Review for Chapter 1 Test – Honors Physical Science

- Be able to identify the base units in the Metric system
- Be able to write a number in scientific notation when given the correct number of significant figures to use
- Be able to determine the number of significant figures in a number
- Be able to express the answer to a mathematical function in scientific notation using the correct number of significant figures
- Be able to convert from one unit to another unit from metric to metric and English to metric
- Be able to determine the variable and control groups in an experiment
- Be able to identify the independent and dependent variable
- Be able to define and distinguish between accuracy and precision
- Use and rearrange the formula for density

Review: Answer the following questions on the lines provided

- **SIGNIFICANT FIGURES** – Identify how many significant figures there are in each number below.

  - 2.100   **4**
  - 65.006   **5**
  - 0.00000385   **3**
  - 6.33×10^7 **3**

  - 1.700×10^{-3} **4**
  - 0.0040   **2**
  - 50.00   **4**
  - 0.000300500   **6**

- **SCIENTIFIC NOTATION** – Express the number or answer in scientific notation, using the proper number of significant figures.

  - 943,000,000,000 9.43×10^{11}
  - 0.0000000000811 8.11×10^{-11}
  - 5,240,000,000,000,000,000,000,000 5.24×10^{24}
  - 0.000006530 6.530×10^{-6}
  - 276,000 2.760×10^5 (Assume that the number has 4 sig figs for this problem)
  - 0.000000000000000000000167 1.67×10^{-22}
  - 0.0000000350 x (7.20 x 10⁴) 2.52×10^{-3}
  - (9.355 x 10⁹) / (3.06 x 10⁸) 30.6

- **CONVERSIONS** – Using your conversion sheet and showing all work, convert the following quantities.

  - 250 yards = _____ **228.5** _____ meters

$$\frac{250 \text{ yds}}{1} \Big| \frac{0.914 \text{m}}{1 \text{ yd}}$$

○ 5.83 days = __503,712__ seconds $\dfrac{5.83 \text{ days} \mid 8.64E^4 \text{ s}}{\mid 1 \text{ day}}$

○ 890,000 cm = __5.53__ miles $\dfrac{890,000 \text{ cm} \mid .01 \text{ m} \mid 1 \text{ mi}}{\mid 1 \text{ cm} \mid 1609 \text{ m}}$

○ 4.6×10^5 mL = __121.53__ gallons $\dfrac{4.6 \times 10^5 \text{ mL} \mid .001 \text{ L} \mid 1 \text{ gal}}{\mid 1 \text{ mL} \mid 3.785 \text{ L}}$

○ 65 mph = __29.05__ m/s $\dfrac{65 \text{ mi} \mid 1609 \text{ m} \mid 1 \text{ hr}}{\text{hr} \mid 1 \text{ mi} \mid 3600 \text{ s}}$

○ 100 m/s = __223.74__ mph $\dfrac{100 \text{ m} \mid 1 \text{ mi} \mid 3600 \text{ s}}{\text{s} \mid 1609 \text{ m} \mid 1 \text{ hr}}$

○ 9.350×10^8 cm³ = __33,019.21__ ft³ $\dfrac{9.350 \times 10^8 \text{ cm}^3 \mid 1 \text{ ft} \mid 1 \text{ ft} \mid 1 \text{ ft}}{\mid 30.48 \text{cm} \mid 30.48 \text{cm} \mid 30.48 \text{ c}}$

○ 640 m² = __760.38__ yds² $\dfrac{640 \text{ m}^2 \mid 1.09 \text{ yd} \mid 1.09 \text{ yd}}{\mid 1 \text{ m} \mid 1 \text{ m}}$

○ 0.91 lbs/in³ = __25.13__ g/cm³

$\dfrac{.91 \text{ lbs} \mid 1000 \text{g} \mid 1 \text{ in} \mid 1 \text{ in} \mid 1 \text{ in}}{\text{in}^3 \mid 2.21 \text{lbs} \mid 2.54 \text{ cm} \mid 2.54 \text{ cm} \mid 2.54 \text{cm}}$

$$D = \frac{m}{V}$$

$m = ($

- **DENSITY** - *For each problem below, write the equation and show your work. Always use units and box in your final answer.*

1. The density of silver (Ag) is 10.5 g/cm³. Find the mass of Ag that occupies 965 cm³ of space.

$D = 10.5 g/cm^3$
$m = ?$
$V = 965 cm^3$

$m = DV \quad 10.5 \cdot 965$

$\boxed{m = 1.01 \times 10^4 g}$

2. A 2.75 kg sample of a substance occupies a volume of 250.0 cm³. Find its density in g/cm³.

$D =$
$m = 2.75 kg$
$V = 250.0 cm^3$

$D = \frac{m}{V} = \frac{2.75 kg}{250.0 cm^3} = \frac{.011 kg}{cm^3} = \boxed{D = 11.0 g/cm^3}$

3. Under certain conditions, oxygen gas (O_2) has a density of 0.00134 g/mL. Find the volume occupied by 250.0 g of O_2 under the same conditions.

$= 1.34c^{-3} g/mL$
$n = 250.0 g$
$J = ?$

$V = \frac{m}{D} = \frac{250.0 g}{1.34 \times 10^{-3} g/mL} = 186567.1 = \boxed{V = 1.87 \times 10^5 mL}$

4. Find the volume that 35.2 g of carbon tetrachloride (CCl_4) will occupy if it has a density of 1.60 g/mL.

$) = 1.60 g/mL$
$n = 35.2 g$
$J =$

$V = \frac{m}{D} = \frac{35.2 g}{1.60 g/mL} = 22 = \boxed{V = 22.0 mL}$

5. The density of ethanol is 0.789 g/mL. Find the mass of a sample of ethanol that has a volume of 150.0 mL.

$D = 0.789 g/mL$
$m = ?$
$V = 150.0 mL$

$m = Dv = 0.789 g/mL (150.0 mL) = 118.35 = \boxed{m = 118 g}$

6. 30.0 g of each of the following acids are needed. Find the volume of each that must be measured out in a graduated cylinder.

A. hydrochloric acid (HCl), density = 1.164 g/mL

$m = 30.0 g$
$D = 1.164 g/mL$
$V = ?$

$V = \frac{m}{D} = \frac{30.0 g}{1.164 g/mL} = 25.773 mL = \boxed{V = 25.8 mL}$

B. sulfuric acid (H_2SO_4), density = 1.834 g/mL

$D = 1.834 g/mL$
$m = 30.0 g$
$V = ?$

$V = \frac{m}{D} = \frac{30.0 g}{1.834 g/mL} = 16.358 = \boxed{V = 16.4 mL}$

C. nitric acid (HNO_3), density = 1.251 g/mL

$D = 1.251 g/mL$
$m = 30.0 g$

$V = \frac{m}{D} \quad \frac{30 g}{1.251 g/mL} = 23.981 = \boxed{V = 24.0 mL}$

7. A rectangular block of lead (Pb) measures 20.0 mm by 30.0 mm by 45.0 mm. If the density of Pb is 11.34 g/cm³, calculate the mass of the block.

$m = ?$
$D = 11.34 g/cm^3$
$V = (20.30.45) = 27000 mm^3$

$\frac{27000 mm^3 | 1 cm^3}{1000 mm^3} \quad m = DV = 11.34 \cdot 270$
$= 306.18 g \quad \boxed{m = 306 g}$

8. A perfect cube of gold (Au) has a side length of 1.55 cm. If the sample is found to have a mass of 71.9 g, find the density of Au.

$V = l \cdot w \cdot h = 3.72 cm^3$
$m = 71.9 g$
$D = ?$

$D = \frac{m}{V} = \frac{71.9 g}{3.72 cm^3} = 19.327 \quad \boxed{D = 19.3 g/cm^3}$

$D = \dfrac{m}{V}$

9. An irregularly-shaped sample of aluminum (Al) is put on a balance and found to have a mass of 43.6 g. The student decides to use the water-displacement method to find the volume. The initial volume reading is 25.5 mL and, after the Al sample is added, the water level has risen to 41.7 mL. Find the density of the Al sample in g/cm³. (Remember: 1 mL = 1 cm³.)

$D = ?$
$m = 43.6g$
$V = 16.2 mL$

$D = \dfrac{m}{V} = \dfrac{43.6g}{16.2 cm^3} = 2.691$: $\boxed{D = 2.69 g/cm^3}$

10. A gas has a mass of 3175 g and takes up enough space to fill a room that is 2.00 m by 2.00 m by 5.00 m. Use the table below, which lists densities in units of g/mL to help you determine what the gas is. (Hint: Make sure your units make sense.)

D
$m = 3175g = 3.175 Kg$
$V = 20 m^3$

$D = \dfrac{m}{V} = \dfrac{3.175 Kg}{20 m^3} = 0.159 kg/m^3$ $\boxed{gas = Helium}$

Gas	Density (kg/m³)
Argon	1.661
Helium	0.159
Hydrochloric Acid	1.59
Hydrogen	0.089

- **EXPLAINING AND JUSTIFYING** – Use complete sentences.
  - o Why do we use significant figures? Use an example to justify.

  - o Define and contrast accuracy and precision. Use an example to justify.

  - o What are the base and derived units in SI measurement?

  - o What are the units in SI measurement?

  - o Why is it important to have standardized measurement in the field of science? Use an example to justify.

Answers will vary if you have questions ask them *