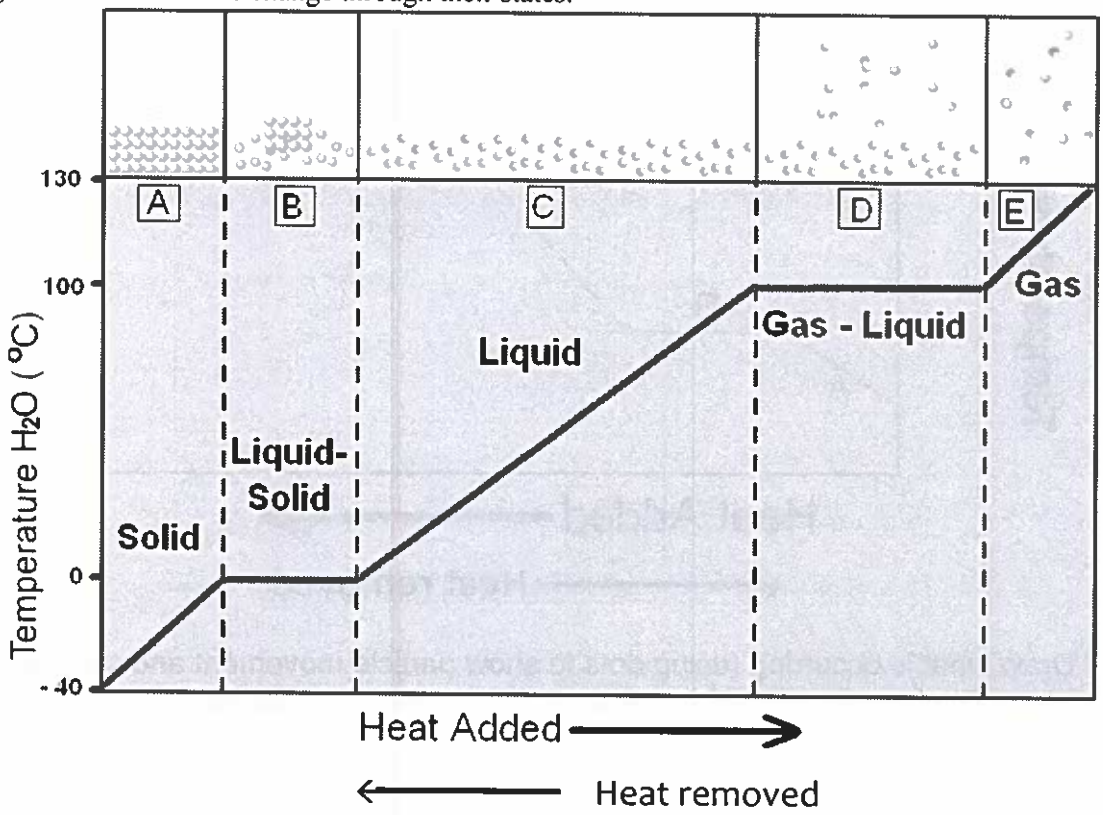
Heating Curve Worksheet **Name** Key 2017 **Per** _____

Below is a diagram showing a typical *heating/cooling curve* for water. It reveals a wealth of information about the structure and changes occurring in water as it is heated or cooled through all three phases of matter at different temperatures. At the top of the diagram are pictures representing the typical particle arrangement as substances change through their states.



1. There is something clearly wrong about the particle spacing in the pictures at the top. What is it? (Hint… the pictures were drawn for most materials, not for water specifically).

Solid water (ice) is more spread out than liquid water - H_2O expands when it freezes.

2. Identify by letter (A-E) in which section the following are found:

a. B Freezing (if cooling)

b. E Particles farthest apart

c. D Boiling

d. A Particle motion is most restricted

e. B Heat of fusion

f. BD *All* areas where energy change is potential only

g. D Heat of vaporization

h. BCD *All* areas where particles move past each other

i. A Least kinetic energy

j. ACE *All* areas where kinetic energy is changing

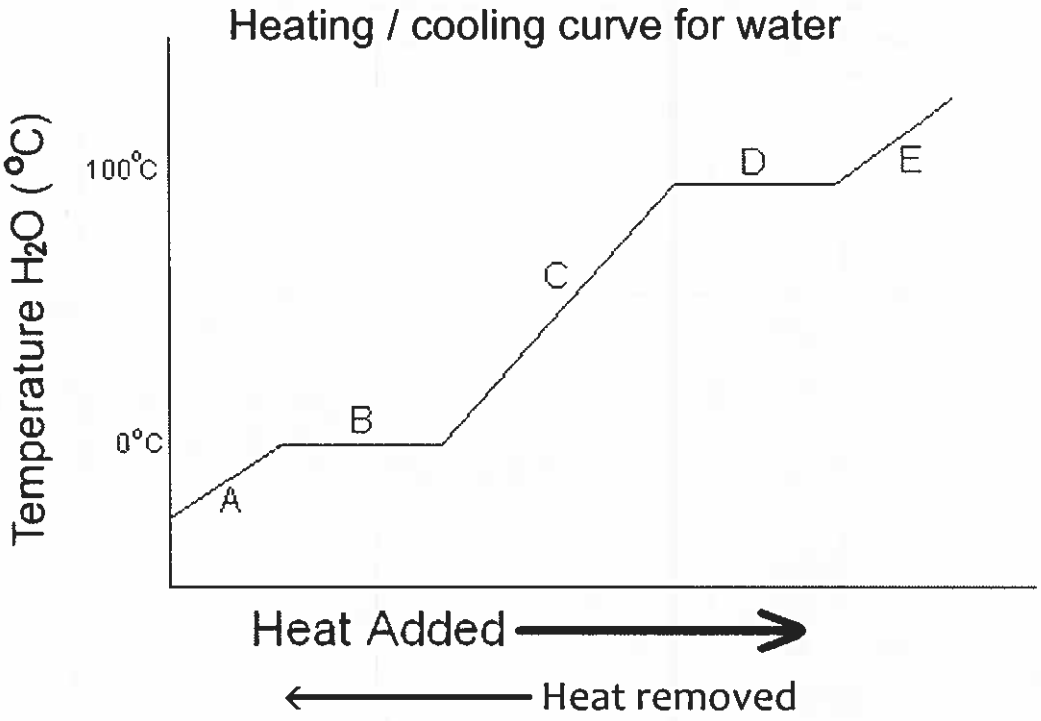
k E most potential energy

l. BD *All* areas where phase changes occur

m. ACE *All* areas in which the heat is making the particles move faster

n. BD *All* areas in which the heat is breaking the attractions or bonds between particles

o. BD *All* areas in which the particles are not changing their speed



1. Draw what is occurring (using dots to show particle movement and spacing) and give a brief explanation about what is occurring on the particle level for the following letters.

b. S → add E → L

Added E weakens IMA's, allowing particles to move past each other

d. L → add E →

Added E overcomes IMA's, allowing particles to escape from the liq.

e.

particles have ↑KE/Temp, so they are moving quickly in straight lines (gas form)