

Exponents and Powers; "Chapter - 12"

$$5 \times 5 \times 5 = 5^3 \begin{matrix} \rightarrow \text{Exponents} \\ \rightarrow \text{base} \end{matrix}$$

We say 5 raised to the power 3.

"Powers with Negative Exponents:-"

$$3^{-3} = \frac{1}{3^3} = \frac{1}{3 \times 3 \times 3} = \frac{1}{27}$$

$$4^{-3} = \frac{1}{4^3} = \frac{1}{4 \times 4 \times 4} = \frac{1}{64}$$

$$\left(\frac{2}{3}\right)^{-2} = \left(\frac{3}{2}\right)^2 = \frac{3^2}{2^2} = \frac{9}{4}$$

"Laws of exponents"

$$\textcircled{1} x^m \times y^m = (xy)^m$$

$$3^2 \times 5^2 = (3 \times 5)^2 = 15^2 = 15 \times 15 = 225$$

$$\textcircled{2} x^m \times x^n = x^{m+n}; 3^5 \times 3^2 = 3^{5+2} = 3^7$$

$$\textcircled{3} x^m \div x^n = x^{m-n}; 3^5 \div 3^2 = 3^{5-2} = 3^3 = 27$$

$$\textcircled{4} x^{-1} = \frac{1}{x^1}; 3^{-3} = \frac{1}{3^3} = \frac{1}{27}; 2^{-4} = \frac{1}{2^4} = \frac{1}{2 \times 2 \times 2 \times 2} = \frac{1}{16} \text{ Ans.}$$

$$\textcircled{5} \left(\frac{x}{y}\right)^{-1} = \left(\frac{y}{x}\right)^1; \left(\frac{3}{2}\right)^{-3} = \left(\frac{2}{3}\right)^3 = \frac{2 \times 2 \times 2}{3 \times 3 \times 3} = \frac{8}{27} \text{ Ans.}$$

$$\textcircled{6} x^0 = 1; 4^0 + 3^0 + 2^0 = 1 + 1 + 1 = 3 \text{ Ans.}$$

$$\textcircled{7} (x^m)^n = x^{m \cdot n}; (3^2)^3 = 3^6 \text{ Ans.}$$

Examples:- Find m so that;  $(-3)^{m+1} \times (-3)^5 = (-3)^7$

$$(-3)^{m+1+5} = (-3)^7$$

$$m+6 = 7$$

$$m = 7 - 6$$

$$m = 1$$