

Scientific Notation

- Scientific notation is expressed as a number between 1 and 9, raised to a power of 10.
- numbers **GREATER** than 1 have a positive exponent
 - > example: 16,200,000
 - > scientific notation: 1.62×10^7
- numbers **SMALLER** than 1 have a negative exponent
 - > example: 0.000000568
 - > scientific notation: 5.68×10^{-7}

Nov 22-9:29 AM

Practice

Put the following numbers into scientific notation

- 1,257 1.257×10^3
- 56,000 5.6×10^4
- 0.000253 2.53×10^{-4}
- 0.00000000000458 4.58×10^{-12}

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Practice

1. Select the largest of the following numbers.

- ~~a. 3.21×10^{-2}~~
~~b. 5.76×10^4~~
~~c. 9.10×10^5~~
 d. 7.24×10^6

2. Write the following number in proper scientific notation: 0.0000378

$$3.78 \times 10^{-5}$$

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Dimensional Analysis

-- using conversion factors to go from one unit to another

-- **CONVERSION FACTOR**: a fraction that is equal to 1

ex: $\frac{12 \text{ inches}}{1 \text{ foot}} = 1 = \frac{1 \text{ foot}}{12 \text{ inches}}$

$$\frac{5}{5} = 1$$

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Dimensional Analysis

1. Start with your known value and unit.
2. Determine the desired unit to convert to.
3. To cancel units, you must put them on the opposite side of the fraction.
4. Continue to cancel units until you have reached the desired unit.

Practice

Convert 3 days to seconds

$$3 \text{ days} \times \frac{24 \text{ hrs}}{1 \text{ days}} \times \frac{60 \text{ min}}{1 \text{ hrs}} \times \frac{60 \text{ sec}}{1 \text{ min}} = 259,200 \text{ sec.}$$

300,000 sec
 $3 \times 10^5 \text{ sec}$

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Practice

22.4 kg/L to kg/mL

$$\frac{22.4 \text{ kg}}{1 \text{ L}} \times \frac{1 \text{ L}}{1000 \text{ mL}} = .0224 \frac{\text{kg}}{\text{mL}}$$

$2.24 \times 10^{-2} \frac{\text{kg}}{\text{mL}}$

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Practice

Traveling at 65 miles/hour, how many minutes will it take to drive 350 miles to Rapid City?

$$350 \text{ miles} \times \frac{1 \text{ hr}}{65 \text{ miles}} \times \frac{60 \text{ min}}{1 \text{ hr}} = 323.077 \text{ min.}$$

320 min.
 $3.2 \times 10^2 \text{ min}$

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CHECK FOR UNDERSTANDING

1. Which is larger, kilograms or grams?
2. Which SI unit would you use to measure the volume of a cup of coffee?
3. Calculate the following. Round the answer to the correct number of sig figs.
 - a. $123.8 + 35.6 - 18.26 =$ _____
 - b. $93.2 \times 86.013 \times 0.056 =$ _____
4. Round the following numbers to the number of sig figs given in parentheses:
 - a. 706.5 (1) _____
 - b. 429.6 (3) _____
5. Solve the following problems using dimensional analysis. Make sure the answer has the proper number of sig figs.:
 - a. 15 mg to g
 - b. 18.9 L to mL
6. If a group of students gets lab results of 25.6 g, 25.8 g and 25.3 g for three trials and the accepted value is 26.0 g, are their results accurate, precise or both? Why?

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