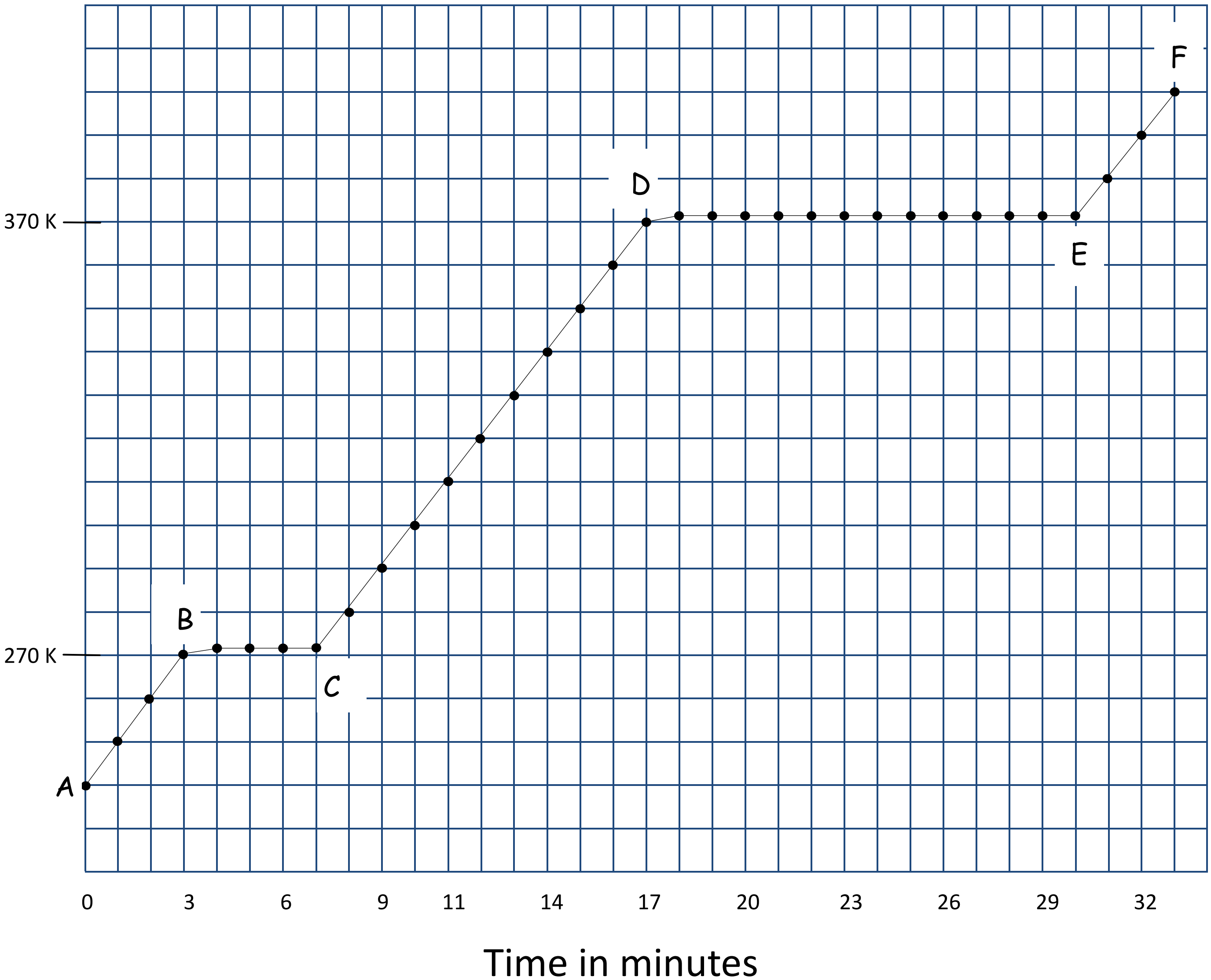
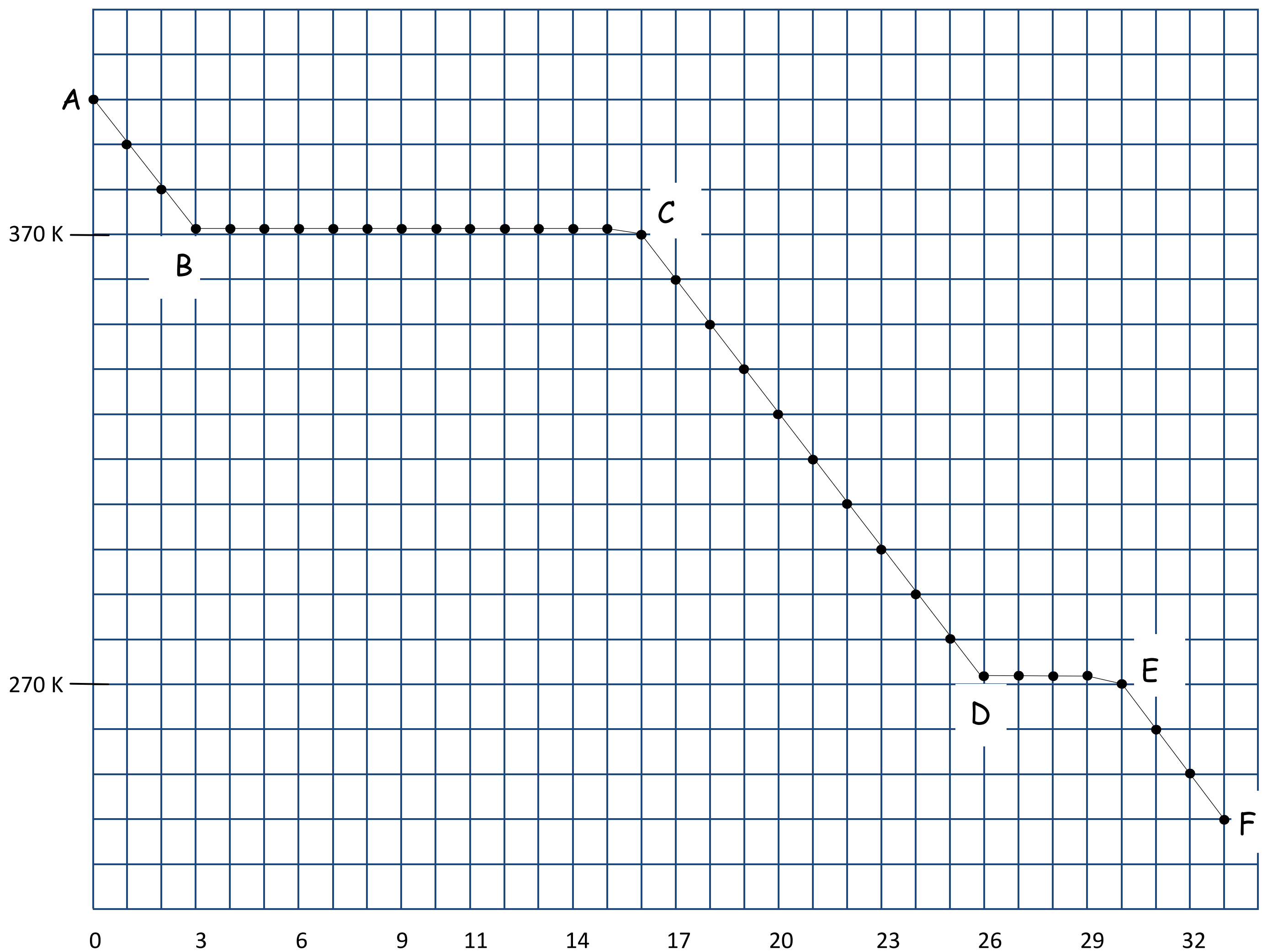
HEATING CURVE FOR WATER



For Heating Curve: Fill in this chart after graphing Use only ↑ ↔ or ↓ and use S, L, G for phases			
Line graph segment:	BC	CD	DE
What happens to the mass of the H_2O	↔	↔	↔
What's happening to the temp of the H_2O?	↔	↑	↔
What's happening to the Kinetic Energy of the H_2O?	↔	↑	↔
What's happening to the Potential Energy of the H_2O?	↑	↔	↑
What phase or phases are present?	S → L	L only	L → G

COOLING CURVE FOR WATER



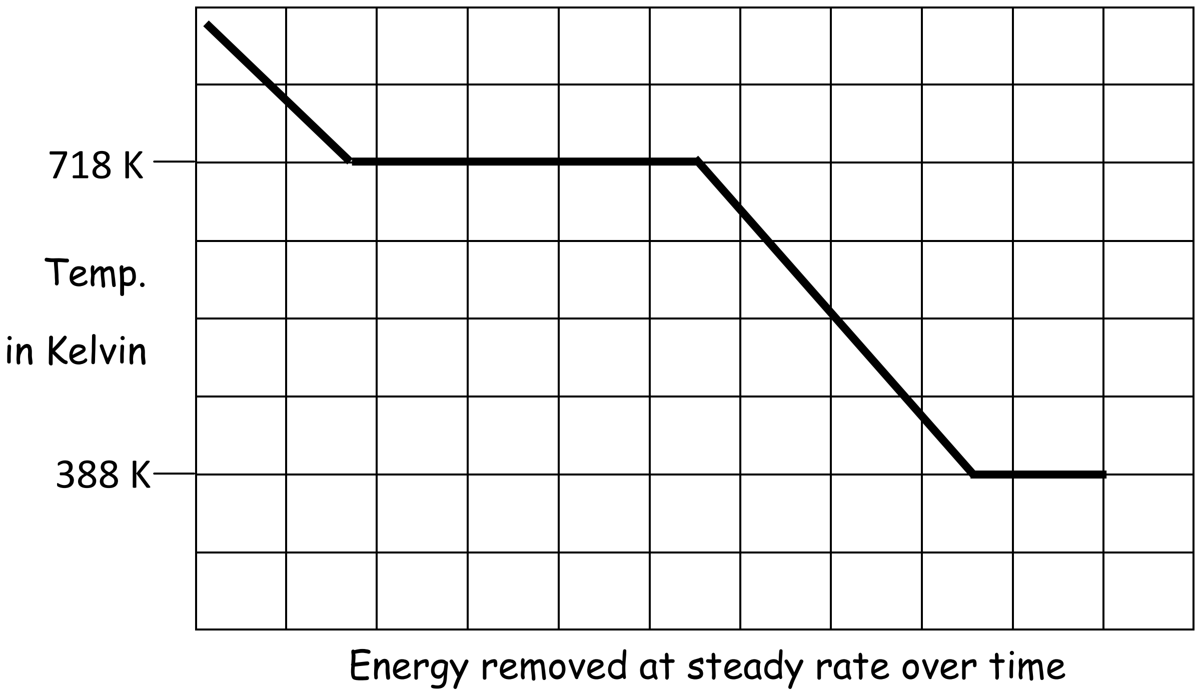
For Cooling Curve: Fill in this chart after graphing Use only ↑ ↔ or ↓ and use S, L, G for phases			
Line graph segment:	BC	CD	DE
What happens to the mass of the H_2O	↔	↔	↔
What's happening to the temp of the H_2O?	↔	↓	↔
What's happening to the Kinetic Energy of the H_2O?	↔	↓	↔
What's happening to the Potential Energy of the H_2O?	↓	↔	↓
What phase or phases are present?	G → L	L only	L → S

Phases Class work Assignment KEY

On the next two pages are the two graphs: the Heating Curve for Water, and the Cooling Curve for Water. Below are the answers to the questions on the last page of your handout.

1. The freezing point for water is 273 Kelvin, or 0° Centigrade. This is also the exact same temperature for the melting point for water. Water will either freeze or melt at this temperature. If you manage to hold this temperature steady you will have both liquid and solid water at the same time, in a "DYNAMIC EQUILIBRIUM". That means that the rate of freezing equals the rate of melting, a balance is reached.
2. The boiling point for water is 373 Kelvin, or 100° Centigrade. This is also the exact same temperature for the condensing point for water. Water will either boil off or condense at this temperature. If you manage to hold this temperature steady you will have both liquid and gas water at the same time, in a "DYNAMIC EQUILIBRIUM". That means that the rate of vaporization equals the rate of condensing, a balance is reached.
3. In both graphs, the segments BC and DE represent the phase changes of water. The melting point/ freezing point happens at ONE TEMPERATURE (273 K, 0° Centigrade), and on a graph that means parallel to the X-axis. The boiling/condensing point also happens at ONE TEMPERATURE (373 K, 100° C), and also will be parallel to the X-axis.
4. Freezing and melting happen at the same temperature. This is the phase change temperature between solid and liquid. Freezing happens as the temperature gets colder, melting happens at the same point while the temperature is increasing.
5. Heating curve: A. Increasing Kinetic Energy happens at segments: AB, CD, and EF
   (all have increasing temperature here too)
   B. Increasing Potential Energy happens at segments: BC and DE
   (only during phase changes when KE is steady)
6. Cooling curve: A. Decreasing Kinetic Energy happens at segments: AB, CD, and EF
   (all have decreasing temperature here too)
   B. Decreasing Potential Energy happens at segments: BC and DE
   (only during phase changes when KE is steady)
7. The flat top line is longer in a heating curve (and also in a cooling curve) because the phase change from liquid to gas (or gas to liquid) is a larger energy event, it takes more energy, or releases more energy that melting or freezing. The energy associated with the "hot" phase change is called the
   HEAT OF VAPORIZATION, and for water, the H_V = 2260 Joules/gram. This energy is either added in a vaporization from liquid to gas, or removed during the condensing process.
   The "cold" phase change requires the HEAT OF FUSION to be added or taken out, and for water, the H_F = 334 Joules/gram.
   Joules are units of energy that we will learn about later in thermochemistry. For now, just think of them as "units" of energy. For water, the H_V is 7x larger than the H_F

COOLING CURVE FOR SULFUR



HEATNG CURVE FOR MERCURY