

Name: _____ Date: _____ Period: _____

TEKS 6.9B Cornell Notes

The student knows that the Law of Conservation of Energy states that energy can neither be created nor destroyed, it just changes form. The student is expected to:

Verify through investigations that thermal energy moves in a predictable pattern from warmer to cooler until all the substances attain the same temperature such as an ice cube melting.

Questions:

Notes:

All matter is made up of tiny particles. These particles are in constant motion even if the object they make up is not moving. The energy the particles have because of their motion is called kinetic energy. The faster the particles move, the more kinetic energy they have.

Some particles in an object move faster than others. **Temperature** is a measure of the average kinetic energy of the particles in an object. A **thermometer** is a device used to measure temperature.

Knowing the temperature of an object is important, but temperature does not tell you the total amount of energy in an object. Different objects can have the same temperature, but different amounts of total energy. The total energy of all of the particles in an object is called **thermal energy**. The thermal energy of an object depends on:

- *The number of particles in the object:* The more particles an object has at a given temperature, the more thermal energy it has. For example, a 1-liter pot of hot cocoa at 75°C has more thermal energy than a 0.2-liter mug of hot cocoa at 75°C because the pot contains more cocoa particles.
- *The temperature of the objects:* If two objects are the same, the object with the higher temperature has more thermal energy than the object with the lower temperature. For example, if two 1-liter pots of hot cocoa have different temperatures, the pot with the higher temperature has more thermal energy.
- *The arrangement of the object's particles:* Thermal energy differs in solids, liquids, and gases. When thermal energy changes, a phase change can occur.

Summary

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The scientific use of the term *heat* is different from its everyday use. In conversation, you might say that an object contains heat. However, objects contain thermal energy, not heat.

Only when thermal energy is transferred is it called heat. **Heat** is thermal energy moving from a warmer object to a cooler object. For example, when you hold an ice cube in your hand, the ice cube melts. This is because thermal energy is transferred, or moves, from your hand to the ice cube.

If two objects have different temperatures, heat will flow from the warmer object to the colder one. When heat flows into a substance, the thermal energy of the substance increases. As the thermal energy increases, the temperature increases. At the same time, the temperature of the object losing the heat decreases. Heat will flow from a warm object to a cooler object until the two objects have the same temperature. You may have experienced this with food. When pizza is placed in an oven, heat is transferred from the oven to the pizza crust, toppings, and cheese until they are the same temperature as the oven.

What happens when something gets colder, such as when ice cream is made? The ingredients used to make it, such as milk and sugar, are not nearly as cold as the finished ice cream. In an ice cream maker, the ingredients are put into a metal can that is packed in ice. You might think that the ice transfers cold to the ingredients in the can. But this is not the case. There is no such thing as "coldness." Instead, the ingredients grow colder as thermal energy flows from them to the ice. Heat transfer occurs in only one direction.

Summary
