Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Pd: \_\_\_\_\_ Ast: \_\_\_\_\_

**M/J Physical Science Adv.: Thermal Energy Study Guide**

1. **Heat**
   1. ***Thermal Energy*** 
      1. Explain the relationship between “thermal energy”, “temperature”, and “heat".
      2. How could two objects have the same thermal energy but different temperatures? Give an example.
      3. How could two objects have the same temperature but different thermal energy? Give an example.
   2. ***Temperature Scales***
2. Which temperature scales are considered metric and which are not?
3. Compare the boiling and freezing point of water on each of the three temperature scales.
4. Why was the Kelvin scale developed? How is it related to Celsius?
   1. ***Temperature & Phases***
5. How does the kinetic energy of the molecules in a substance relate to the temperature/phases?
6. Describe how adding thermal energy to a substance over time will affect its temperature/phase. Draw a diagram to illustrate your thoughts.
   1. ***Heat***
7. Compare Convection, Conduction, and Radiation
8. Differentiate conductors and insulators. How does density affect thermal conductivity?
9. What causes a convection current? How does density affect this current?
10. What evidence do we have that radiation can transfer thermal energy through empty space?
11. What type of heat was involved in the “purple ice” lab station? Why did the purple food coloring move through the water in a “circle”?
12. In the “black blocks” lab station, why did block B feel “cold” when you first observed the blocks, and why did it melt the ice faster? What type of heat was responsible for melting the ice cubes?
13. In the “heat lamp” lab station, what type of heat was responsible for raising the temperature on the thermometer under the lamp?
14. At the “hand bath” lab station, explain why your left hand and your right hand perceived different water temperatures when you placed them in the room temperature water (*after removing your left hand from the ice water and your right hand from the warm water*)…even though both hands were feeling the same water.
15. What does the phrase, “Heat always flows in one direction” mean? When will heat no longer flow between objects?
16. Why does your hand feel cold when you hold an ice cube?
17. Why does a stovetop feel hot if you touch it while it is turned on?
18. Explain the expression, “There’s no such thing as *cold*.”