Honors Chemistry Problem Party

Unit One

1. Define accuracy and precision using the analogy of pitching a baseball. You may use pictures in your analogy. Accuracy - nearness to accepted
Precision - how close are all measurements
2. What is the difference between absolute error and relative error?
absolute is the deviation, relative is the %.
3. Why is giving an answer in the correct number of significant digits important?
the answer reflects the precision of the measured values.
4. How many significant figures are there in each of the following:

a. 156.18 5
b. 381,000 3
c. 905 3
d. 4000 1
e. 9,000,000 1
f. 420,000 2
g. 6.80236 3
h. 70.040 5
i. 1760 3
j. 0.820750 5
k. 9.73×10^{-2} 3
l. 8.020×10^{5} 4

5. Round off each of the following to the number of figures indicated.

Number	5 figures	4 figures	3 figures	2 figures
563.189	563.19	563.2	563	560
5.13159	5.1316	5.132	5.13	5.1
8.59530	8.5953	8.595	8.60	8.6

6. In the following, calculate the answer based on the correct method of using significant figures and decimal places.

a. 20.7 m + 7.01 m + 151.110 m = 178.82 ~ 178.8 m
b. 3053 L − 70 L = 2983 L
c. 68.57 km + 358.01 km + 59 km = 485.58 ~ 486 km
d. 2000 g − 60.0 g = 1940 g
e. 781.6 cm X 54 cm = 42206.4 ~ 42000 cm^2
f. 952 g X 17.3 g = 16469.6 ~ 16500 g^2
g. 95.4 L / 10.875 L = 8.772413793 ~ 8.77 L
h. 6.02×10^{23} atoms / 1.81×10^{24} atom = .332596685 ~ .332 atoms

$\frac{507\text{ mm}}{1}\left|\frac{1\text{ m}}{10^3\text{ mm}}\right. = .507\text{ m}$ $\frac{47.4\text{ cm}}{1}\left|\frac{\text{m}}{10^2\text{ cm}}\right. = .474$

7. Express the sum of 507 mm + 47.4 cm + 8.01 m in METERS using the appropriate number of decimal places.
.507 m + .474 m + 8.01 m = 8.991 ~ 8.99 m
8. If 42.5 L of gasoline is drawn from a tank originally containing 75 L of gasoline, what volume of gasoline remains in the tank? 75 L − 42.5 L = 32.5 ~ 33 L
9. What is the density of an unknown metal with a mass of 15 grams and a volume of 30 liters?
$\frac{15\text{ g}}{30\text{ L}} = .5\text{ g/L}$
10. Use the reference table to answer the following:

Metal	Density
Zinc	7.140 g/cm³
Antimony	6.684 g/cm³
Copper	8.96 g/cm³
Carbon	2.2670 g/cm³
Sulfur	2.07 g/cm³

a. The volume of 25 grams of zinc. (a) $\frac{25\text{ g}}{7.140\text{ g/cm}^3} = 3.5\text{ cm}^3$
b. The mass of 2.5 cm³ of antimony. (b) $6.684\text{ g/cm}^3 \times 2.5\text{ cm}^3 = 16.71 \sim 17\text{ g}$
c. The volume of 100 g of copper.
d. The mass of 2 ml of sulfur.
e. A graduated cylinder contains 450 ml of water. A lump of coal is lowered into the water and the liquid level rises to 525 ml. Knowing that coal is a form of carbon, what is the mass of the coal?

11. Calculate the following using the information below:

Trial	Mass	Accepted Value
1	23.26 g	23.20 g
2	23.18 g	
3	22.95 g	

a. What is the Ea for trial 1? Er for trial 1?
b. What is the Ea for trial 2? Er for trial 2?
c. What is the Ea for trial 3? Er for trial 3?
d. What is the Da for the experiment?

(c) $\frac{100\text{ g}}{8.96\text{ g/cm}^3} = 11.1681 \sim 10\text{ cm}^3$
(d) $2.07\text{ g/cm}^3 \times 2\text{ cm}^3 = 4.14 \sim 4\text{ g}$
(e) $2.2670\text{ g/cm}^3 \times 75\text{ cm}^3 = 170.025 \sim 170\text{ g}$

(a) Ea = |23.26 g − 23.20 g| = .06 Er $\frac{.06}{23.20} \times 100 = .3\%$
(b) Ea = |23.18 g − 23.20 g| = .02 Er = $\frac{.02}{23.20} \times 100 = .09\%$
(c) Ea = |22.95 g − 23.20 g| = .25 ER = $\frac{.25}{23.20} \times 100 = 1.08\% \sim 1.1\%$
(d) Da = |23.26 − 23.13| = .13

12. Solve the following problems using dimensional analysis and the appropriate number of sigfigs.

a. 600 dm = 6 Dm $\frac{600\ dm}{1} \times \frac{1\ Dm}{10\ dm} = 6\ Dm$

b. 4.5×10^{-5} kl = .045 L $\frac{4.5 \times 10^{-5}\ kl}{1} \times \frac{1000\ L}{1\ kl} = .045\ L$

c. 5.66 cg = 56.6 mg $\frac{5.66\ cg}{1} \times \frac{10\ mg}{1\ cg} = 56.6\ mg$

d. 6.6 cg = .00066 Hg $\frac{6.6\ cg}{1} \times \frac{1\ Hg}{10000\ cg} = .00066\ Hg$

e. 4.50 gram = .45 Decagrams $\frac{4.50\ g}{1} \times \frac{1\ Dg}{10\ g} = .45\ Dg$

f. 100.0 g/liter = 100.0 mg/ml $\frac{100.0\ g}{1\ L} \times \frac{1000\ mg}{1\ g} \times \frac{1\ L}{1000\ ml} = 100.0\ mg/ml$

g. 0.0023020 g = 2302.0 ug $0.0023020\ g \times \frac{10^6\ ug}{1\ g} = 2302.0\ ug$

h. 2.10×10^4 nanometers = 2.1×10^{-6} Dekameters $\frac{2.10 \times 10^4\ nm}{1} \times \frac{1\ Dm}{10^{10}\ nm} = 2.1 \times 10^{-6}$

i. 6.4 cm^3 = 6.4×10^{-12} Hm^3 $\frac{6.4\ cm^3}{1} \times \frac{1\ Hm^3}{10^{12}\ cm^3} = \frac{(1\ Hm)^3}{(10^2\ m)^3}$

j. 12.02 m^2 = 1.202×10^7 mm^2 $\frac{12.02\ m^2}{1} \times \frac{10^6\ mm^2}{1\ m^2} = \frac{(10^3\ mm)^2}{(1\ m)^2}$

k. 78 km/hr = 1300 m/min $\frac{78\ km}{hr} \times \frac{10^3\ m}{1\ km} \times \frac{1\ hr}{60\ min} = 1300\ m/min$

13. In each of the following, which is the independent variable and which is the dependent variable?

a. Distance a car moves (D) and the time it takes the car to move that distance (I)

b. Volume of a gas (D) —— temperature of a gas (I)

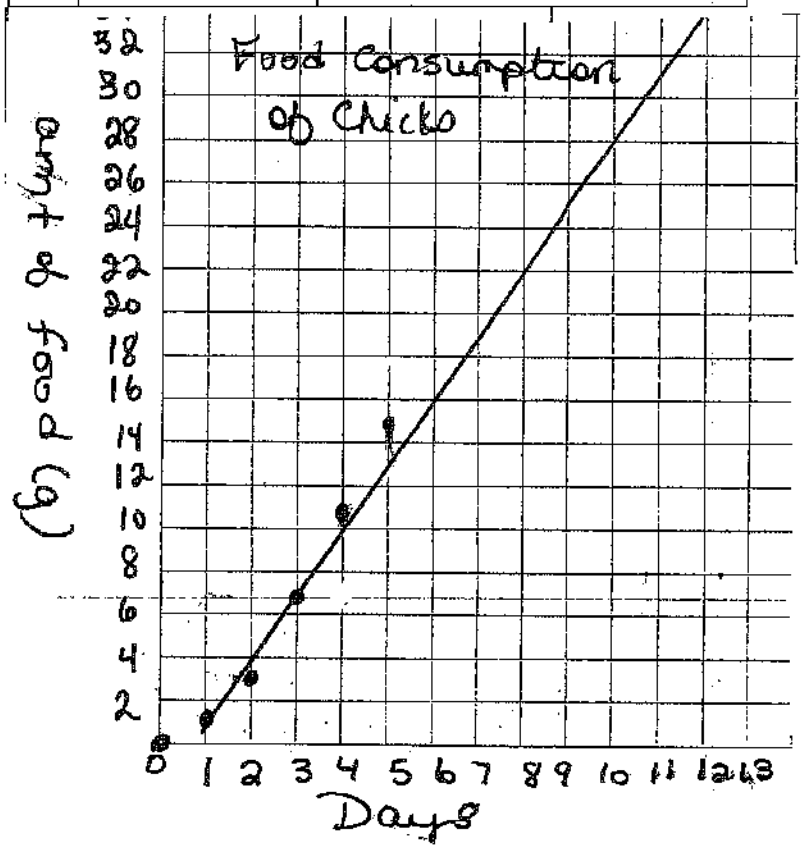
c. Atmospheric temperature (I) ———— amount of perspiration a person creates (D)

d. Force of a crash (I) ———— amount of bruising on a victim (D)

14. Create a graph using the information below. Complete the questions when the graph is completed and ready to be analyzed/

Baby chickens, like all baby birds, require a constant source food. As a chick grows, more energy is required for daily activities, and their food requirements increase. The following data table reports the average food eaten by a group of 10 chickens over a 5-day period.

Baby Chicken Food Consumption		Questions
Day (I)	Food Consume (g) (D)	1. Identify the independent and dependent variable. 2. How much grain will the checks eat on day 6? Day 7? (extrapolate your data line) 16 g, 18 g 3. What type of relation does the graph represent (direct or inverse proportion? Direct
0	0.0	
1	1.0	
2	3.2	
3	6.5	
4	10.8	
5	15.4	



15. Complete the table below:

Standard Notation	How many sigfigs are in each mass?	Scientific Notation
.000045	2	4.5×10^{-5} g
0.00298	3	2.98×10^{-3}
310	2	3.1×10^{2} g
0.000000633	3	6.33×10^{-7}
110	2	1.1×10^{2} g
75400	3	7.54×10^{4}
.00911	3	9.11×10^{-3} g
0.000008776	4	8.775×10^{-6}
142,000	3	1.42×10^{5} g

16. Complete the following table:

Measurement	Standard Notation	Scientific Notation
155 cm= $\frac{1550\text{cm}}{1} \mid \frac{1\text{ Dm}}{10\text{cm}}$	15.5 Dm	1.55×10^{1} Dm
155 cm= $\frac{155\text{cm}}{1} \mid \frac{1\times10^{12}\text{ pm}}{1\text{ cm}}$	155,000,000,000 pm	1.55×10^{12} pm
2.77×10^{-7} kg= $\frac{2.77\times10^{-7}\text{ kg}}{1} \mid \frac{1\text{ kg}}{1\times10^{6}\text{ mg}}$	.277 mg	2.77×10^{-1} mg
86700 dl= $\frac{86700}{1} \mid \frac{1\text{ Hl}}{100\text{ dl}}$	867 Ml	8.67×10^{2} Ml
0.000876 Km= $\frac{1\text{ Km}}{1} \mid \frac{1\times10^{9}\text{ Gm}}{1\times10^{6}\text{ Km}}$	.000000000876 Gm	8.76×10^{-10} Gm

17. Determine the absolute error, percent error, and absolute deviation for the following scenarios:

a. John was asked to find the mass of a rock. He massed it the first time and determined the rock had a mass of 10.20 grams. Worrying that he has used the balance incorrectly, he massed the rock again and determined the mass to be 10.30 gram. To determine which of the measurements was closest to the actual mass, he massed the rock a third time and determined that it has a mass of 10.25 grams.

$Da = |10.20 - 10.25| = .05$

Ea = Can't determine w/o accepted

$\%(E_R)$ = Can't determine w/o accepted

b. A lab group was asked to find the density of a piece of aluminum. The lab procedure required five trials. The results of their experiment was: 3.80 g/ml, 3.82 g/ml, 3.74 g/ml, 3.69 g/ml, and 3.66 g/ml. The actual density of aluminum as published is 3.70 g/ml.

$Da = |3.80 - 3.79| = .01$

$Ea = |3.80 - 3.70| = .1$

$E_R = \frac{.1}{3.70} \times 100 = 2.70 \sim$

3%