SKILL #07

CODE: SN.2

Operations with Scientific Notation

Multiplication

Rule: Multiply coefficients, add exponents

$$(a \times 10^m) \times (b \times 10^n) = (a \times b) \times 10^{m+n}$$

Examples:

- $(2 \times 10^3) \times (3 \times 10^4) = 6 \times 10^7$
- $(4.5 \times 10^2) \times (2 \times 10^{-3}) = 9 \times 10^{-1}$
- $(1.5 \times 10^5) \times (4 \times 10^6) = 6 \times 10^{11}$

Division

Rule: Divide coefficients, subtract exponents

$$(a \times 10^m) \div (b \times 10^n) = (a \div b) \times 10^{m-n}$$

Examples:

- $(8 \times 10^3) \div (2 \times 10^4) = 2 \times 10^7$
- $(4.5 \times 10^2) \div (1.5 \times 10^{-3}) = 3 \times 10^5$
- $(1.2 \times 10^5) \div (4 \times 10^6) = 3 \times 10^{-2}$

Addition & subtraction

Rule: Exponents must be the same! If not, rewrite one number so the exponents match, then add/subtract the coefficients.

$$(a \times 10^n) + (b \times 10^n) = (a + b) \times 10^n$$

Examples:

a) $(5.2 \times 10^3) + (3.8 \times 10^3) = 9.0 \times 10^3$ (we add directly because they have the same exponent 10^3)

b) $(4.5 \times 10^5) - (2.0 \times 10^4)$

- STEP 1: rewrite 2.0×10^4 to have the exponent 10^5 --> $2.0 \times 10^4 = 0.2 \times 10^5$
- STEP 2: subtract the coefficients $(4.5 - 0.2)$ --> $4.5 - 0.2 = 4.3$
- STEP 3: Write the result with the exponent: --> $\mathbf{4.3 \times 10^5}$

⚠ Common Mistakes to Avoid

❌ Adding or subtracting without matching exponents.

❌ Forgetting to adjust the coefficient to keep it between 1 and 10 after multiplying/dividing.

❌ Incorrectly adding or subtracting exponents for multiplication/division.

Additional Resources