**Extinguishing Properties of Water Handout Key**

Because the students are to use their own words the correct answers will vary.

1. Describe the physical characteristics of water.
   * *Water exists in one of three physical states:*

o *Solid* *–* *water freezes as ice at 32°F or 0°C*

o *Liquid* *–* *between the temperatures of 32°F and 212°F (0–100°C)* o *Gas* *–* *(invisible water vapor) vaporizes at 212°F or 100°C*

* + *Water weighs 8.33 pounds per gallon and expands to 1700 times its original volume when converted to steam at 212°F*

1. Explain the Law of Specific Heat.
   * *The measurement of the heat absorbing capacity of a substance*
2. Explain the Law of Latent Heat.
   * *Latent heat – the amount of heat energy absorbed or released during a change of state (solid<->liquid<->gas)*
   * *Latent Heat of Vaporization – the energy that is required to change a substance from a liquid to a gaseous state.*
3. Explain the Law of Heat Flow.
   * *The 2nd law of thermodynamics – heat flows spontaneously from a hot to a cold body*
   * *For heat to be transferred, the two bodies must be at different temperatures*
   * *Heat moves from warm or hot objects to cooler objects*
   * *The rate at which the heat transfer occurs is dependent on the* o *temperature difference between the two objects*

o *conductivity of the materials involved*

o *greater the difference, the greater the transfer rate*

1. Compare the advantages and disadvantages of water as an extinguishing agent. Discuss at least three of each.

***Advantages***

* + Readily available and considered inexpensive
  + Has a greater heat absorbing capability (higher specific heat) than most common extinguishing agents
  + Takes a relatively large amount of heat to completely convert to steam (high latent heat of vaporization)
  + Used in many different forms or ways: o *As a solid stream*

o *As a broken stream*

o *From a fog nozzle as a straight stream, narrow pattern fog stream, or wide pattern fog* *stream*

***Disadvantages***

* *Has high surface tension*
* *Can react readily with some materials like combustible metals*
* *Allows radiant heat to pass through it*
* *Freezes at 32° F or 0° C*
* *Conducts electricity readily*
* *Class D fires involve combustible metals that water readily reacts with if used as an extinguishing agent*