Unit 1: Chemtools & Properties of Matter Study Guide

Honors Chemistry

***You are expected to SHOW WORK for all problems. NO WORK = NO CREDIT!**

Goal: You should be able to conduct lab activities in a safe and thoughtful manner.

1. What happens if something spills or breaks?
2. What should you always be wearing to protect your eyes in the lab?
3. Describe three ways to conduct lab safely.

Goal: You should be able to identify the property being measured by the unit.

Write the correct metric unit for each of the following properties:

1. Length
2. Mass
3. Volume
4. Temperature

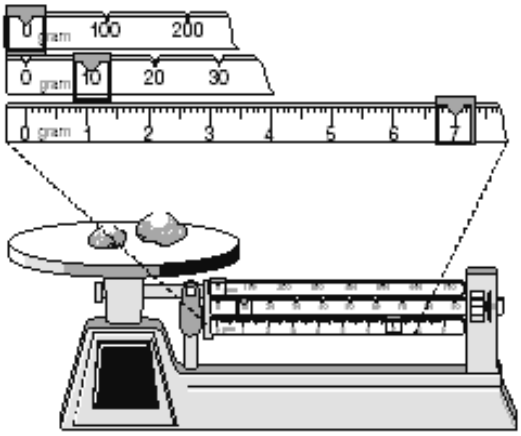
Goal: You should know commonly used prefixes.

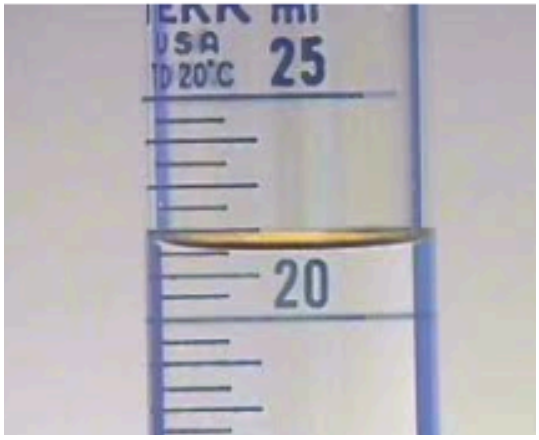
Write the correct amount of the base unit that is equal to:

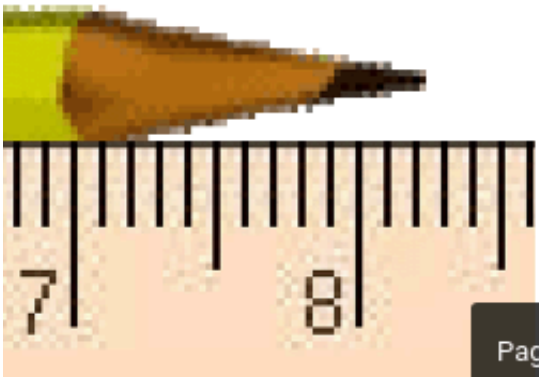
1. 1 kilometer
2. 1 milliliter
3. 1 microgram
4. 1 centijoule
5. 10 kilometers
6. 100 milliliters

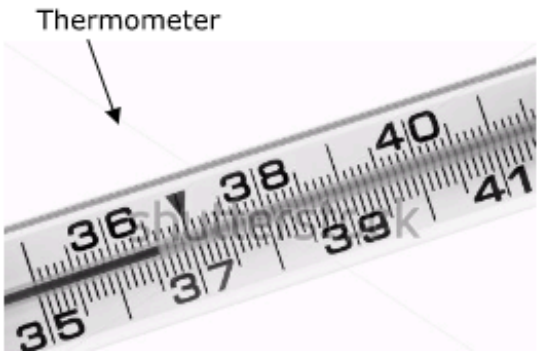
Goal: You should be able to describe how to measure and record the appropriate number of decimal places.

From each instrument shown, record the measurement as accurately as possible with the appropriate metric units.









Goal: You should be able to determine how many significant figures a measurement has.

Write the correct number of significant digits for each of these.

1. 0.00105
2. 1,005,000
3. 6.2340
4. 47

Goal: You should be able to convert standard form numbers to scientific notation.

Convert each of the numbers into scientific notation.

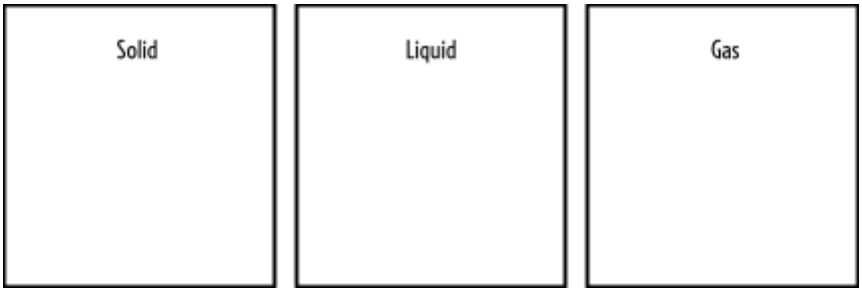
1. 0.00105
2. 1,005,000
3. 6.2340
4. 47

Goal: You should be able to solve a word problem using dimensional analysis.

1. How many inches are there in 45.6 cm? (There are 2.54 cm in 1 inch)
2. How many centimeters are there in 1.23×10^{-6} kilometers?
3. How many hours are there in 34.5 years?
4. How many milliliters are in a cubic meter? (There are 1,000 L in 1 m^3)
5. How many dekagrams are there in 760 milligrams?
6. How many liters are there in 210 centiliters?
7. Convert 450 km to miles. (there are 1.6 km in one mile)
8. Convert 7.293 HL to dL
9. How many grams are there in 4.102×10^5 mg?
10. How many cL are in a 5.0021 µL sample?
11. How many km are there in 1.453×10^{14} mm?
12. How many m are there in 6.14×10^5 nm?
13. How many cg are there in 2.0213×10^{-7} kg?
14. Your car's gas tank holds 18.6 gallons and is one quarter full. Your car gets 16 miles/gal. You see a sign saying, "Next gas 73 miles." Your often-wrong brother, who is driving, is sure you'll make it without running out of gas. Can you make it or should you stop now?
15. You're throwing a pizza party for 15 and figure each person might eat 4 slices. You call up the pizza place and learn that each pizza will cost you $14.78 and will be cut into 12 slices. How much is the pizza going to cost you?

Goal: You should be able to discuss properties of substances based on their state/phase of matter.

In the corresponding boxes below, sketch diagrams showing the particles of a solid, liquid, and gas.



1. Which of the following is NOT a property of a liquid?
    a. Definite volume
    b. Indefinite shape
    c. Ability to flow
    d. Indefinite volume
2. Which of the 3 phases of matter has both a definite shape and a definite volume?

Goal: You should be able to distinguish between elements, compounds, and mixtures.

1. In a(n) _____, all of the atoms are the same.
2. A(n) _____ is made up of molecules that contain at least 2 different types of atoms that are chemically bonded to one another.
3. A(n) _____ contains at least 2 different types of atoms, but they are not chemically bonded to one another.
4. Only _____ and _____ are pure substances.
5. Draw a picture of an atom and a picture of a molecule.
6. Draw a picture of a mixture that contains an element and a compound.
7. If a substance is made of molecules, does it have to be a compound? Explain your reasoning.

Goal: You should be able to distinguish between physical and chemical properties of substances.

For each of the following, indicate whether the property is a **chemical** or **physical** property.

1. Color
2. Odor
3. Flammability
4. Solubility
5. Ability to rust
6. Density
7. Boiling point
8. Reactivity

Goal: You should be able to distinguish between intensive and extensive properties of substances.

For each of the following, indicate whether the property is **intensive** or **extensive**.

1. Color
2. Ability to rust
3. Mass
4. Solubility
5. Density
6. Melting point
7. Odor
8. Flammability

Goal: You should be able to calculate the density of substance and use density to identify a substance.

Use the information in the table below to answer the following questions. **SHOW YOUR WORK!** Be sure to round numerical answers to the correct number of significant figures!

1. What is the volume of 135.0 g of silver?
2. A 50.0-g sample of a metal has a volume of 18.5 mL. What is the metal?
3. 10.00 cm^3 cubes of lead metal is obtained. Calculate the mass of the cube.
4. Calculate the density of a rock that has a mass of 5.00 g and a volume of 0.35 mL.
5. A jeweler suspects that a piece of gold jewelry in his collection is fake. He decides to check, so he measures the mass and volume of the piece and finds that its mass is 225 g and its volume is 11.9 mL. Is the piece of jewelry made from pure gold? How do you know?

Metal	Density
Gold	19.3 g/mL
Mercury	13.6 g/mL
Lead	11.4 g/mL
Aluminum	2.70 g/mL
Silver	10.5 g/mL