Standard Form (Scientific Notation)

♦ 1. Definition and Format

Standard Form is a way of writing very large or very small numbers using powers of 10.

A number is written in standard form if it is in the format:

$$A \times 10^n$$

Where:

- $1 \le A < 10$
- n is an integer (can be positive or negative)
- Examples:
- $3.2 \times 10^4 = 32000 \rightarrow \text{large number}$
- $5.67 \times 10^{-3} = 0.00567 \rightarrow \text{small number}$

2. Converting Numbers Into and Out of Standard Form

A. Converting from Ordinary Numbers → Standard Form

- 1. Move the decimal point to make the number between 1 and 10.
- 2. Count how many places you moved the decimal:
 - If you moved it left, n is positive.
 - If you moved it right, n is negative.

Examples:

1. 12,300 → Move decimal 4 places left:

$$1.23 \times 10^{4}$$

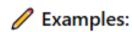
2. 0.0065 → Move decimal 3 places right:

$$6.5 \times 10^{-3}$$

B. Converting from Standard Form - Ordinary Numbers

Multiply the number by 10^n :

- If n is positive, move decimal right.
- If n is negative, move decimal left.



1.
$$4.7 \times 10^5 = 470000$$

2.
$$9.1 \times 10^{-2} = 0.091$$

♦ 3. Calculating with Standard Form

A. Multiplying in Standard Form

Use the rule:

$$(A \times 10^m) \times (B \times 10^n) = (A \times B) \times 10^{m+n}$$

Example:

$$(3 \times 10^4) \times (2 \times 10^3) = 6 \times 10^7$$

B. Dividing in Standard Form

Use the rule:

$$rac{A imes 10^m}{B imes 10^n} = \left(rac{A}{B}
ight) imes 10^{m-n}$$

Example:

$$rac{6 imes 10^8}{2 imes 10^3} = 3 imes 10^5$$

C. Adding or Subtracting in Standard Form

Step-by-step:

- 1. Make sure both numbers have the same power of 10.
- 2. Add or subtract the numbers (A values).
- 3. Write the result in standard form if needed.



$$(3.2\times10^4)+(6.8\times10^4)=10.0\times10^4=1.0\times10^5$$



Summary Table

Operation	Rule / Tip
Multiply	Multiply A values, add powers: $A imes B imes 10^{m+n}$
Divide	Divide A values, subtract powers: $rac{A}{B} imes 10^{m-n}$
Add/Subtract	Match powers of 10, then operate on A values

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