

SCIENTIFIC NOTATION

To write very large or very small numbers in scientific notation, using our knowledge of exponents.



REVIEW: POWERS OF 10

- *Evaluate* the following powers

$$10^0 = 1$$

$$10^2 = 100 \quad (\text{decimal moves 2 places to the right})$$

$$10^{-2} = 0.01 \quad (\text{decimal moves 2 places to the left})$$

$$10^5 = 100000 \quad (\text{decimal moves 5 places to the right})$$

$$10^{-4} = 0.0001 \quad (\text{decimal moves 4 places to the left})$$



SCIENTIFIC NOTATION DEFINITION

$$a \times 10^n$$

Hints:

- ✓ *Look at the first important number (not zero). The decimal goes after that!*
- ✓ *x 10 to the power of however many spaces the decimal moved (positive exponent for large number, negative for small decimal numbers)*

Ex: $35\ 400\ 000 = 3.54 \times 10^7$

Ex: $0.000\ 025 = 2.5 \times 10^{-5}$



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Object	Diameter (km)	Sci Not (km)
Earth	12 756	<u>1.28×10^4</u>
Saturn	116 464	<u>1.16×10^5</u>
Jupiter	142 984	<u>1.42×10^5</u>
Sun	1 392 000	<u>1.39×10^6</u>
Aldebaran	59 770 000	<u>5.98×10^7</u>

Object	Diameter (m)	Sci Not (m)
Salt Grain	0.005	<u>5×10^{-3}</u>
Skin Cell	0.000 03	<u>3×10^{-5}</u>
Chromosome	0.000 007	<u>7×10^{-6}</u>
HIV Virus	0.000 000 130	<u>1.3×10^{-7}</u>
Hepatitis B	0.000 000 045	<u>4.5×10^{-8}</u>



CALCULATIONS

Multiplying or dividing:

- 1) Separate (rearrange) the numbers from the powers.
- 2) Multiply or divide the numbers in front
- 3) Use exponent rules to multiply the powers of 10
- 4) Make sure your answer is in scientific notation

Example 1

$$\begin{aligned}(2.5 \times 10^4) \times (6 \times 10^{-6}) &= (2.5 \times 6) \times (10^4 \times 10^{-6}) \\ &= 15 \times 10^{-2} \text{ (not in sci. notation)} \\ &= (1.5 \times 10^1) \times 10^{-2} \\ &= 1.5 \times 10^{-1}\end{aligned}$$



Example 2:

$$(0.2 \times 10^3) \times (4 \times 10^5)$$

$$= (0.2 \times 4) \times (10^3 \times 10^5)$$

$$= 0.8 \times 10^8 \text{ (still not scientific notation)}$$

$$= (8 \times 10^{-1}) \times 10^8$$

$$= 8 \times 10^7$$

