1. **Define the following terms.**
   a. Matter: Anything that has mass and takes up space; matter is made up of atoms.
   b. Element: A pure substance that cannot be further broken down (i.e. Hydrogen, Carbon)
   d. Compound: A pure substance that is made of two or more elements and can be broken down into these (i.e. H₂O)
   e. Homogeneous Mixture: A classification of matter that is variable in which all the parts look the same (i.e. Kool-aid)
   f. Heterogeneous Mixture: A classification of matter that is variable in which you can distinguish between the different parts (i.e. sand and water; salad dressing)

2. **Classification of Matter**  
   Label each of the following as an element, compound, homogeneous mixture or a heterogeneous mixture.
   a. A substance that cannot be broken down into simpler substances **Elem**
   b. A combination of two or more substances **Compound**
   c. Can be broken down chemically into elements **Compound**
   d. Pizza **Heterogeneous**
   e. Pure air **Homogeneous**
   f. Sugar **Comp**
   g. Kool-aid **Homo**
   h. Hydrogen **Elem**
   i. Beach Sand **Hete**
   j. Flat Soda **Homo**

3. **Describe each of the following as chemical or physical changes.**
   a. Wood burning **Chemical**
   b. Ice melting **Physical**
   c. Changing shape **Physical**
   d. Pounding metal into a shape **Phys**
   e. Water evaporating **Physical**
   f. Forming a precipitate **Chemical**
   g. Cooking a cake **Chemical**
   h. Rusting a nail **Chemical**
   i. Forming a gas **Chemical**
   j. Grinding rocks into sand **Physical**
   k. Dissolving salt in water **Physical**
   l. Digesting food **Chemical**

4. **Phases/States of Matter**
   a. What do all changes in state of matter require? **Energy**
   b. During a physical or chemical change energy may be absorbed (endothermic) or released (exothermic).
   c. What state of matter has indefinite shape and indefinite volume? **gas**
   d. What state of matter has definite shape and definite volume? **solid**
   e. What state of matter has indefinite shape and definite volume? **liquid**
   f. In what state of matter do the atoms vibrate in a fixed position? **solid**
   g. In which state of matter can the forces of attraction among the particle are so weak that they can be ignored? **gas**
   h. What phase of matter is hydrogen in at -255 °C? **liquid**
   i. What phase of matter is Acetic acid in at 0 °C? **solid**
   j. What substances are gases at -100 °C? **Hydrogen & Nitrogen**
   k. What substances are solid at -100 °C? **Acetic Acid & Gold**
   l. What is the freezing point of Gold? **1064.2°C**
   m. What is the condensation point of Nitrogen? **-195.8°C**
   n. What state of matter has the highest molecular movement? **plasma**

### Melting and Boiling Points of Some Substances

<table>
<thead>
<tr>
<th>Substance</th>
<th>Melting Point</th>
<th>Boiling Point</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hydrogen</td>
<td>-259.3°C</td>
<td>-252.9°C</td>
</tr>
<tr>
<td>Nitrogen</td>
<td>-210.0°C</td>
<td>-195.8°C</td>
</tr>
<tr>
<td>Acetic Acid</td>
<td>16.6°C</td>
<td>117.9°C</td>
</tr>
<tr>
<td>Gold</td>
<td>1064.2°C</td>
<td>2856°C</td>
</tr>
</tbody>
</table>
o. What state of matter has the lowest molecular movement? **solid**

p. Label each of the phases and phases changes occurring in the graph below

> solid melting freezing liquid vaporization condensation gas

5. Phase Changes
   a. As a sample of matter is heated what happens to the particles? **The particles will move more quickly (faster).**
   b. During a phase change what happens to the temperature? **The temperature stays constant (remains the same).**
   c. **MELTING** is when an object goes from a solid to a liquid
   d. **VAPORIZATION** is when an object goes from a liquid to a gas
   e. **SUBLIMATION** is when an object goes from a solid to a gas without become a liquid first
   f. **DEPOSITION** is when an object goes from a gas to a solid without become a liquid first
   g. **CONDENSATION** is when an object goes from a gas to a liquid
   h. **FREEZING** is when an object goes from a liquid to solid

6. Gas Laws
   a. Describe Boyle’s Law: when temperature is held constant, pressure and volume of a gas are directly proportional
   b. Describe Charles’s Law: when pressure is held constant, temperature and volume of a gas are indirectly proportional (opposite)
   c. Describe Lussac’s Law: when volume is held constant, temperature and pressure of a gas are directly proportional.
   d. Which law says that as the temperature of a gas decrease the pressure will decrease if the volume is constant?
      **Lussac’s Law**
   e. Which law says if you decrease the volume of a container of gas then the pressure will increase if the temperature remains constant? **Boyle’s Law**
   f. Which law says that if pressure is constant an increase in temperature will cause an increase in volume? **Charles’s Law**
   g. If temperature increases volume **INCREASES** if pressure is constant.
   h. If pressure decreases volume **INCREASES** if temperature is constant.
   i. If the temperature decreases pressure **DECREASES** if volume is constant.
   j. If temperature decreased volume **DECREASES** if pressure is constant.
   k. If pressure increases volume **DECREASES** if temperature is constant.
   l. If the temperature increases pressure **INCREASES** if volume is constant.