

Measurement and Matter Review

- 1) Classify each material as a Heterogeneous Mixture, Solution, Compound, or Element.

Material	Classification	Material	Classification
a. air		e. alcohol	
b. paper		f. milk	
c. table salt		g. plutonium	
d. apple		h. water	

- 2) Classify the following properties as chemical or physical. If a physical property, classify it as E for extensive or I for intensive.

Property	Chemical or Physical	Property	Chemical or Physical
a. color		h. expansion	
b. reactivity		i. melting point	
c. flammability		j. rusting	
d. odor		k. reacts with air	
e. porosity		l. density	
f. stability		m. length	
g. solubility		n. specific heat capacity	

- 3) Mark the following statements as true or false.

- | | | |
|--|------|-------|
| a. All homogeneous mixtures appear to have a uniform appearance. | True | False |
| b. All mixtures that appear uniform are homogeneous. | True | False |
| c. In a solution no grains or particles are visible. | True | False |
| d. Solutions are single-phase systems. | True | False |

4) Classify the following changes as chemical or physical.

Change	Chemical or Physical
a. digestion of food	
b. fading of dye in cloth	
c. growth of a plant	
d. melting of ice	
e. explosion of gasoline in an engine	
f. making rock candy by evaporating water from a sugar solution	
g. burning of coal	
h. tearing of a piece of paper	
i. exploding dynamite	

5) Classify the following mixtures as homogeneous or heterogeneous

Mixture	Heterogeneous or Homogeneous
a. gasoline	
b. foamy shaving cream	
c. oil and vinegar	
d. stainless steel	
e. white copier paper	
f. pepperoni pizza	
g. diet soda	
h. coarse sand paper	
i. a sheet of plywood	
j. duct tape	
k. liquid hand soap	

6) Express the following numbers in meters.

- a. 742 cm _____ meters
- b. 1,055 mm _____ meters
- c. 6000 km _____ meters
- d. 0.0075 cm _____ meters
- e. 0.251 mm _____ meters
- f. 0.00625 km _____ meters

7) Express the following numbers in grams.

- a. 152 kg _____ grams
- b. 0.074 kg _____ grams
- c. 0.500 kg _____ grams
- d. 20,160 mg _____ grams
- e. 765 mg _____ grams
- f. 5.4 mg _____ grams

8) Express the following numbers in liters.

- a. 1500 mL _____ liters
- b. 340 mL _____ liters
- c. 0.30 mL _____ liters
- d. 17,354 μL _____ liters

9) Express the following numbers in milliliters.

- a. 92 L _____ mL
- b. 0.015 L _____ mL
- c. 1,924 μL _____ mL
- d. 754 L _____ mL
- e. 2 L _____ mL

10) Write the number of significant figures for each number.

- | | | | |
|--------------------------|-------|------------------------|-------|
| a. 27316 | _____ | f. 9.040×10^5 | _____ |
| b. 186,000 | _____ | g. 0.00623 | _____ |
| c. 717 | _____ | h. 40.070 | _____ |
| d. 1000 | _____ | i. 5280 | _____ |
| e. 6.52×10^{-2} | _____ | j. 0.070830 | _____ |

11) Change °C to K

- a. 0°C _____ K c. 312°C _____ K
b. 100°C _____ K d. 74°C _____ K

12) Change K to °C

- a. 420 K _____ °C c. 900 K _____ °C
b. 712 K _____ °C d. 113 K _____ °C

13) Given the formula $^{\circ}\text{C} = \frac{5}{9}(^{\circ}\text{F} - 32)$, change °F to °C:

- a. 32°F _____ °C c. -40°F _____ °C
b. 50°F _____ °C d. 16°F _____ °C

14) Change °C to °F:

- a. 0°C _____ °F c. 60°C _____ °F
b. -40°C _____ °F d. 13°C _____ °F

15) Write the following numbers in scientific notation.

- a. 0.0063 _____
b. 72,800 _____
c. 5,264,812 _____
d. 0.000000024 _____
e. 0.326 _____
f. 1 _____
g. 145,000,000 _____
h. 1/5 _____

16) Write the following numbers in scientific notation as regular numbers.

- a. 2.5×10^3 _____ e. 9.99×10^{-3} _____
b. 1.6×10^{-4} _____ f. 4.32×10^1 _____
c. 8.33×10^2 _____ g. 8.78×10^{-1} _____
d. 6.04×10^0 _____ h. 1.05×10^5 _____

17) Solve the following problems. Use the correct number of significant figures in your answers.

a. $30.7 \text{ mm} + 44.5 \text{ cm} + 7.01 \text{ m}$ (answer in meters) _____

b. If 32.5 L were taken from 85 L, how much is left? _____

c. What is the area of the bottom of a tank
30.0 cm long and 15.0 cm wide? _____

d. 98.4 divided by 10.375 _____

18) Name a SI unit used to express the following parameters.

a. length _____

b. temperature _____

c. density _____

d. pressure _____

e. volume _____

19) Name a metric unit used to express the following parameters.

a. length _____

b. temperature _____

c. density _____

d. pressure _____

e. volume _____

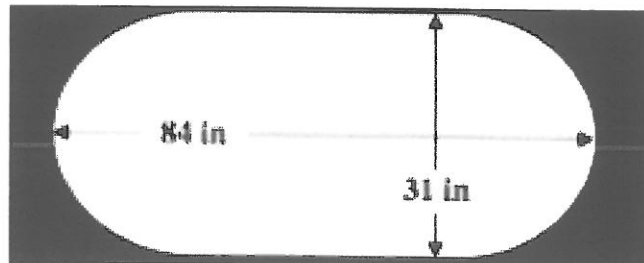
Use dimensional analysis to solve the following problems:

20) An automobile engine has a volume of 5.02 L. What is this volume in ml?

21) In Saudi Arabia, gasoline costs 30.0 Hillala per liter. If there are exactly 100 Hillalas in one Ryal and one Ryal exchanges for 25.0 cents, what is the cost in cents/liter?

- 22) Convert 55 miles/hour to meters/second.
- 23) You are riding home from a party and the driver has been drinking. The car is traveling at 60 mph. Suddenly a child steps into the road ahead. Because the driver has been drinking his reaction time has been slowed by 1 second. How far toward the impending accident will the car travel before the driver begins to stop? (Note: this is equal to the extra distance it will take to stop the car because the driver has been drinking.)
- 24) You are shadowing a nurse at Hershey Medical Center who receives an order to adjust the infusion rate of a pump so that 1.6 mg of lidocaine are being delivered per minute. Hanging is a 100cc piggyback containing 0.4 grams lidocaine, a 0.4% solution. Without writing anything down, the nurse tries to solve the problem on a calculator. After the fifth different and incorrect answer you find a piece of scratch paper and offer to show her how to set up the problem. She assures you she can always do problems like this on tests, but admits that at the moment her brain doesn't seem to be working. How would you set up and explain the problem to her?
- 25) One 1.6 oz package of cinnamon and spice instant oatmeal contains 34 grams of carbohydrates. If you had 1 package of instant oatmeal per day 6 days a week, how many ounces of carbohydrate would you consume in a week? (16 oz = 1 lb = 453.6 g)

- 26) A man weighing 198 lbs climbs into a very large bathtub of 30°C water and submerges himself. The bathtub is 84.0 inches long, and 31.0 inches wide. The ends of the bathtub are perfect semicircles that are 31.0 inches in diameter. The water level of the tub increases by 2.36 inches; assume that the sides of the bathtub are perpendicular to the floor. The density of water at 30°C is 0.996 g/cm³.
- a) What is the man's volume (in cm³)?



- b) What is the man's density (g/cm³)?

- c) Would the man sink or float if the bathtub was big enough?

Useful Information

1 inch = 2.54 cm

1 lb = 453.6 grams

1 mile = 5280 feet

Volume of a cylinder = $\pi r^2 h$

