

Name \_\_\_\_\_ Date \_\_\_\_\_

CH1 WKST

1. List two necessary defining characteristics of matter and illustrate with examples.
2. Distinguish between the gas, liquid and solid phase by listing the unique properties of each that are not shared by the others.

Gas:

Liquid:

Solid:

3. Distinguish between pure substances, homogeneous mixtures and heterogeneous mixtures by listing the unique properties of each that are not shared by the others.
4. Define the terms *atom*, *element* and *compound* (You may use drawings to support and clarify your definitions.)
5. State the principle postulates of Dalton's atomic theory.

6. For each of the separation techniques listed below, give an example of how the technique is used to separate the components of a mixture.

- a) Decantation
- b) Filtration
- c) Evaporation
- d) Distillation
- e) Paper chromatography

7/8. Units for which of the following physical quantities are base units in SI and which are SI-derived units? For each provide the name and symbol (abbreviation) of the SI unit used to express physical quantity.

Physical Quantity	Fundamental or derived unit	Name of Unit	Symbol
volume	-----	-----	-----
mass	-----	-----	-----
density	-----	-----	-----
amount of substance	-----	-----	-----
temperature	-----	-----	-----
heat	-----	-----	-----
length	-----	-----	-----
time	-----	-----	-----

9. Give the name of the prefix and its abbreviation for each of these multipliers.

Factor	Prefix	Abbreviation
$10^9$	-----	-----
$10^6$	-----	-----
$10^3$	-----	-----
$10^{-1}$	-----	-----
$10^{-2}$	-----	-----
$10^{-3}$	-----	-----
$10^{-6}$	-----	-----
$10^{-9}$	-----	-----

10. Figure I shows a glass cylinder containing four liquids each of different density. Two of the liquids have been identified. A table containing a list of substances and their density (at 25 °C) has been provided. From the list select a substance for Liquid #1 and Liquid #3. Briefly explain the reason(s) for your selections and for the remaining substances the reason they were not selected.

Substance	Density (g/mL)	Liquid #
Mercury	13.5	Liquid #4
Water	1.0	Liquid #2
Hexane	0.660	
Ethyl alcohol	0.789	
Dichloromethane	1.33	
Aluminum	2.699	
Bromine	2.928	
Gold	19.3	

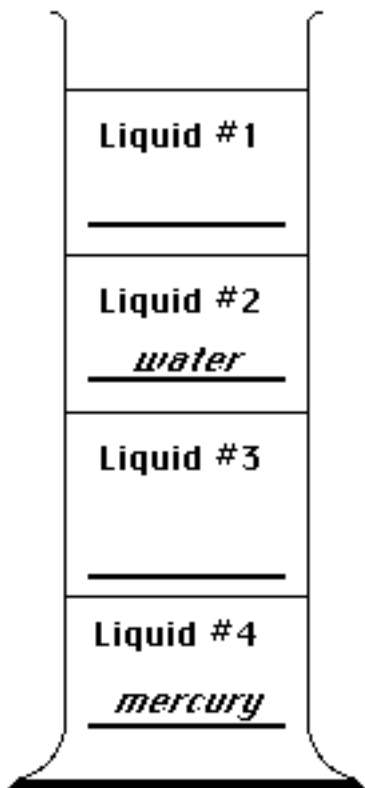
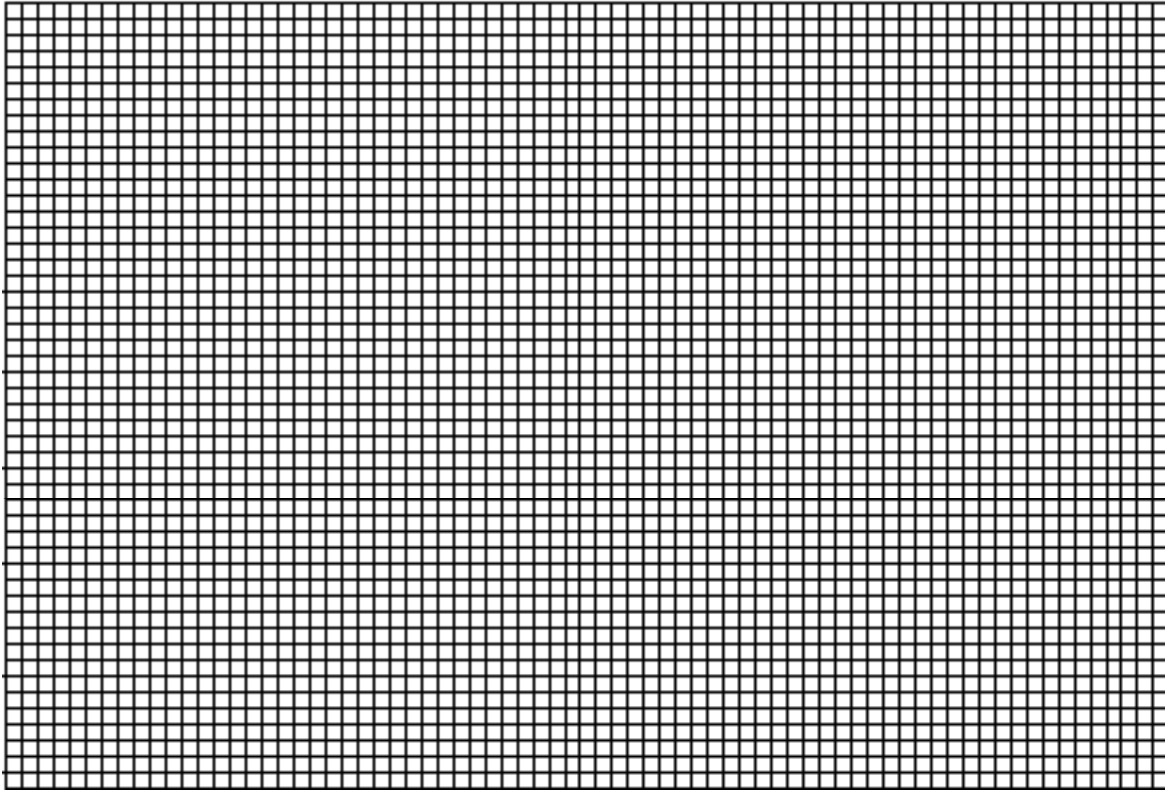


Figure I.

11. The temperature of liquid ethanol was measured several times with two thermometers as the sample was heated from its freezing point to its boiling point. One thermometer was calibrated in degrees Celsius, the other in degrees Fahrenheit. The data collected is shown in the table below.

Temperature $^{\circ}\text{F}$	Temperature $^{\circ}\text{C}$
-103	-75
-75	-59
32	0
91	33
172	78

a) Plot the data with  $^{\circ}\text{F}$  on the  $y$ -axis and  $^{\circ}\text{C}$  on the  $x$ -axis. Determine the mathematical equation relating  $^{\circ}\text{F}$  to  $^{\circ}\text{C}$ .



b) Use the equation obtained from your graph to calculate the Fahrenheit temperature corresponding to  $-40\text{ }^{\circ}\text{C}$ .

12. The density of concentrated sulfuric acid is  $1.84\text{ g/mL}$ . Concentrated sulfuric acid is 95 % pure sulfuric acid. What volume of concentrated sulfuric acid contains 100 g of pure sulfuric acid?

13. a) During a flood an average of  $1.00 \times 10^3\text{ ft}^3$  of water flowed out of a dam's flood gate each minute. What volume in  $\text{ft}^3$  and liters flowed out of the gate in one hour?

b) If the flow was constant for one entire day, what mass of water in kilograms was released from the dam? What weight in pounds?