* Remember: B-Day test is Monday 11/24
A-Day test is Tuesday 11/25

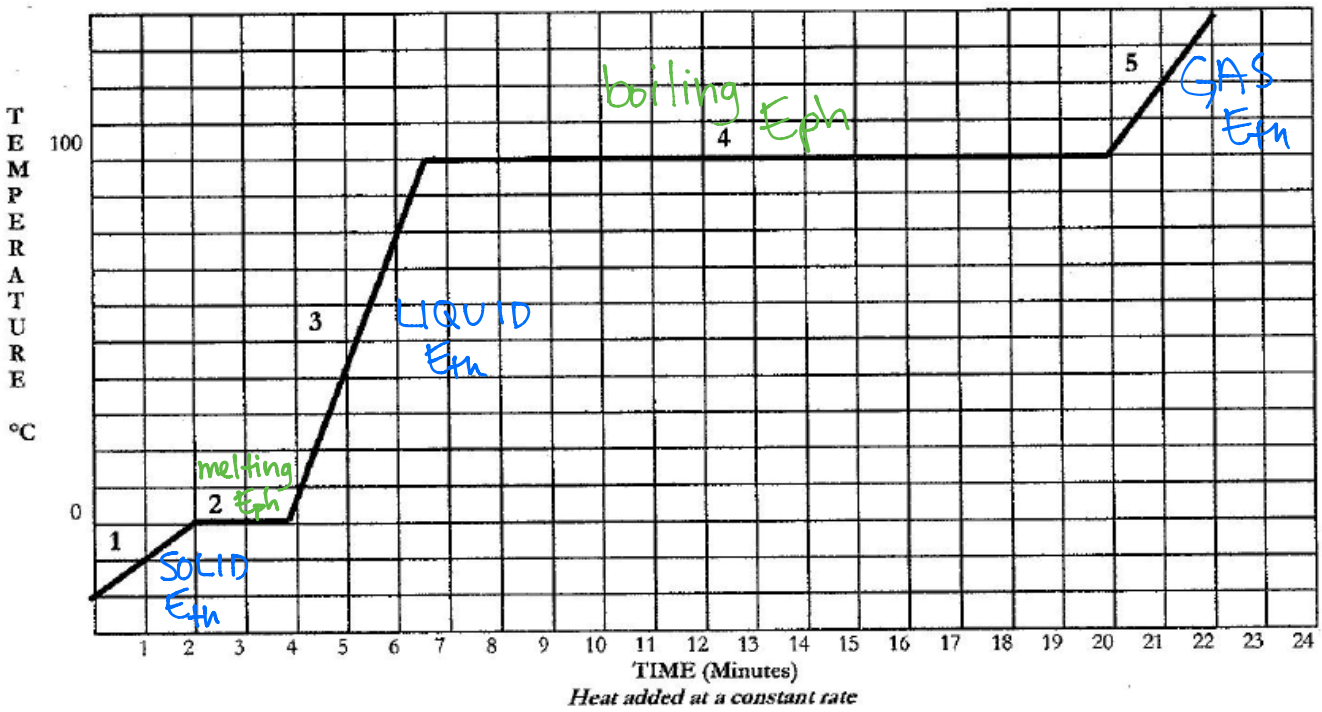
Unit 3 Exam Review
Week 14 – Assignment

Name: Key
Date: _____ Block: 1A 3A 4A 3B

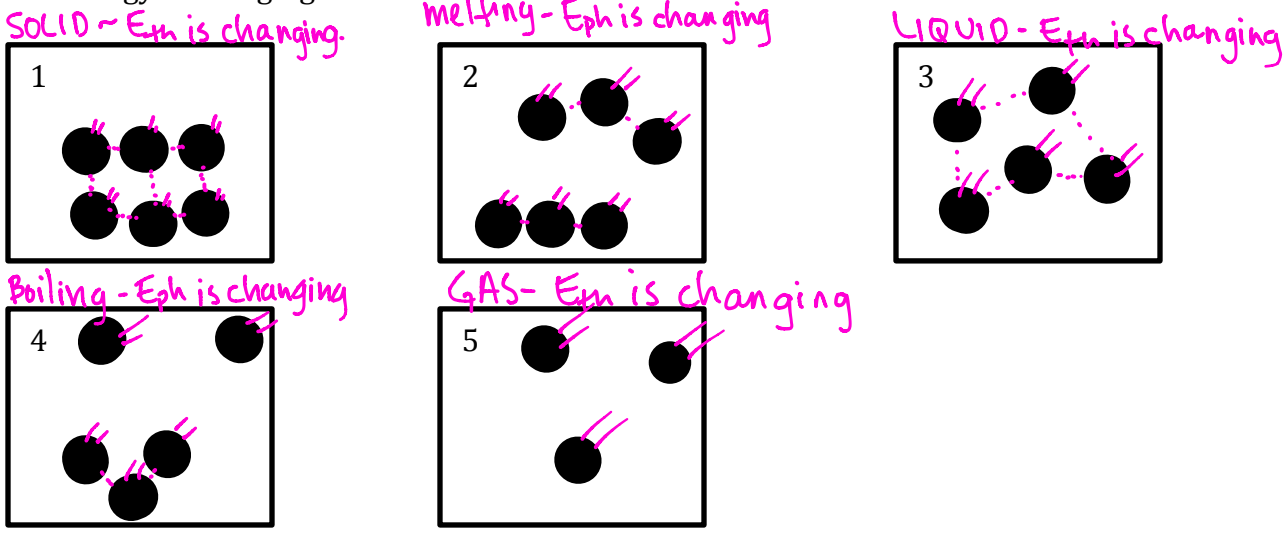
Please answer the following questions to review for your Unit 3 Exam on Monday Nov 24th. If math is required, please show all work.

1. Explain the difference between thermal energy and phase energy? What are the symbols used for each? Which energy corresponds to kinetic energy and which to potential?
   Thermal energy (E_{th}) is the energy associated with the movement of particles. The more thermal energy a substance has, the faster its particles move. Thermal energy corresponds to kinetic energy.
   Phase energy is the energy associated with the state of matter based upon the attractions between the particles (E_{ph}). The lower the phase energy, the more attractions there are between particles. Phase energy corresponds to potential energy.

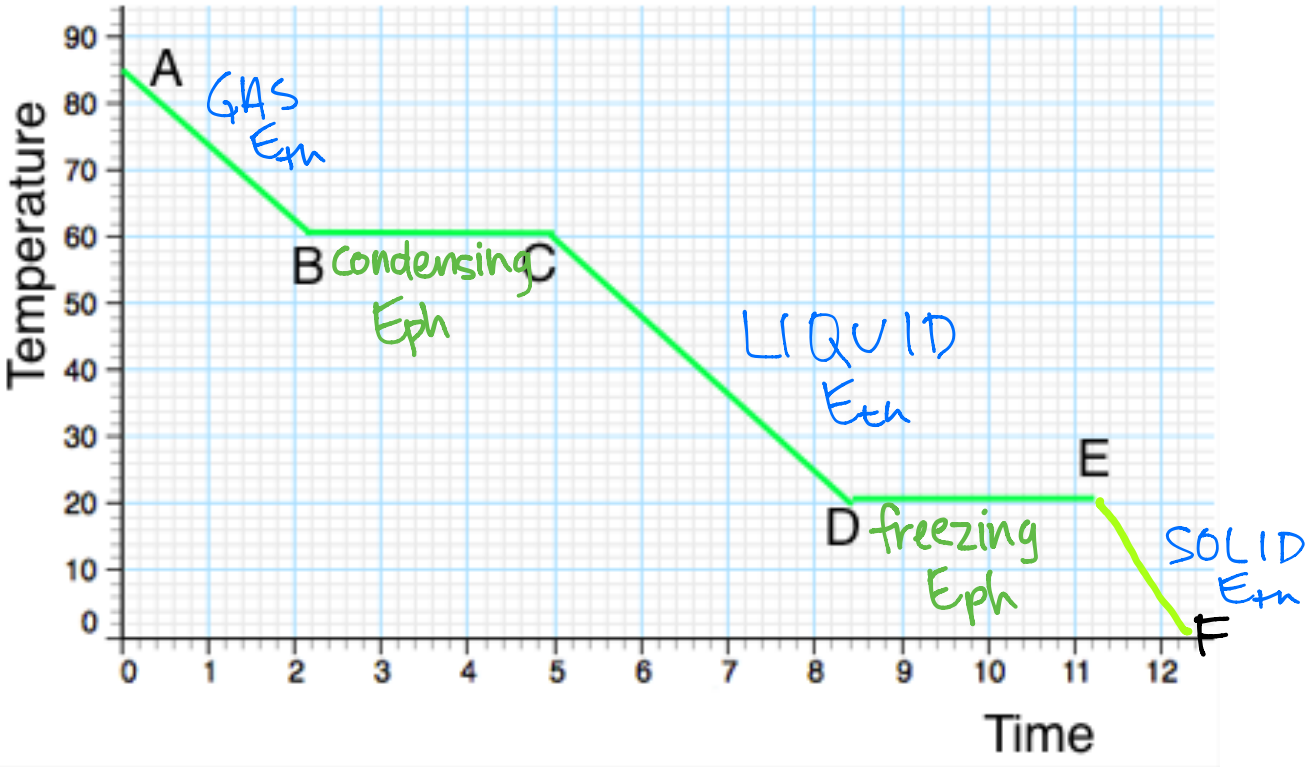
2. Label the following heating curve with:
   a. The phase or phase change that occurs in each section of the graph
   b. The energy mode that is changing in each section of the graph
   c. What is the boiling point of this substance? 100°C
   d. What is the melting point of this substance? 0°C



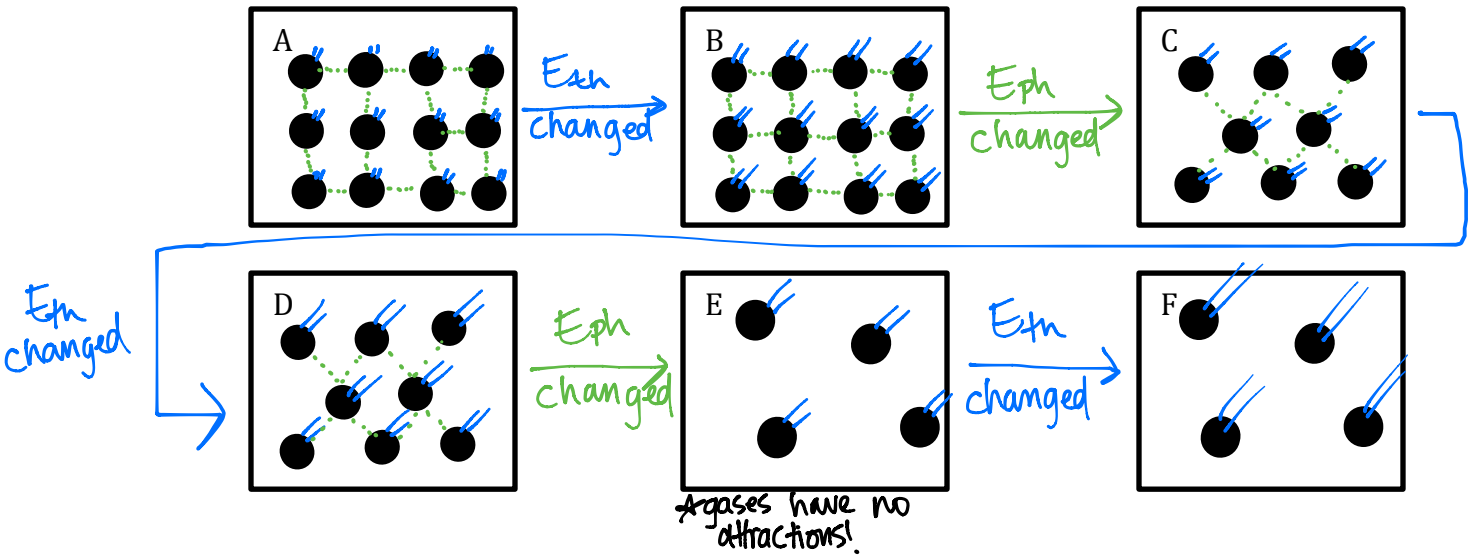
3. Draw particle diagrams for points 1-5 on the heating curve. Make sure to show whether thermal or phase energy is changing.



4. Label the following cooling curve with:
   a. The phase or phase change that occurs in each section of the graph
   b. The energy mode that is changing in each section of the graph
   c. What is the boiling point of this substance? 60°C
   d. What is the melting point of this substance? 20°C



5. Draw particle diagrams for points A-F on the heating curve. Make sure to show whether thermal or phase energy is changing.



6. Describe what heat/energy is doing during a change in thermal energy.
   - When thermal energy is changing, phase energy is constant.
   - If heat is added to the system, then the particles speed up.
   - If heat is released from the system, then the particles slow down.

7. Describe what heat/energy is doing during a change in phase energy.
   - When phase energy is changing, then thermal energy is constant.
   - If heat is being added to the system, attractions between the particles are being broken.
   - If heat is released from the system, then attractions between the particles are being formed.

For each of the following scenarios, identify:
Type of change (phase or temperature)
Type of energy being used (E_{th}, E_{ph}, E_{ch})
Energy entering or exiting
Endothermic reaction or exothermic reaction

8. Ice Cream Melts
   a. Type of change
   Phase
   b. Type of energy
   Eph
   c. Entering or exiting?
   entering
   d. Endo or Exo?
   endo

9. Ethanol evaporates.
   a. Type of change
   Phase
   b. Type of energy
   Eph
   c. Entering or exiting?
   entering
   d. Endo or Exo?
   endo

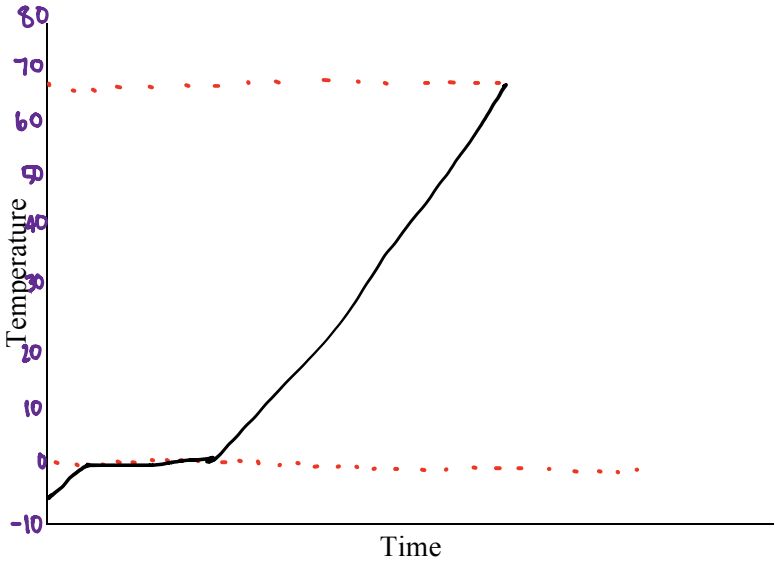
10. Water freezes.
   a. Type of change
   Phase
   b. Type of energy
   Eph
   c. Entering or exiting?
   exiting
   d. Endo or Exo?
   exo

11. Coffee heats up.
   a. Type of change
   Temperature
   b. Type of energy
   Eth
   c. Entering or exiting?
   entering
   d. Endo or Exo?
   endo

12. Soup cools.
   a. Type of change
   Temperature
   b. Type of energy
   Eth
   c. Entering or exiting?
   exiting
   d. Endo or Exo?
   exo

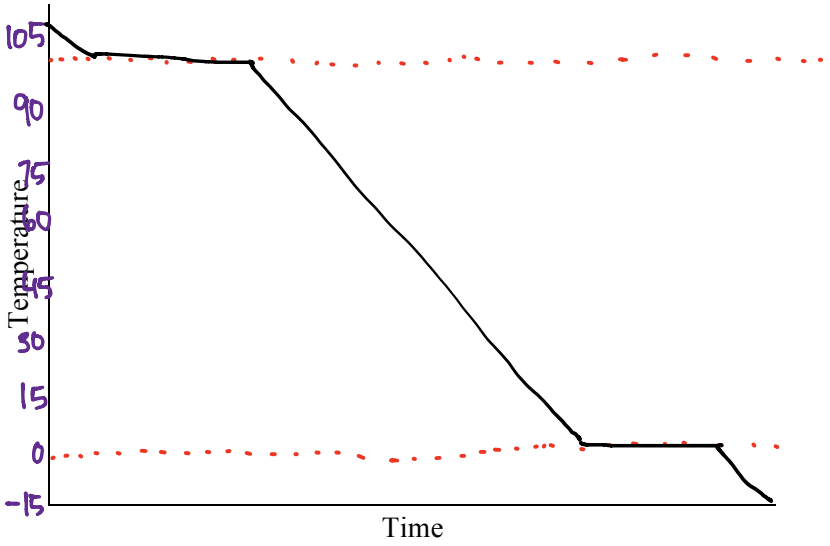
13. Water condenses.
   1. Type of change
   Phase
   2. Type of energy
   Eph
   3. Entering or exiting?
   exiting
   4. Endo or Exo?
   exo

14. Sketch a heating curve for the following scenario:
A sample of solid water at – 5°C is heated until it becomes liquid water at 75 °C.



15. Sketch a cooling curve for the following scenario:

A sample of water vapor at 105°C is cooled until it becomes solid water at -15 °C.



For the following calorimetry problems, use table 1 for the specific heats. Show all work. $Q = m \cdot C \cdot \Delta T$

Table 1. Specific Heats of Metals	
Metal	**Specific Heat Capacity (J/g°C)**
Iron	0.444
Copper	0.385
Aluminum	0.900
Magnesium	1.017

16. If a 15 gram sample of copper is heated from 10 °C to 50 °C, how much energy was required?

Q = X

m = 15g

c = 0.385 J/g°C

ΔT = 50°C - 10°C = 40°C

$Q = m\,c\,\Delta T$

$X = (15)(.385)(40)$

$X = 231\ J$

endothermic

17. If a 25 gram sample of aluminum is cooled from 75 °C to 50 °C, how much energy was released?

Q = X

m = 25g

c = 0.9 J/g°C

ΔT = 50°C - 75°C = -25°C

$Q = m\,c\,\Delta T$

$X = (25)(0.9)(-25)$

$X = -562.5\ J$

exothermic

18. How much iron was cooled if -6,000 J of heat was released when it was cooled from 50 °C to 10 °C?

Q = -6000 J

m = X

c = 0.444 J/g°C

ΔT = 10°C - 50°C = -40°C

exothermic

$Q = m\,c\,\Delta T$

$\frac{-6000}{(0.444)(-40)} = \frac{(x)(.444)(-40)}{(0.444)(-40)}$

$X = \frac{-6000}{-17.76}$

$X = 337.8\text{g}$