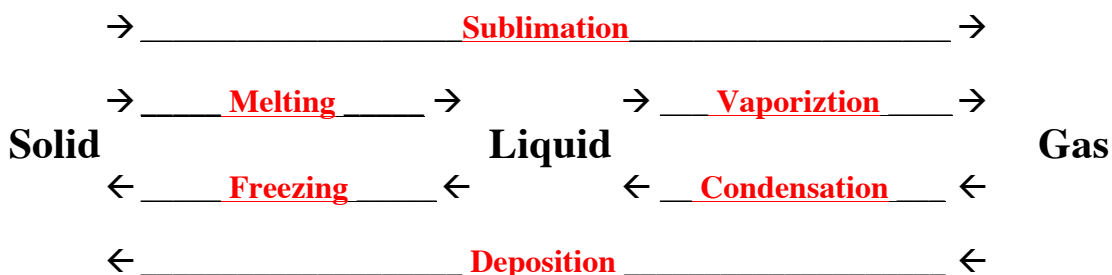Name __**ANSWER KEY**_____ Date _____

Matter & Energy Review Sheet
Quantitative Chemistry

1. Table – Describe the volumes & shapes of the phases of matter below (definite or not).

Phase	Volume	Shape
Gas	**Indefinite**	**Indefinite**
Liquid	**Definite**	**Indefinite**
Solid	**Definite**	**Definite**

2. Diagram – Complete the names of the processes in the diagram below.

→ _____**Sublimation**_____ →

→ _____**Melting**_____ →   → ___**Vaporiztion**____ →

Solid   **Liquid**   **Gas**

← _____**Freezing**_____ ←   ← __**Condensation**___ ←

← _____**Deposition**_____ ←

3. Identify the following as physical (P) or chemical (C) changes.
   _____**P**_____ a. Water boils in a pot.
   _____**P**_____ b. Wood is cut with an axe.
   _____**C**_____ c. Two clear solutions are mixed, and a yellow solid is formed.
   _____**C**_____ d. A girl has her hair permed at a salon.

4. Identify the substances below, and place checks in the appropriate columns. Each substance should have 2 columns checked.

Substance	Pure Substance	Mixture	Element	Compound	Homogeneous	Heterogeneous
A Pond		**X**				**X**
Silver	**X**		**X**			
Silver Nitrate	**X**			**X**		
Fruit Punch		**X**			**X**	

5. Define:
   a. Filtration –

   b. Distillation –

   c. Energy –

6. Briefly describe the differences between the following:

   a. Intensive vs. Extensive Properties

   b. Physical vs. Chemical Properties

   c. Endothermic vs. Exothermic Reactions

1

7. Convert the temperatures below.
   a. 87.0°F to Celsius

   $$°C = \tfrac{5}{9}(\_ °F - 32)$$

   $$= \tfrac{5}{9}(87.0°F - 32) = 30.6°C$$

   b. 289.0 K to Fahrenheit

   $$°C = \_ K - 273 \qquad\qquad °F = \tfrac{9}{5}\_ °C + 32$$

   $$= 289.0 \text{ K} - 273 = 16.0°C \qquad = \tfrac{9}{5}(16.0°C) + 32 = 60.8°F$$

8. Use fence-posting to convert the following energy values to the units specified below.
   a. 45.8 joules to kilojoules

   $$45.8 \text{ J} \times \frac{1 \text{ kJ}}{1000 \text{ J}} = 0.0458 \text{ kJ}$$

   b. 0.0098 kilocalories to joules

   $$0.0098 \text{ kcal} \times \frac{1000 \text{ cal}}{1 \text{ kcal}} \times \frac{4.184 \text{ J}}{1 \text{ cal}} = 41 \text{ J}$$

Solve the following problems. Be sure to show your work, and use significant figures!

9. How much energy (in joules) is required to raise the temperature of 177 g of copper from 33°C to 87°C? The specific heat capacity of copper is 0.39 J/g°C.

   $$Q = s\, m\, (T_f - T_i)$$

   $$Q = \left(0.39 \; \frac{J}{g°C}\right)(177 \text{ g})\,(87 \text{ °C} - 33 \text{ °C})$$

   $$Q = 3800 \text{ J}$$

10. Calculate the specific heat capacity of a substance if it takes 201.6 calories to raise the temperature of a 395 g sample by 5.0°C.

    $$201.6 \text{ cal} \times \frac{4.184 \text{ J}}{1 \text{ cal}} = \underbrace{843.49}_{\to 4 \text{ sig figs}} \text{ J} \qquad s = \frac{Q}{m\,\Delta T} = \frac{(843.49 \text{ J})}{(395 \text{ g})\,(5.0 \text{ °C})}$$

    $$s = 0.43 \; \frac{J}{g°C}$$

11. What is the mass in grams of a sample of gold if it takes 0.30 kJ to raise its temperature from 25.0°C to 27.5°C? The specific heat capacity of gold is 0.13 J/g°C.

    $$0.30 \text{ kJ} \times \frac{1000 \text{ J}}{1 \text{ kJ}} = \underbrace{300.}_{\to 2 \text{ sig figs}} \text{ J} \qquad m = \frac{Q}{s\,(T_f - T_i)} = \frac{(300.\,J)}{\left(0.13 \; \dfrac{J}{g°C}\right)\underbrace{(27.5 \text{ °C} - 25.0 \text{ °C})}_{\to 2 \text{ sig figs rounded to tenths place}}}$$

    $$m = 920 \text{ g}$$

12. Calculate the temperature change that occurs when 7890 J of energy is added to 1.96 lbs of water.

    $$1.96 \text{ pounds} \times \frac{454 \text{ g}}{1 \text{ lb}} = \underbrace{889.8}_{\to 3 \text{ sig figs}} \text{ g} \qquad \Delta T = \frac{Q}{s\,m} = \frac{(7890 \text{ J})}{\left(4.184 \; \dfrac{J}{g°C}\right)(889.8 \text{ g})}$$

    $$\Delta T = 2.12°C$$