**1st Semester Physical Science Study Guide**

1. What is the SI unit for measuring volume? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

2. What is the SI unit for measuring mass? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

3. What is the SI unit for measuring length? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

4. How many milligrams are there in 1gram? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

5. If 1 marble has a mass of 1 gram, then

100 marbles would have a mass of 1 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1000 marbles would have a mass of 1 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Convert each quantity below.** *Scratch Paper Area*

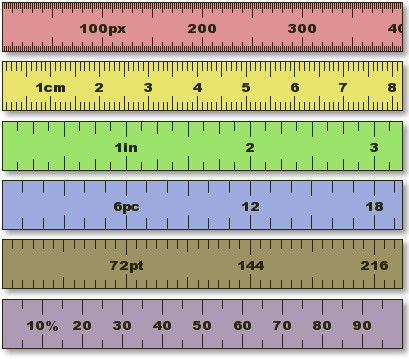
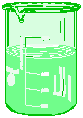
58.2 cm = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ m

78 m = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Km

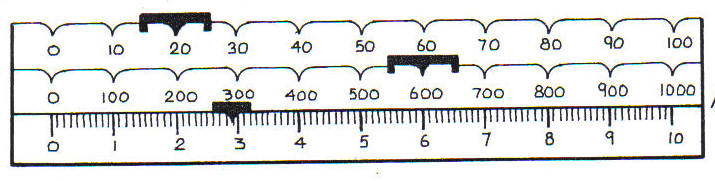
5.26 L = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ mL

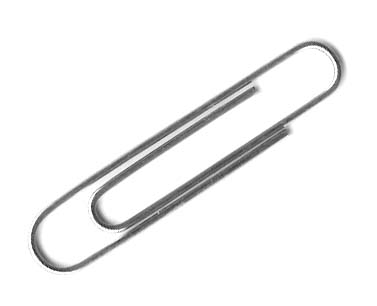
0.000727 Kg = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ mg

**Tell what each tool below is used to measure.**

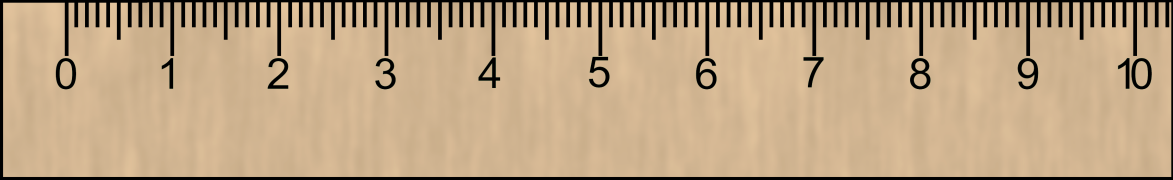
  

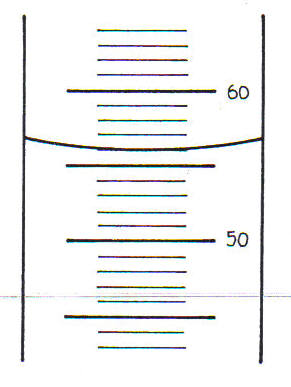
\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

****What mass does the triple beam balance measure to the nearest tenth (0.1) g? \_\_\_\_\_\_\_\_\_\_g

\_\_\_\_\_\_\_\_\_\_g

What length does the ruler measure the paperclip to the nearest tenth (0.1) cm? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_cm





What volume does the graduated cylinder measure? \_\_\_\_\_\_\_\_\_\_\_ml

*Hypothesis: The* GE light bulbs last longer than generic light bulbs*.*

Independent Variable (IV) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Dependent Variable (DV) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

What is the charge and location of the following subatomic particles in the atom?

Protons\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Neutrons\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Electrons\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

What are the outermost electrons of an atom called? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

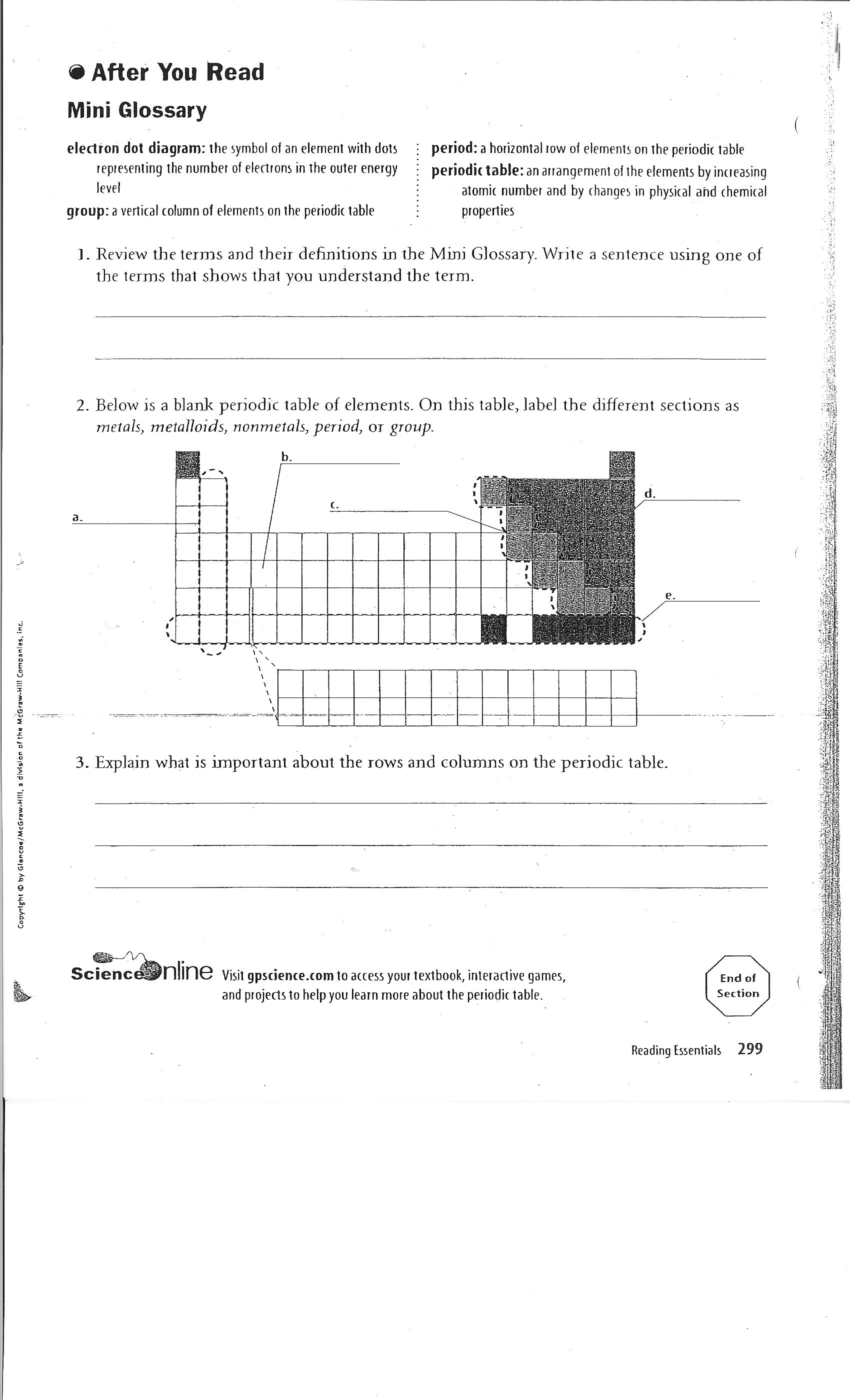
Mendeleev published the first periodic table. He arranged all the known elements in order of increasing \_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_

Define these terms which are used to describe metals:

Ductile = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Malleable = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Luster = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

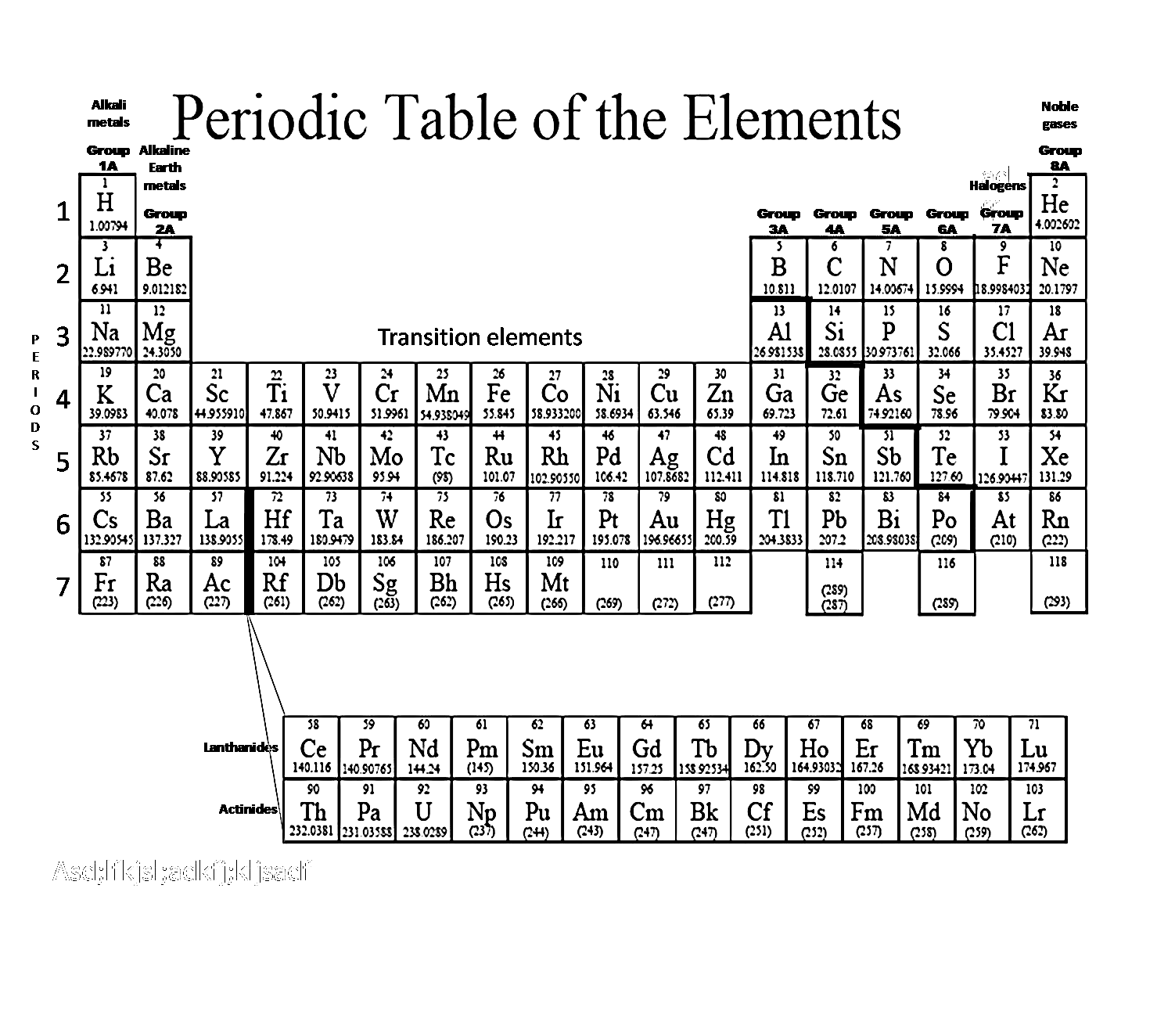
**Label the periodic table outline below.**

What are the names of the following families on the periodic table?

* 1. Group 1: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
  2. Group 2: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
  3. Group 17: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
  4. Group 18: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Which group from would be the least reactive, or most stable, group? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Why? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_



1. Which element has atomic number 12? \_\_\_\_\_\_\_
2. Which element has atomic number 56? \_\_\_\_\_\_\_

Write the formula for calculating the number of neutrons in an atom.

\_\_\_\_\_\_\_\_\_\_\_ **-** \_\_\_\_\_\_\_\_\_\_\_ **=** \_\_\_\_\_\_\_\_\_\_

1. How many neutrons does Be have? \_\_\_\_\_\_\_
2. How many electrons does Ca have? \_\_\_\_\_\_\_
3. How many electrons does Sr have? \_\_\_\_\_\_\_
4. Which element would be the most reactive? \_\_\_\_\_\_\_
5. Which element would have the fewest electron shells? \_\_\_\_\_\_\_
6. Which element has the most subatomic particles? \_\_\_\_\_\_\_\_

Define the following:

1. **Protons:**
2. **Electrons:**
3. **Neutrons:**
4. **Ions:**
5. **Mass Number:**
6. **Atomic Number:**
7. **Valence Electrons:**
8. **Metalloids:**
9. **Transition Metals:**

Find the element **Chlorine** **(Cl)** on the periodic table.

Atomic # \_\_\_\_\_\_\_\_\_\_\_ # of protons \_\_\_\_\_\_\_\_\_\_

# of electrons \_\_\_\_\_\_\_\_\_\_ # of energy levels (period #)\_\_\_\_\_\_\_\_\_

**Draw the Bohr’s Model of electrons**

# of valence electrons (group?)\_\_\_\_\_\_\_

Draw the Lewis Electron Dot Diagram

Atomic Mass \_\_\_\_\_\_\_\_\_

# of neutrons \_\_\_\_\_\_\_\_\_

What is the chemical formula for water? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

The freezing point of water is \_\_\_\_\_\_\_\_\_\_\_.

The boiling point of water is \_\_\_\_\_\_\_\_\_\_\_\_.

**Properties**

**physical properties chemical property physical changes chemical change phase changes**

1. \_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_ are a form of physical change because the substance stays the same.
2. Flammability, the ability to burn, is an example of a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
3. Cutting paper and phase changes are examples of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
4. Burning white paper to become black ashes is a type of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
5. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ include color, odor, and shape.
   1. **Describe the following properties as: Physical or Chemical**

Ability to burn: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ ability to react: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Color, shape or size: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ density: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

* 1. **Describe the following changes as: Physical or Chemical**

Cut paper into two pieces: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Iron rusts: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Melt ice: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Wood burns: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**BaCl2 + Na2SO4** 🡪 **BaSO4 + 2NaCl**

Identify the *reactants* in this chemical equation: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Identify the *products* in this chemical equation: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

In which type of bond are electrons shared? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

In which type of bond are electrons transferred? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

The part of the solution that gets dissolved: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

The part of the solution that does the dissolving: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Which part is usually the greatest in a solution: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

In a solution of Kool-aid drink, sugar and Kool-aid are the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and the water is the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

Balance the following equations:

**\_\_\_\_Mg +** \_\_\_\_ **O2 →** \_\_\_\_\_ **MgO**

**\_\_\_\_Fe + \_\_\_\_O2 → \_\_\_\_\_Fe2O3**

**\_\_\_\_Al + \_\_\_\_ HCl → \_\_\_\_AlCl3 + \_\_\_\_H2**

Using Oxidation numbers, write the product for the following reactions. (criss cross method)

Ca + 0 **→**  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Al + Br **→**  \_\_\_\_\_\_\_\_\_\_\_\_\_

Na + S **→** \_\_\_\_\_\_\_\_\_\_\_

Write the name for the compounds LiBr. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, NaOH\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

*Identify each equation as one of 4 types of chemical reactions.*

1. 2HCl + Zn 🡪 ZnCl2 + H2 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
2. 2H2O2 🡪 2H2O + O2 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
3. BaCl2 + Na2SO4 🡪 BaSO4 + 2NaCl \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
4. 2Na + Cl2 🡪 2NaCl \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Complete the Table**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Isotope/Ion Name** | **atomic #** | **mass #** | **# of protons** | **# of neutrons** | **# of electrons** |
| Lithium-7 | 3 |  |  |  |  |
| Boron-11 |  |  |  |  | 5 |
| Neon-20 |  |  | 10 |  |  |
| Mg +2 |  |  | 12 | 12 |  |

*Use the pH scale below to answer the following questions:*

What is the strongest acid on the scale? \_\_\_\_\_\_\_\_\_\_\_\_\_\_

What is the strongest base on the scale? \_\_\_\_\_\_\_\_\_\_\_\_\_

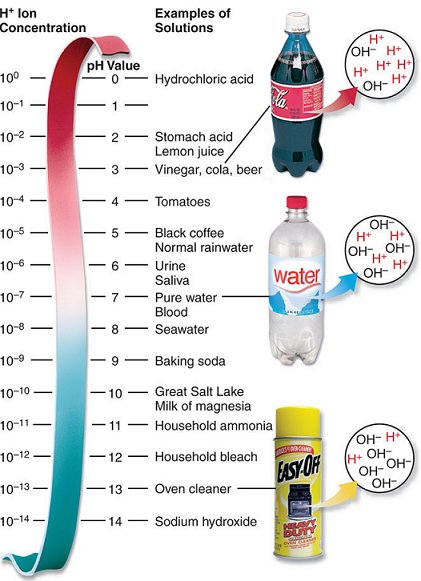
Which substance is neutral? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Write a neutralization reaction between hydrochloric acid (HCl) and sodium hydroxide (NaOH).

Which food/drink has a pH closest to the pH of stomach acid? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

If you are told to clean the oven, would you use an acid or a base? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Bodily fluids such as urine, saliva, and blood are close to being \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

*Use the pH scale on the left to answer questions 8-11.*

\_\_\_\_\_\_\_8. Which of the following substances is the strongest acid on the scale?

1. Tomatoes
2. Sea water
3. Lemon juice

\_\_\_\_\_\_\_9. Which of the following substances is the strongest base on the scale?

1. Oven cleaner
2. Baking soda
3. Bleach

\_\_\_\_\_\_\_ 10. Which has more OH**-** ions?

1. Coke
2. Water
3. Easy-Off

\_\_\_\_\_\_\_ 11. If you needed to neutralize a reaction of Hydrochloric Acid (HCl), which substance would work best?

1. Seawater
2. Sodium Hydroxide
3. Stomach Acid

Identify the acid & base as well as the salt and water in the Acid/Base neutralization reaction below.

HCl + KOH 🡪 KCl + H2O

Complete the reaction below:

HI + NaOH 🡪

HBr + LiOH 🡪

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ paper is a pH indicator we have talked about in class.

Red litmus paper will turn \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ in the presence of a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

Blue litmus paper will turn \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ in the presence of a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ paper is a pH indicator we have used in class.

Red litmus paper will turn \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ in the presence of a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

Blue litmus paper will turn \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ in the presence of a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

**pH Scale**

Acidic Neutral Basic

* + 1. 1 2 3 4 5 6 **7** 8 9 10 11 12 13 14

\_\_\_\_\_\_\_\_\_ According to the pH scale above, which of the following pH measurements is basic?

1. 7.0
2. 3.2
3. 10.5

\_\_\_\_\_\_\_\_ In a neutralization reaction, an acid and a base combine to form \_\_\_\_\_.

1. water
2. a salt
3. both a & b

\_\_\_\_\_\_\_\_ Which of the following is an acid?

1. lemon juice
2. water
3. soap

\_\_\_\_\_\_\_\_ Which of the following is an base?

1. lemon juice
2. water
3. soap

According to the pH scale above, which pH measurements are Basic? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Neutral? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Acidic? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

What type of substances are typically acids? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

What types of substances are typically bases? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_