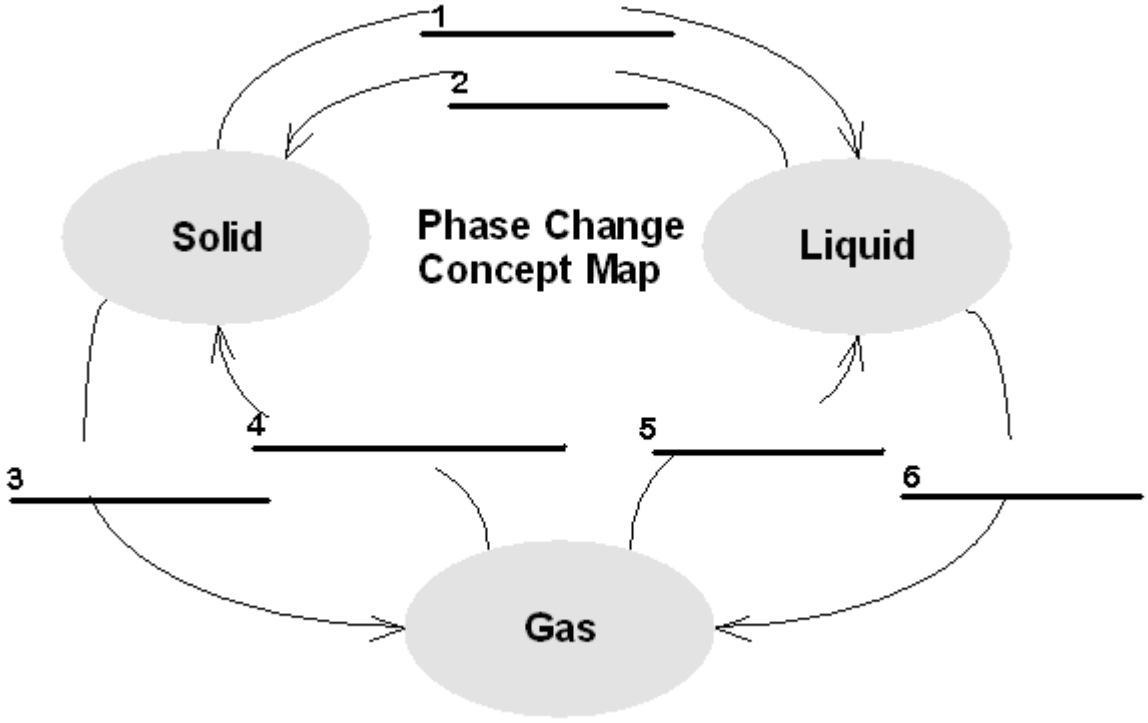
Phase Change Packet Name_____ Block_____ Date_____

Part 1: Fill in the following diagram labeling the different ways that phases can change.



Part 2: Define the following terms relative to phase changes.

7. Specific Heat: _____

_____

8. Heat of Fusion: _____

_____

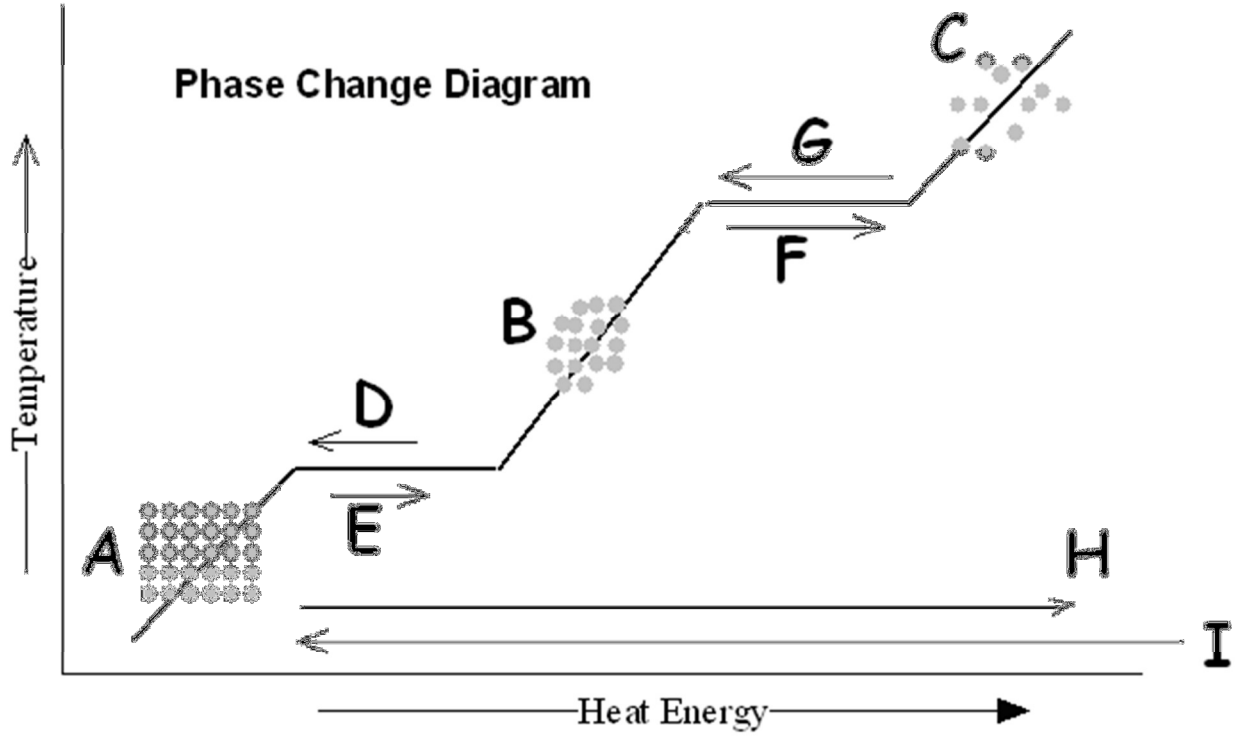
9. Heat of Vaporization: _____

_____

Part 3: Fill in the following values for WATER (in Joules): (#10-14)

Specific Heat of ICE	**Specific Heat of WATER**	**Specific Heat of STEAM**	**Heat of Fusion for H_2O**	**Heat of Vaporization for H_2O**
10)	11)	12)	13)	14)

Part 4: Label the various portions of the "Phase Change of Water Graph" with the appropriate terms from Part 1.



15. Color the line that represents the heat of fusion with a highlighter (Color Key ☐)

16. Color the line that represents the heat of vaporization with a highlighter (Color Key ☐)

#17-19 are phases, #20-25 are phase changes terms (use chart above)

17. A = _____

18. B = _____

19. C = _____

20. D = _____

21. E = _____

22. F = _____

23. G= _____

24. H = _____

25. I = _____

Looking at the graph above, what is happening to the particles at the molecular level (A, B, & C)?

A – Solids:	B - Liquids:	C – Gases:

Phase Change Formulas	
For Solid to Solid:	heat in calories = (mass in grams) x (specific heat of solid) x (ΔT)
For Freezing and Melting:	heat in calories = (mass in grams) x (heat of fusion)
For Liquid to Liquid:	heat in calories = (mass in grams) x (specific heat of liquid) x (ΔT)
For boiling and condensing:	heat in calories = (mass in grams) x (heat of vaporization)
For Steam to Steam:	heat in calories = (mass in grams) x (specific heat of gas) x (ΔT)

Part 5: Solve the following calculations related to phase change:

26. How much heat is required to warm 275 g of water from 76 °C to 87 °C?

27. How much heat is required to warm -19 °C ice to 0 °C ice if you have a 250 gram sample?

28. How much heat would be required to change the 0 °C ice from # 27 to 0 °C liquid water?

29. How much heat is necessary to change a 52.0 g sample of water at 33.0 °C into steam at 110.0 °C? *This problem requires several steps since temperature changes and a phase change takes place. Use the hints to solve.*

    a. Solve for the heat required to increase the water temperature from 33.0 °C to 100.0 °C. Stop here because the water will change phase at this temperature.

    b. Solve for the heat required to change the water into steam (no change in temp).

    c. Calculate the heat required to change the temperature of the steam from 100.0 °C to 110.0 °C.

    d. To get the heat required for the whole process, add the calculated heats from above.

30. In a household radiator, 1000 g of steam at 100 °C condenses (changes from gas to liquid at the same temp). How much heat is released in this phase change? *(+ = heat gained, - = heat lost)*

31. A container of water is heated from 25.0 °C to 36.4 °C by absorbing 6,400 Joules of heat energy from a hot plate. What is the mass of the water?

32. How much heat is necessary to change a 100 g ice cube at -7 to steam at 114 °C? *(You will have to go through (1) heating -7°C ice to 0°C ice, (2) go through the heat of fusion to turn 0°C ice into 0°C water, (3) heat 0°C water to 100°C water, (4) go through the heat of vaporization to turn 100°C water into 100°C steam, and (5) heat 100 °C steam to 114 °C steam. Lastly, add all the heat values from the five steps to solve for the total heat.)*

33. How much heat is released when 25 g of 110 °C steam condense to 95 °C water?