

Scientific Notation:

Express the following numbers in scientific notation:

- a) 543
- b) 20,000,000
- c) 12,000.0
- d) 0.0000230
- e) 0.0012

Significant Figures:

Determine the number of significant figures for each of the following measurements:

- a) 2.303 meters
- b) 5.50 seconds
- c) 0.024 liters
- d) 24.3 kilograms
- e) 115.20 centimeters
- f) 100 miles/hour

Significant Figures (Part 2): Doing math with measured quantities

Perform the following and express your answers using the appropriate number of significant figures:

a) 22.5 liters + 0.023 liters =

b) 110 apples - 25 apples =

c) 110 meters - 25 meters =

d) $\left[\frac{12.003 \text{ grams}}{\text{mole}} \right] \times 2.5 \text{ moles} =$

e) $50.45 \text{ cm}^3 / 0.02 \text{ cm}^2 =$

f) $2.5 \text{ moles} \times \left[\frac{6.022 \times 10^{23} \text{ atoms}}{\text{mole}} \right] =$

Unit Conversion:

Convert the following quantities and express your answers using the appropriate number of significant figures:

a) 2.3 kilograms = _____ grams

b) 5.50 liters = _____ milliliters (mL)

c) 2.4 mL = _____ L

d) 24.3 calories = _____ joules (1 cal = 4.184 J)

e) 115.2 quarts = _____ liters (1 L = 1.057 qt)

f) $1013. \text{ kg/m}^3 =$ _____ g/mL (1 mL = 1 cm³)

g) $100.0 \text{ mL/hr} =$ _____ cm^3/s (1 hr = 60 min = 3600 s)

Unit Conversion within the Metric System:

Mass: The most common form of hydrogen atom has a mass of 1.67×10^{-27} kg. Express the mass of this hydrogen atom in the following units (use scientific notation):

- a) nanograms (ng)
- b) micrograms (μ g)
- c) milligrams (mg)
- d) grams (g)

Length: A single carbon atom has a diameter of approximately 2.0 angstroms. The angstrom unit is related to the meter by the following: $1 \text{ angstrom} = 10^{-10} \text{ m}$. Express the diameter of a carbon atom in the following units (use scientific notation):

- a) nanometers (nm)
- b) micrometers (μ m)
- c) millimeters (mm)
- d) kilometers (km)
- e) How many carbons would you need to stack side-by-side to make a 1.0 inch long carbon atom chain?