Introduction of Exponents (Powers)

- Exponents or powers represent repeated multiplication of the same number.
 In 2⁴, 2 is the base and 4 is the exponent.
- It means $2 \times 2 \times 2 \times 2 = 16$.
- Exponents help in writing large products in a short form.
- Read as "2 raised to the power 4" or "2 to the power of 4".

Terms to Remember

- Base The number that is multiplied (e.g. 3 in 3⁵)
- Exponent The number of times the base is used as a factor (e.g. 5 in 3⁵)
- Value The actual result after multiplication (e.g., 3⁵ = 243)

Key Rules of Exponents

- a¹ = a
- $a^o = 1$ (where $a \neq 0$)
- $a^m \times a^n = a^{(m+n)}$
- $a^m \div a^n = a^{(m-n)}$
- $(a^m)^n = a^{(m \times n)}$

Examples with Solutions

Example:

Evaluate 4³

 $4^3 = 4 \times 4 \times 4 = 64$

Example:

Find the value of 6° and 91

6^o = 1

9¹ = 9

Example:

Simplify $3^2 \times 3^3$

 $3^2 \times 3^3 = 3^{(2+3)} = 3^5 = 243$

Example:

Simplify $8^5 \div 8^2$

 $8^5 \div 8^2 = 8^{(5-2)} = 8^3 = 512$

Example:

Evaluate $(2^3)^2$

 $(2^3)^2 = 2^{(3 \times 2)} = 2^6 = 64$

Summary Points

- Exponents show repeated multiplication of the base.
- aⁿ means multiply a by itself n times.
- a^o is always 1 (except when a = 0).
- Exponent rules make calculations faster and simpler.
- Used widely in algebra, scientific notation, and large number expressions.