

PLEASE PRINT NEATLY. I want to give you as much credit as possible, but if it is unclear what the letter or number is, I cannot assume it is correct.

PART 1. FILL IN THE BLANK.

1. What is the definition of a hypothesis? (3 pts.)

A hypothesis is a possible explanation of why a trend occurs in your observations or experiments.

2. The state of matter that takes the volume and the shape of its container is the

_____ gas _____. (2 pts.)

3. What is the definition of a heterogeneous mixture? (2 pts.)

a mixture that is not uniform throughout

4. Fill in the blanks with the conversion factor.

_____ 1 _____ micrometers = _____ 1×10^{-6} _____ meters (1 pt.)

5. Fill in the blanks with the conversion factor.

_____ 1 _____ milliliters = _____ 1×10^{-3} _____ liter. (1 pt.) or: 1000 mL = 1 L

6. Fill in the blanks with the conversion factor. _____ 1 _____ cm = _____ 1×10^{-2} _____ m (1 pt.)

or: 100 cm = 1 m

7. Identify how many significant figures are in each of the following numbers: (1 pt. each)

a) 3.70 _____ 3 _____

b) 50 _____ 1 _____

c) 58,100 _____ 3 _____

d) 0.0040 _____ 2 _____

8. Circle the Last Significant Place (LSP) in each of the following numbers: (1 pt. each)

(I don't know how to circle in Microsoft Word, so I will underline the digit)

a) 3.70 _____ b) 50 _____

c) 58,100 _____ d) 0.0040 _____

9. Write the following numbers in Standard Scientific Notation: (1 pt. each)

a) 0.00043 _____ 4.3×10^{-4} _____ b) 371,000 _____ 3.71×10^5 _____

10. Write the following numbers in "ordinary" decimal form: (1 pt. each)

b) 6.2×10^4 _____ 62,000 _____ b) 7.13×10^{-3} _____ 0.00713 _____

11. Identify each of the following as measurements of length, area, volume, mass, density, time, or temperature: (1 pt. each)

a) 548 km² _____ area _____ b) 8.96 g/mL _____ density _____

c) 0.0854 L _____ volume _____ d) 32 μg _____ mass _____

e) 43.2 cm³ _____ volume _____

12. What is the best answer to the following expression? $(85.4 + 35.48) =$ _____ 120.9 _____
(2 pts.) (Follow significant figure rules.) $85.4 + 35.48 = 120.88 = 120.9$

13. What is the best answer to the following expression? $(190 - 32) =$ _____ 160 _____
(2 pts.) $190 - 32 = 158 = 160$

14. What is the best answer to the following expression? $(4.58)(0.029) =$ _____ 0.13 _____ (2
pts.) first # has 3 sig. figs. And second # has 2 s.f., so answer has 2 s.f. = 0.13282

15. What is the best answer to the following expression? $\frac{(32.57 - 25.5)}{232.0} =$ _____ 0.030 _____ (2
pts.) $(32.57 - 25.5) = 7.07$, $7.07/232.0 = 0.030474$

16. Fill in the element name of the given chemical symbol. (1 pt. each)

a) Rn _____ radon _____ b) Mn _____ manganese _____

c) Ra _____ radium _____ d) Fe _____ iron _____

e) Au _____ gold _____ f) Sn _____ tin _____

g) K _____ potassium _____ h) Hg _____ mercury _____

17. Fill in the chemical symbol of the given element name. (1 pt. each)

a) barium Ba b) hydrogen H

c) platinum Pt d) argon Ar

e) silver Ag f) chromium Cr

g) chlorine Cl h) nickel Ni

PART 2. PROBLEMS. Show all units. Show all answers to correct significant figures. MUST SHOW ALL WORK. Write numbers and letters legibly. Use exact conversion factors.

18.) $35\text{ }^{\circ}\text{C} = \underline{308}$ K. (3 pts.)

$$\underline{35 + 273.15 = 308.15 = 308\text{ K}}$$

19.) $35\text{ }^{\circ}\text{C} = \underline{95}$ $^{\circ}\text{F}$. (4 pts.)

$$\underline{T_{\text{F}} = 1.8(T_{\text{C}}) + 32 = 1.8(35^{\circ}\text{C}) + 32 = 95\text{ }^{\circ}\text{F}}$$

20.) $52.3\text{ cm} = \underline{0.523}$ m (3 pts.)

$$\underline{52.3\text{ cm} \left(\frac{1\text{ m}}{100\text{ cm}} \right) = 0.523\text{ m}}$$

21.) $52.3\text{ cm} = \underline{1.72}$ ft. (4 pts.)

$$\underline{52.3\text{ cm} \left(\frac{1\text{ in.}}{2.54\text{ cm}} \right) \left(\frac{1\text{ ft.}}{12\text{ in.}} \right) = 1.715879 = 1.72\text{ ft.}}$$

22.) $732 \text{ ns} = \underline{0.732} \text{ } \mu\text{s}$ (4 pts.)

$$732 \text{ ns} \left(\frac{1 \times 10^{-9} \text{ s}}{1 \text{ ns}} \right) \left(\frac{1 \mu\text{s}}{1 \times 10^{-6} \text{ s}} \right) = 0.732 \mu\text{s}$$

23.) A sample is weighed in lab giving 32.259 g, and the volume was measured to be 5.43 mL at 25°C. What is the density of this sample at 25°C? (4 pts.)

$$\text{density} = \frac{\text{mass}}{\text{volume}} = \frac{32.259 \text{ g}}{5.43 \text{ mL}} = 5.94 \text{ g/mL}$$

24.) Gold has a density of 19.3 g/mL at 25°C. What is the volume of a 15.0 g sample of gold at 25°C? (6 pts) **each step of algebra shown (program won't let me cross off anything)**

$$\text{density} = \frac{\text{mass}}{\text{volume}} \quad \text{volume} * \text{density} = \frac{\text{mass}}{\text{volume}} * \text{volume} \quad \text{volume} * \text{density} = \text{mass}$$

$$\frac{\text{volume} * \text{density}}{\text{density}} = \frac{\text{mass}}{\text{density}} \quad \text{volume} = \frac{\text{mass}}{\text{density}} = 15.0 \text{ g} \left(\frac{1 \text{ mL}}{19.3 \text{ g}} \right) = 0.777 \text{ mL}$$

25.) Lead has a density of 11.3 g/mL at 25°C. What is the mass of a 10.0 mL sample of lead at 25°C? (5 pts)

(see first steps of last problem)

$$\text{mass} = \text{volume} * \text{density} = 10.0 \text{ mL} \left(\frac{11.3 \text{ g}}{\text{mL}} \right) = 113 \text{ g}$$

26.) What is the length of 20.0 feet in meters? (5 pts.)

ft. → in. → cm → m

$$20.0 \text{ ft.} \left(\frac{12 \text{ in.}}{1 \text{ ft.}} \right) \left(\frac{2.54 \text{ cm}}{1 \text{ in.}} \right) \left(\frac{1 \text{ m}}{100 \text{ cm}} \right) = 6.096 = 6.10 \text{ m}$$

27.) The density of gold is 19.3 g/mL at 25°C.. What is this density in pounds/gallon at 25°C? (5 pts.)
(1 kg = 2.20 pounds, 1 gallon = 3.79 L)

g → kg → pounds , mL → L → gallon

$$\left(\frac{19.3 \text{ g}}{\text{mL}} \right) \left(\frac{1 \text{ kg}}{1000 \text{ g}} \right) \left(\frac{2.20 \text{ lbs.}}{1 \text{ kg}} \right) \left(\frac{1000 \text{ mL}}{1 \text{ L}} \right) \left(\frac{3.79 \text{ L}}{1 \text{ gallon}} \right) = 161 \frac{\text{pounds}}{\text{gallon}}$$

28.) A fish aquarium holds 50.0 gallons of water. What is this volume in ft³ (cubic feet)? (6 pts.)
(1 gallon = 3.79 L)

gallons → Liter → mL → cm³ → in.³ → ft.³

$$50.0 \text{ gallon} \left(\frac{3.79 \text{ L}}{1 \text{ gallon}} \right) \left(\frac{1000 \text{ mL}}{1 \text{ L}} \right) \left(\frac{1 \text{ cm}^3}{1 \text{ mL}} \right) \left(\frac{1 \text{ in.}}{2.54 \text{ cm}} \right) \left(\frac{1 \text{ in.}}{2.54 \text{ cm}} \right) \left(\frac{1 \text{ in.}}{2.54 \text{ cm}} \right) \left(\frac{1 \text{ ft.}}{12 \text{ in.}} \right) \left(\frac{1 \text{ ft.}}{12 \text{ in.}} \right) \left(\frac{1 \text{ ft.}}{12 \text{ in.}} \right) =$$

$$= 6.69 \text{ ft.}^3$$