Notes & Steps

Key idea

Scientific notation writes very large or very small numbers compactly as $a \times 10^n$, where $1 \leq a < 10$ and n is an integer.

Steps — large numbers

1. Move the decimal point left until only one digit remains before it.
2. Count how many places you moved — that is the exponent n.
3. Write the result as $a \times 10^n$.

Steps — small numbers

1. Move the decimal point right until only one non-zero digit is before it.
2. Count the places moved — that is $-n$.
3. Write as $a \times 10^{-n}$.

Examples

- $2000 = 2 \times 10^3$ (move 3 left)
- $0.00037 = 3.7 \times 10^{-4}$ (move 4 right)
- $5 \times 10^3 = 5000$ (move 3 right)
- $7.5 \times 10^{-2} = 0.075$ (move 2 left)

Common mistake

Writing 30×10^2 instead of 3×10^3. The coefficient must be between 1 and 10. 30 is too large. Adjust: $30 \times 10^2 = 3 \times 10^3$.

Try these

1. Write 2000 in scientific notation.
2. Write 0.00037 in scientific notation.
3. Express 5×10^3 as an ordinary number.

Notes & Steps

Example 1: large number

Write $9,500,000$ in scientific notation.

$$9\,500\,000$$

Move the decimal point 6 places left: 9.5. Answer: 9.5×10^{6}.

Example 2: small number

Write 0.00012 in scientific notation.

$$0.00012$$

Move the decimal point 4 places right: 1.2. Answer: 1.2×10^{-4}.

Try these

1. Convert 3.84×10^{5} to a normal number.
2. Write 0.02 in scientific notation.
3. Write 7.5×10^{-2} as a decimal.

Notes & Steps

Example 3: multiplying in sci. not.

Calculate $(3 \times 10^4) \times (2 \times 10^3)$.

$$3 \times 2 = 6$$

$$10^4 \times 10^3 = 10^7$$

Answer: 6×10^7.

Example 4: dividing in sci. not.

Calculate $(6 \times 10^5) \div (2 \times 10^2)$.

$$6 \div 2 = 3$$

$$10^5 \div 10^2 = 10^3$$

Answer: 3×10^3.

Common mistake

Adding exponents instead of subtracting during division. Remember: divide coefficients, subtract exponents.