Early Booklet E.C.:	**/ 2**
Unit 1 Hwk. Pts:	**/ 29**
Unit 1 Lab Pts:	**/ 56**
Late, Incomplete, No Work, No Units Fees?	Y / N

Unit 1 – Introduction to Chemistry & Data Analysis

Chapters 1 – 2 of your book.

Learning Targets for Unit 1

1.1 I can define substance.
1.2 I can compare and contrast mass and weight.
1.3 I can identify the common steps of scientific methods.
1.4 I can compare and contrast types of data.
1.5 I can identify types of variables.
1.6 I can describe the difference between a theory and scientific law.
1.7 I can apply knowledge of laboratory safety.
1.8 I can define SI base units for time, length, mass and temperature.
1.9 I can explain how adding a prefix changes a unit.
1.10 I can compare the derived units for volume and density.
1.11 I can express numbers in scientific notation.
1.12 I can convert between units using dimensional analysis.
1.13 I can define and compare accuracy and precision.
1.14 I can describe the accuracy of experimental data using error and percent error.
1.15 I can apply rules for significant figures to express uncertainty in measured and calculated values
1.16 I can create and interpret graphs to reveal patterns in data.

Unit Vocabulary for Unit 1

Substance	Mass	Weight	Control
Dependent variable	Hypothesis	Independent variable	Qualitative data
Quantitative data	Scientific law	Scientific method	Theory
Base unit	Density	Scientific notation	Accuracy
Error	Percent error	Precision	Significant figure
Applied Research	Extrapolation	Interpolation	Pure research
Derived Unit	Standard Unit	Metric Prefix	Chemistry
	Experiment		

Conclusion
Data

Possible 1.1 Pts.: 6
Late, Incomplete, No work, No Units Fee: - 1 - 2 - 3
Final Score: / 6

1.1 Problems – Introduction to Chemistry
Sections 1.1 – 1.4 of your book.

1. Which measurements depend on gravitational force – mass or weight? Explain.

2. What is the function of a control in an experiment?

3. You are asked to study how much sugar can be mixed or dissolved in water at different temperatures. The amount of sugar that can be dissolved in water goes up as the water's temperature goes up. What is the independent variable? Dependent variable? What factor/s is/are held constant?

Label each of the following pieces of data as qualitative or quantitative, and explain why you chose that designation:

4. A beaker weighs 6.6g.

5. Sugar crystals are white and shiny.

6. Fireworks are colorful.

Possible 1.2 Pts.: 6
Late, Incomplete, No work, No Units Fee: - 1 - 2 - 3
Final Score: / 6

1.2 Problems – Units
Section 2.1 of your book.

1. Explain why a measurement must include both a number and a unit.

2. Explain why standard units of measurement are particularly important to scientists.

3. A 5.0-mL sample of water has a mass of 5.0 g. What is the density of water?

4. The density of aluminum is 2.70 g/mL. What is the volume of 8.10 g of aluminum?

5. What metric unit would be a likely choice to measure a football field?

6. List the seven S. I. base units.

Possible 1.3 Pts.: 6
Late, Incomplete, No work, No Units Fee: - 1 - 2 - 3
Final Score: / 6

1.3 Problems – Conversions

Section 2.1 of your book.

1. When would a scientist employ a unit conversion? Explain a specific example where this would be appropriate.

2. Convert 59.2 grams to kilograms

3. Convert 0.0034 milliseconds to seconds

4. Convert 1489 μL to L

5. Convert 481 mg to kg

6. Convert 0.00298 kL to mL

Possible 1.4 Pts.: 6
Late, Incomplete, No work, No Units Fee: - 1 - 2 - 3
Final Score: / 6

1.4 Problems – Uncertainty in Data
Section 2.3 of your book.

1. Why are percent error values never negative?

Round each number to four significant figures:

2. 431801 kg 1.43506 E 4 mL

3. 1.03449 m 0.0028503 g

Solve problems 4 and 5, and round to the correct number of significant figures:

4. 7.31 E 4 g + 3.23 E 3 g

5. 38,736 km / 4784 km

6. The accepted density for copper is 8.96 g/mL. Calculate the percent error if a student experimentally obtains a density of 8.8 g/mL.

Possible 1.5 Pts.: 5
Late, Incomplete, No work, No Units Fee: - 1 - 2 - 3
Final Score: / 5

1.5 Problems – Representing Data
Section 2.4 of your book.

1. Which type of graph would you use to depict gasoline consumption over a 10-year period? Explain your answer.

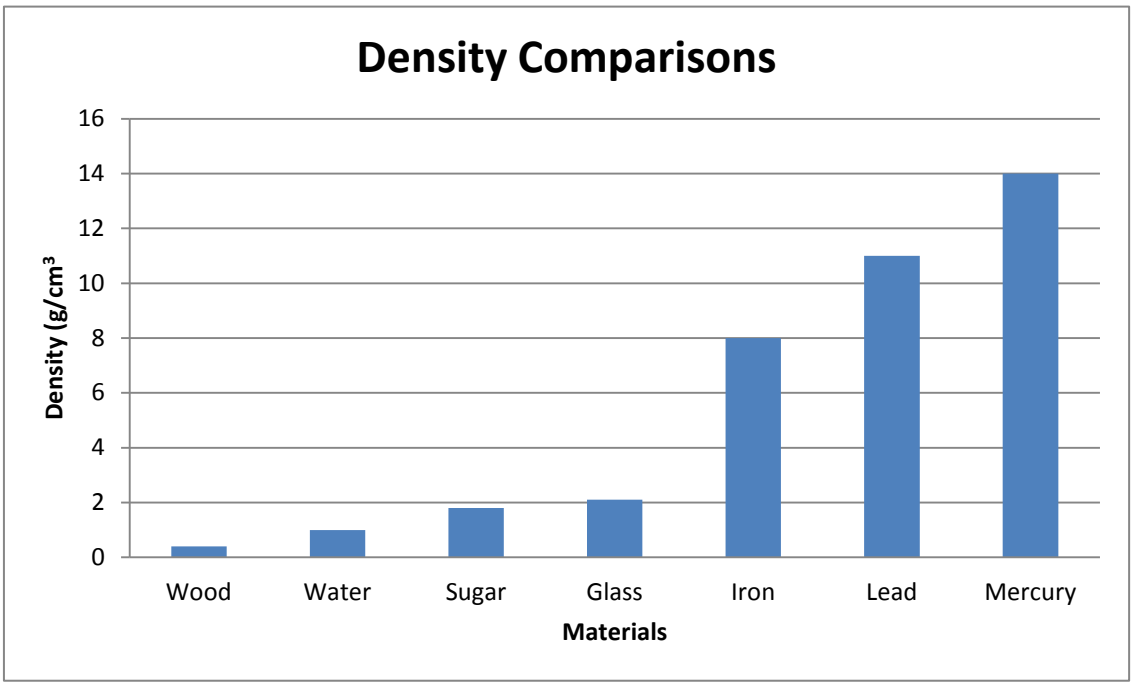
Use the graph to answer the following:

2. Which substance has the greatest density?

3. Which substance has the least density?

4. Which substance has a density close to 7.87 g/cm^3?

5. Which substance has a density of 11.4 g/cm^3?



Chemistry	Lab 1.1 - Measuring Equipment				
Name:					Correction Credit: Half
Lab Points:	Missed:	Late, No Units, No Work Fee:	First Score:	Corrections:	Final Score:
18		-1 -2 -3 -4			

Theory: All Equipment in the lab has specific usage parameters that must be followed.

Triple Beam Balance:

1. Provides accuracy to the hundredths place. Estimate the last digit to within 0.01 g.
2. To adjust your balance to read 0.00 g when there is nothing on it (to make the needle of the scale land right on the center mark), turn the mass adjustment knob located under the weighing plate. You can rotate it clockwise to make the needle go down, or counterclockwise to make it go upwards.
3. Check, and adjust your zero if necessary each time you use the lab.
4. I will check that you have zeroed your balance every so often at random, so be ready to prove that it reads accurately.

Graduated Cylinder – 10.0 mL and 100.0 mL:

1. Read the bottom of the meniscus if it is a depression, and the top if it bulges upwards. 100.0 mL cylinder accuracy is +/- 0.5 mL. 10.0 mL cylinder is +/- 0.1 mL.
2. The plastic collar at the top of the glass cylinders is to prevent them from breaking if they tip over onto the lab bench. Please leave them high up on the cylinder.

Glass Beakers – 100 mL, 250 mL, 600 mL:

1. These are good to +/- 5%. For example, if you measured 50.0 mL, it could be as low as 47.5 mL or as high as 52.5 mL. Use a graduated cylinder when accuracy matters.
2. Glass rods scratch the bottoms of beakers, which can lead to thermal breakage. Stir gently.

Procedure (1 pt per measurement – include UNITS for full credit.)

1. I will give each group two objects to mass out. Report their masses here after carefully zeroing your balance.

Object 1: _____

Object 2: _____

2. I will add a certain amount of water to each group's two graduated cylinders. Report them here, remembering the 100.0 mL cylinder is good to +/- 0.5 mL, and the 10.0 mL cylinder is +/- 0.1 mL.

10.0 mL cylinder: _____

100.0 mL cylinder: _____

3. Pour 75.0 mL of water into your 600 mL beaker from the faucet, then determine more accurately how much you poured by transferring it into your 100.0 mL graduated cylinder.

   Report your value here: _____

4. Pour 50.0 mL of water into your 250 mL beaker from the faucet, then determine more accurately how much you poured by transferring it into your 100.0 mL graduated cylinder.

   Report your value here: _____

5. Pour 25.0 mL of water into your 100 mL beaker from the faucet, then determine more accurately how much you poured by transferring it into your 10.0 mL graduated cylinder. This will take a few transfers and empty-ings to get the full volume.

   Report your value(s) here (2 pts): _____

Questions (2 pts each):

1. Why should you check the zeroing of your balance before using it at the start of your lab?

2. Why is it important to measure liquid volumes to the nearest 0.5 mL (in 100 mL graduated cylinder), rather than +/- 5% value (from a beaker)?

3. Compare your liquid measurements for steps 3, 4, and 5. By what percent are your values off? To find this:
   a. Determine the difference between your measured value (from the graduated cylinders) and your target value,
   b. Divide that difference by the target value.
   c. Multiply the result by 100 and add a % sign.

600 mL beaker %: _____

250 mL beaker %: _____

100 mL beaker %: _____

Chemistry	Lab 1.2 - Measuring Density				
Name:					Correction Credit: Half
Lab Points:	Missed:	Late, No Units, No Work Fee:	First Score:	Corrections:	Final Score:
18		-1 -2 -3 -4			

Theory: In this activity, you will learn how to take mass, length, and volume data with a triple-beam balance, a ruler, and a graduated cylinder to determine densities of different substances. Report mass to hundredths of a gram, and include ALL units.

$$\text{density} = \frac{\text{mass (g)}}{\text{volume (mL or cm}^3\text{)}} = \frac{m}{v}$$

Also: remember that one milliliter (mL) equals one cubic centimeter (cm^3).

Equipment:
triple beam balance
metric ruler
100 mL graduated cylinder
String
aluminum (Al),
copper (Cu),
lead (Pb),
wood blocks,
soft steel nails

Part 1. Density of Metals (6 points total)

Choose one of the metal cylinders and report what it is. Measure and record its mass. Measure the dimensions of the cylinder. Compute its volume using the formula provided. Finally, calculate your element's density.

Element (name, symbol): _____ Mass (in grams): _____

Cylinder dimensions: radius (r) _____ height (h) _____

Equation for the volume of a cylinder: Volume = $\pi \cdot r^2 \cdot h$ $\pi = 3.14$

Cylinder's calculated volume (cm^3): _____

Calculated density: _____

Find your element on the density charts near the microwave oven and record its accepted density here: _____

Calculate how close to the accepted density your value was and report this value.

What could account for differences?

Part 2. Density of Wood (5 points)

Get one of the wooden rectangular solids. Measure and record the mass to the hundredths of a gram with the balance. Then, measure its dimensions so that you can compute its volume (length • width • height). Finally, calculate its density.

Mass of wood: _____

Dimensions: length_____ width _____ height _____

Calculated volume (watch your units here): _____

Calculated density: _____

Look at the density chart again. What species of tree listed on the chart most closely matches your sample's density? _____

Part 3. Density of Irregular Solids (5 points)

If the item you're trying to measure isn't regularly shaped, you can use the process of *water displacement* to determine its volume.

Before getting your object wet you should measure its mass. Once that's done, get a 100 mL graduated cylinder and fill it partway up with water. Record this level. Then, tie a string to your object, and lower it in the water. The amount that the water level rises as your object is submerged is its volume! (The string allows you to remove your object without pouring the water out of the cylinder).

Select a nail from the cart and use this technique to compute its density.

Nail's mass: _____

Initial volume of water in cylinder: _____

Final volume of water in cylinder: _____

Nail's volume (final minus initial volume): _____

Your nail's calculated density: _____

Look at the density charts. What is the density of soft steel, and how close to the accepted density was your value? What could account for any differences?

Part 4. Questions. (2 points)

1. Which method of determining volume do you feel to be the most accurate (dimensional calculation or water displacement), and why?

2. How could you improve your measuring skills in future lab exercises?

Chemistry	Essential Skill - Unit Conversions
Name:	**Period:**
This serves as a practice worksheet to prepare you in the short term for the Unit Conversions Quiz, and for the long term by reinforcing an essential skill in chemistry.	

Convert the following values as indicated. Use scientific notation where appropriate, don't forget units! Prefix values can be found in the resource section of your Booklet.

While this is not worth points, you can use it on your Unit Conversions Essential Skills quiz.

Part 1 – Single Step Conversions

1. 145 g to kg

2. 89 mL to L

3. 1.25 E 7 m to km

4. 14 kg to g

5. 3.64 m to cm

6. 0.0077 s to μs

Part 2 – Multiple Step Conversions

7. 13 kg to mg

8. 9.1 E -7 kL to mL

9. 1.2 E 13 nm to km

10. 13.1 ms to μs

Multi Step Conversion with a twist.

Suppose you measured some object's weight loss to be 1.48 kilograms per minute (1.48 kg/min). You want to know how many grams that is each second (g/s): convert 1.48 kg/min into g/s.

Points Possible:	**10**
Late/Inc. Fee: -1	**-2 - 3**
Final Score:	**/ 10**

Unit 1 Review – Introduction to Chemistry

This serves as test preparation for the Unit 1 exam. Points earned are based on completion, and we will go over any questions you have during the review. Additionally, there will possibly be points earned based on a set of questions that you present to the class.

1. Express 12,300 in proper scientific notation.
2. How many significant figures are there in the number 23.800 m?
3. Multiply the following, and express your answer in proper scientific notation (with units): 4.283 m X 8.2 m.
4. Add the following. Express your answer to the right number of sig. figs. (with units): 14.38262 g + 0.013 g.
5. Is the measurement 4.63 g an example of quantitative or qualitative data? Explain why.
6. Give an example of qualitative data and explain why it is so.
7. In an experiment, a scientist measures how many grams of solid product form with different temperatures. Which of the variables is independent and which is dependent?
8. Arrange the following steps of the scientific method into the proper order: Data (model), Question, Observation, Experiment, Conclusion, Hypothesis.
9. Give a specific example of a physical model, and a graphical model in science.
10. What is the density of an object with a volume of 21.0 mL and a mass of 58.0 g?
11. What is the mass of a substance of density 8.90 g/mL, and volume of 13.8 mL (to the correct number of sig. figs!)?
12. What is the volume of an object with a mass of 89 grams and a density of 4.8 g/mL (correct number of sig. figs!)?
13. Does density depend on the amount of material being studied? Why or Why not?
14. Convert 14.5 m to cm.
15. Convert 15.8 degrees Fahrenheit to Celsius.
16. Convert 158 degrees Celsius to Kelvin.
17. What is the approximate slope of a line on a graph if the first point is (3.5, -4.5) and the last is (8.4, 15.9)?
18. What are the seven base units in the metric system?
19. Why is the liter an example of a derived unit?
20. What is the difference between mass and weight?
21. Give an example of applied research. Why is it applied?
22. A scientist calculates a density of 15.8 g/mL. The accepted value is 16.0 g/mL. What is the error, and percent error?
23. Convert 1.45 E 6 ng to grams.
24. Devise an experiment in which there is a dependent and independent variable. Which is which?