

Introductory Chemistry Math Drill

Remember to deal with units in the same way as we deal with variables in algebra.

2. Solve the equation for R : $PV = nRT$

3. Find the ratio (in lowest terms) of 15 kilograms to 5 kilograms. Show your set-up.

4. Consider each of the following measurements. Determine the number of significant figures in each.

(a) 403.50 g _____ (e) 29.000 L _____

(b) ~~6~~46555 x 10⁵ g _____ (f) 0.0304 dg _____

(c) 250.1 °C _____ (g) 0.00007 g _____

(d) 2.700 g/cm³ _____ (h) 609 kg _____

5. Round off each of the following measurements to *three* significant figures.

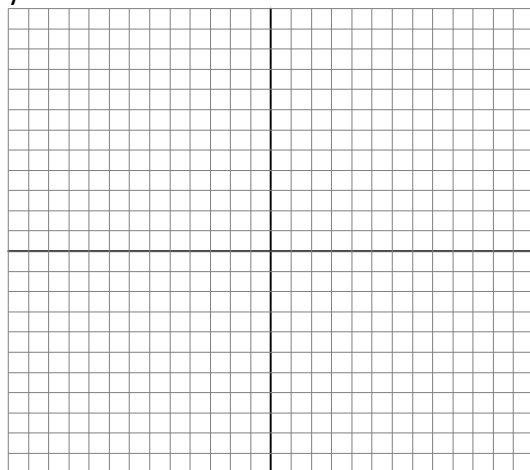
(a) 105.9 g _____ (d) 0.0098305 m _____

(b) 123256 cm _____ (e) 1003 K _____

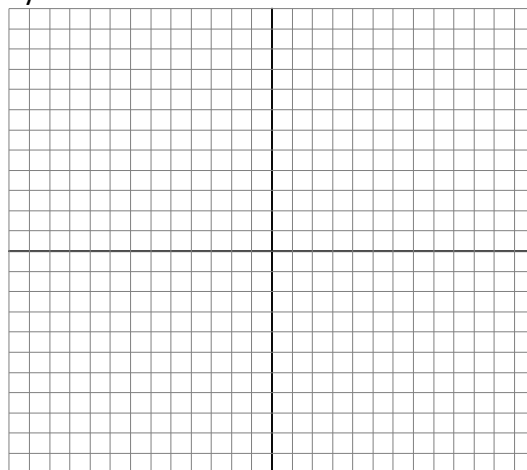
(c) 0.0009999 g _____ (f) 6.46555 x 10⁵ g _____

Graph the Following:

$$y = 2x - 5$$



$$xy = 12$$



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6. Write each of the following in *correct* scientific notation.

(a) 0.703 _____

(d) 9002.0 _____

(b) 0.00550×10^{-6} _____

(e) 12000000 _____

(c) 10500 _____

(f) 455×10^4 _____

7. Solve these problems, rounding off your answer to the correct number of significant figures.

(a) $13.44 \text{ in} + 3.55 \text{ in} + 240.1 \text{ in}$

(e) $\frac{145.5502 \text{ g}}{19.2 \text{ mL}}$

(b) $88.7 \text{ g} - 87.7 \text{ g}$

(f) $(2.0 \times 10^{-4} \text{ m})(1.56 \times 10^{-6} \text{ m})$

(c) $(2.54 \text{ cm})(4.0050 \text{ cm})(2.5 \text{ cm})$

(g) $\frac{6.25 \text{ g}}{(11.135 \text{ cm} + 2.9 \text{ cm})}$

(d) $\frac{(4.33 \text{ m})(5.0 \text{ m})(655.5 \text{ m})}{(22.8 \text{ }^\circ\text{C})}$

(h) $(2.54 \times 10^{-3} \text{ m})(5.2 \times 10^6 \text{ m})$

8. Add the following masses, expressing your answer in grams to the correct number of significant figures. Show your work.

$25.5 \text{ mg} + 25.5 \text{ cg} + 25.5 \text{ g}$

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9. Perform the following conversions using a factor label set-up.

(a) 5.0 m^3 to cm^3

(b) 975 ft^2 to m^2

(c) 0.75 m^3 to L

10. A rectangle has length of 6.5 cm and width of 25.3 mm.

(a) Calculate the area of the rectangle in units of cm^2 .

(b) Calculate the area in mm^2 .

11. Perform the following conversions using the *factor-label method*. Write the answers, rounded off to the correct number of significant figures with correct units, in the indicated spaces.

(a) A car uses 6.0 liters of gasoline to travel 101 km. Convert the mileage into units of $\frac{\text{mi}}{\text{gal}}$.

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(b) Convert the density of water, $1.00 \frac{\text{g}}{\text{mL}}$ into pounds per cubic foot ($\frac{\text{lbs}}{\text{ft}^3}$).

(c) A person on a diet loses 10.0 pounds in 1.00 month. Calculate the average rate of mass loss in units of $\frac{\text{mg}}{\text{s}}$. Assume that 1.00 month = 30 days (exactly).

(d) The average car in the United States will travel 25.0 miles for each gallon of gas. Express this gas consumption rate of 25.0 miles per gallon ($\frac{\text{mi}}{\text{gal}}$) in the metric units of km per L ($\frac{\text{km}}{\text{L}}$).

(e) Rum is often sold by the fifth (0.200 gallon). Convert this volume into units of cubic meters.

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Problems With Units (Simplify each mathematical expression.)

1. $(40.0 \text{ ft})(3.0 \text{ lb})$

5. $(9.800 \times 10^3 \text{ cm})(5.40 \times 10^{-10} \text{ s}^{-1})$

2. $\frac{39005 \text{ mi}}{13.5 \text{ hr}}$

6. $\frac{6.45 \times 10^{-35} \text{ ms}}{(4 \times 10^{18} \text{ ms})^3}$

3. $76.94 \text{ in} + 75.4 \text{ ft}$

7. $\frac{(2.40 \times 10^4 \text{ g})(7.5 \times 10^{-6} \text{ cm}^2)}{3.0 \times 10^{-32} \text{ s}}$

4. $(3.6 \times 10^5 \mu\text{L}^2)^{\frac{1}{2}}$

8. $6.568 \times 10^{-5} \text{ L} - 3.83 \times 10^{-3} \text{ mL}$

Unit Conversion Problems (Perform the indicated unit conversions.)

1. $25.0 \mu\text{L}$ to mL

2. 1.0 ft^2 to mm^2

3. $1.75 \times 10^4 \text{ cm/s}^2$ to in/min^2

4. 2.8 lb/ft^3 to g/L

5. $3.668 \times 10^{-5} \text{ m}^3$ to L

Logarithms (Simplify or solve for x.)

1. $\log(1 \times 10^{-4})$

4. $\log x = -11$

2. $\log 5.44$

5. $\log x = 8.75$

3. $\log(2.66 \times 10^7)$

6. $\log x = -2.7$

Unit Conversions Table* (will be provided in an exam)**Note: "1" is always exact and often not shown.**

Length	Mass	Volume	Pressure	Energy
1 in = 2.54 cm (exact) 1 ft = 12 in (exact) 1 yd = 3 ft (exact) 1 mi = 5280 ft (exact)	1 lb = 453.6 g 1 kg = 2.205 lb 1 lb = 16 oz (exact)	1 L = 1.057 qt 1 gal = 3.785 L 1 ft ³ = 28.32 L 1 qt = 16 fl oz (exact) 1 gal = 4 qt (exact) <u>memorize below:</u> 1 mL = 1 cm³ 1000 mL = 1 L	1 atm = 14.696 psi 1 atm = 760 mmHg (exact) <u>memorize below:</u> 1 torr = 1 mmHg	4.184 J = 1 cal 1 kWh = 3.60x10 ⁶ J

* Using this table you may need to use more than one conversion factor to convert to a desired unit!

Memorize these unit abbreviations!**Pay attention to lower case and upper case letters****Abbreviation (in bold)****m** : meters**in** : inches**ft** : feet**yd** : yards**mi** : miles**lb** : pounds**kg** : kilograms**oz** : ounces**qt** : quarts**gal** : gallons**L** : liters**ft³** : cubic feet**fl oz** : fluid ounces**atm** : atmospheres**psi** : pounds (force) per square inches**mmHg** : millimeters of mercury**cal**: calories (scientific)**Cal**: Calories (food energy)**kWh**: kilowatt-hour**Memorize these SI prefixes!**

Prefix	abbreviation	value
pico	p	10 ⁻¹²
nano	n	10 ⁻⁹
micro	μ	10 ⁻⁶
milli	m	10 ⁻³
centi	c	10 ⁻²
deci	d	10 ⁻¹

deka	da	10 ¹
hecto	h	10 ²
kilo	k	10 ³
mega	M	10 ⁶
giga	G	10 ⁹
tera	T	10 ¹²