \left(-\frac{8}{3}\right) = \left(-\frac{8}{3}\right)^4$$

$$3) \quad iii) \frac{-1}{128} = \frac{-1}{2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2} = \left(-\frac{1}{2}\right)^7$$

$$iv) \frac{729}{64} = \frac{3 \times 3 \times 3 \times 3 \times 3 \times 3}{2 \times 2 \times 2 \times 2 \times 2 \times 2} = \left(\frac{3}{2}\right)^6$$

$$\begin{array}{r} 2 \overline{) 128} \\ 2 \overline{) 64} \\ 2 \overline{) 32} \\ 2 \overline{) 16} \\ 2 \overline{) 8} \\ 2 \overline{) 4} \\ 2 \overline{) 2} \end{array}$$

$$\begin{array}{r} 3 \overline{) 729} \\ 3 \overline{) 243} \\ 3 \overline{) 81} \\ 3 \overline{) 27} \\ 3 \overline{) 9} \\ 3 \overline{) 3} \end{array}$$

$$4) \text{ ii) } \left(\frac{-7}{3}\right)^{11} \times \left(\frac{-7}{3}\right)^{13} = \left(\frac{-7}{3}\right)^{11-13} = \left(\frac{-7}{3}\right)^{-2} = \left(\frac{-3}{7}\right)^2$$

$$\text{vi) } \left(\frac{1}{24}\right)^{13} \div \left(\frac{1}{24}\right)^{16} = \left(\frac{1}{24}\right)^{13-16} = \left(\frac{1}{24}\right)^{-3} = (24)^3$$

$$\begin{aligned} 5) \text{ i) } & \left(\frac{6}{5}\right)^3 \times \left(\frac{5}{2}\right)^2 \\ &= \frac{(2 \times 3)^3}{5^3} \times \frac{5^2}{2^2} \\ &= \frac{5^2}{5^3} \times \frac{2^3}{2^2} \times 3^3 \\ &= 5^{2-3} \times 2^{3-2} \times 3^3 \\ &= 5^{-1} \times 2^1 \times 27 \\ &= \frac{54}{5} \\ &= 10\frac{4}{5} \text{ (Ans)} \end{aligned}$$

$$\begin{aligned} 5) \text{ iv) } & \left(\frac{-3}{4}\right)^3 \times \left(\frac{-5}{2}\right)^3 \times \left(\frac{2}{3}\right)^5 \\ &= \frac{(-3)^3}{(2^2)^3} \times \frac{(-5)^3}{2^3} \times \frac{2^5}{3^5} \\ &= \frac{+3^3}{2^6} \times \frac{+5^3}{2^3} \times \frac{2^5}{3^5} \\ &= \frac{3^3}{3^5} \times \frac{2^5}{2^6 \times 2^3} \times 5^3 \\ &= 3^{3-5} \times \frac{2^5}{2^9} \times 5^3 \\ &= 3^{-2} \times 2^{-4} \times 5^3 \\ &= \frac{5^3}{3^2 \times 2^4} = \frac{125}{9 \times 16} = \frac{125}{144} \text{ (Ans)} \end{aligned}$$

$$\begin{aligned} 5) \text{ vi) } & \left(\frac{-4}{3}\right)^8 \div \left(\frac{-4}{3}\right)^{12} \\ &= \left(\frac{-4}{3}\right)^{8-12} \\ &= \left(\frac{-4}{3}\right)^{-4} \\ &= \left(\frac{-3}{4}\right)^4 = \frac{(-3)^4}{4^4} = \frac{81}{256} \text{ (Ans)} \end{aligned}$$

$$\begin{aligned}
 6. \text{ ii)} \quad & \frac{3^5 \times 25 \times 10^5}{5^7 \times 6^5} \\
 &= \frac{3^5 \times 5^2 \times (2 \times 5)^5}{5^7 \times (2 \times 3)^5} \\
 &= \frac{\cancel{3^5} \times 5^2 \times \cancel{2^5} \times 5^5}{5^7 \times 2^5 \times \cancel{3^5}} \\
 &= \frac{5^{2+5}}{5^7} \\
 &= \frac{\cancel{5^7}}{\cancel{5^7}} = 1 \quad (\text{Ans}).
 \end{aligned}$$

$$\begin{aligned}
 8) \quad \text{RAM} &= 8 \text{ gigabyte.} \quad \left[\overset{\text{given}}{1 \text{ gigabyte} = 10^9 \text{ bytes}} \right] \\
 &= 8 \times 10^9 \text{ bytes.} \quad (\text{Ans}).
 \end{aligned}$$

$$\begin{aligned}
 9) \quad \text{Total player} &= 128 \quad \text{No of rounds (n)} = 4 \\
 \therefore \text{After 4th round players moved to the next round} \\
 &= \frac{\text{Total players}}{2^n} = \frac{128}{2^4} = \frac{128}{16} = 8 \quad (\text{Ans})
 \end{aligned}$$

In exponential notation in terms of initial number of players = $\frac{128}{2^4}$ (Ans).

$$\begin{aligned}
 10) \text{ ii)} \quad 156 \text{ km} &= (156 \times 1000) \text{ m} \\
 &= (156 \times 1000 \times 100) \text{ cm} \\
 &= 15600000 \text{ cm} \\
 &= 156 \times 10^5 \text{ cm} \quad (\text{Ans})
 \end{aligned}$$