Applications of exponents

- Exponents are used to represent very large or very small numbers in a compact form.
- They are helpful in scientific calculations, computer memory storage, distances in space, and repeated multiplication.
- Exponents help in solving real-life problems easily and quickly.
- They are also used in areas like population growth, area and volume formulas, and compound interest.
- Exponential notation reduces the chance of errors in large calculations.

Common Real-Life Applications

- **Scientific Notation** – writing large numbers like 1000000 as 10^6
- **Expressing Area** – Area of square = side^2
- **Expressing Volume** – Volume of cube = side^3
- Speed of light, atomic sizes, and planet distances are expressed using powers of 10
- Memory units in computers like KB, MB, GB use exponents of 2 (1 KB = 2^{10} bytes)

Examples with Solutions

Example – Scientific notation

Express 1 crore (10000000) using exponent

= 10^7

Example – Area using exponents

Find the area of a square with side 12 m

Area = side^2 = 12^2 = 144 m^2

Example – Volume using exponents

Find the volume of a cube of side 5 cm

Volume = side^3 = 5^3 = 125 cm^3

Example – Computer memory

1 MB = 2^{10} KB = 1024 KB

Example – Very small number

One micron = $\frac{1}{1000000}$ m = 10^{-6} m

Summary Points

- Exponents are useful to write large or small numbers compactly.
- Used in scientific, mathematical, and technical fields.
- Area and volume formulas use exponents to simplify expressions.
- Scientific notation helps in expressing values like distance, size, and data.
- Exponents are important in everyday life such as in computing and space science.