

Show All Work To Receive Credit! Conversion factors and prefixes:

$G = 10^9$, $M = 10^6$, $k = 10^3$, $c = 10^{-2}$, $m = 10^{-3}$, $\mu = 10^{-6}$, $n = 10^{-9}$, $2.54 \text{ cm} = 1 \text{ in}$,
 $12 \text{ in} = 1 \text{ ft}$, $5280 \text{ ft} = 1 \text{ mile}$, $3 \text{ feet} = 1 \text{ yd}$, $60 \text{ sec} = 1 \text{ min}$, $1 \text{ hr} = 60 \text{ min}$, $4 \text{ quarts} = 1 \text{ gal}$, $2 \text{ pints} = 1 \text{ quart}$

1. (4 Pts) A snail is traveling at a rate of 25 cm/minute. How fast is the snail going in inches per second?

$$\frac{25 \cancel{\text{cm}}}{\cancel{\text{min}}} \times \frac{1 \text{ in}}{2.54 \cancel{\text{cm}}} \times \frac{1 \cancel{\text{min}}}{60 \text{ s}} = 0.164 \frac{\text{in}}{\text{s}}$$

2. (6 Pts)) Perform each of the following conversions. You must show the complete setup.

a. Convert 99 mL to nL.

$$\frac{99 \cancel{\text{mL}}}{\cancel{\text{mL}}} \times \frac{10^{-3}}{1} \times \frac{1 \text{ nL}}{10^{-9}} = 9.9 \times 10^7 \text{ nL}$$

b. Convert 105 μL to mL.

$$\frac{105 \cancel{\mu\text{L}}}{\cancel{\mu\text{L}}} \times \frac{10^{-6}}{1} \times \frac{1 \text{ mL}}{10^{-3}} = 105 \times 10^{-3} \text{ or } 1.05 \times 10^{-1} \text{ or } 0.105 \text{ mL}$$

3. (5 Pts)) Assume each of following numbers are measurements. Perform the indicated operations and then report the answer with the proper number of significant figures.

a. $2.14 \text{ cm} + 12.126 \text{ cm} + 0.12 \text{ cm} = \underline{14.39} \text{ cm}$
 ↑
 To this place

b. $1.25 \text{ cm} \times 2.1 \text{ cm} \times 1.145 \text{ cm} = \underline{3.0} \text{ cm}^3$
 ↑
 2 S.F.

4. (5 Pts) Chloroform, CHCl_3 , has a density of 1.48 g/mL. How many mL of chloroform are needed to provide 85.0 g?

$$\frac{85.0 \cancel{\text{g}}}{1.48 \cancel{\text{g}}} \times \frac{1 \text{ mL}}{1} = 57.4 \text{ mL}$$

5. (5 Pts) A sample of silver ore was found to contain 0.46 % silver by mass. How many grams of silver can be recovered 400.0 kg of ore?

$$\frac{400.0 \cancel{\text{kg ore}}}{100 \cancel{\text{ore}}} \times \frac{0.46 \text{ Ag}}{100} \times \frac{10^3}{1} = 1840 \text{ g Ag}$$

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1. (4 Pts) A snail is traveling at a rate of 45 cm/minute. How fast is the snail going in inches per second?

$$\frac{45 \text{ cm}}{\text{min}} \times \frac{1 \text{ in}}{2.54 \text{ cm}} \times \frac{1 \text{ min}}{60 \text{ s}} = 0.295 \frac{\text{cm}}{\text{s}}$$

2. (6 Pts)) Perform each of the following conversions. You must show the complete setup.

a. Convert 65 mL to nL.
$$\frac{65 \text{ mL}}{\text{mL}} \times \frac{10^{-3}}{10^{-9}} = 6.5 \times 10^7 \text{ nL}$$

b. Convert 85 μL to mL.
$$\frac{85 \mu\text{L}}{\mu\text{L}} \times \frac{10^{-6}}{10^{-3}} = 8.5 \times 10^{-2} \text{ mL}$$

3. (5 Pts)) Assume each of following numbers are measurements. Perform the indicated operations and then report the answer with the proper number of significant figures.

a. $2.14 \text{ cm} + 12.126 \text{ cm} \oplus 0.12 \text{ cm} = \underline{14.39} \text{ cm}$
 (Note: 14.39 is written with a vertical line under the 9, and "place" is written below it with an arrow pointing to the 9.)

b. $1.25 \text{ cm} \times 2.1 \text{ cm} \times 1.145 \text{ cm} = \underline{3.0} \text{ cm}^3$
 (Note: 3.0 has an arrow pointing up to the 0, with "2 S.F." written below it.)

4. (5 Pts) Chloroform, CHCl_3 , has a density of 1.48 g/mL. How many mL of chloroform are needed to provide 28.0 g?

$$\frac{28.0 \text{ g}}{1.48 \text{ g}} \text{ mL} = 18.9 \text{ mL}$$

5. (5 Pts) A sample of silver ore was found to contain 0.046 % silver by mass. How many grams of silver can be recovered 400.0 kg of ore?

$$\frac{400.0 \text{ kg ore}}{1} \times \frac{10^3}{100 \text{ ore}} \times 0.046 \text{ Ag} = 184 \text{ g Ag}$$