

## Part I: Temperature and Thermal Energy Transfer

Matter is made up of tiny particles that are always in motion. Because the particles that make up matter are in motion, the particles have kinetic energy. The amount of kinetic energy the particles have is related to how fast they are moving. Particles that are moving fast have more kinetic energy than particles that are moving slowly. Temperature is a measure of the average kinetic energy of particles in a substance. Temperature is measured with a thermometer using units of degrees Celsius. When a thermometer is used to measure the temperature of a substance that is considered "hot," the particles of the substance are moving fast. Much faster than when the thermometer measures the temperature of the same substance that is considered "cold."



Thermal energy is the heat energy contained within a substance. Thermal energy transfers from one substance to another ONLY when there is a temperature difference. Thermal energy always moves from substances of higher temperatures to substances of lower temperatures. Warm things always transfer thermal energy to cool things causing the cooler temperature to increase. Do cool things transfer "coolness" to warm things? Think of this as heat transfer, not cool transfer. Thermal energy will continue to transfer between substances until both reach the same temperature. When there is no longer a temperature difference between substances, thermal energy transfer stops.

Your teacher will provide you with a small piece of ice. How does the temperature of the ice compare to the temperature of your body? Place the ice in the palm of your hand and observe the ice as it melts. Answer the questions in Part I of your Thermal Energy document.

## Part I: Temperature and Thermal Energy Transfer

1. What is temperature?
2. What is thermal energy?
3. How does the temperature of the ice chip compare to the temperature of your hand?

4. In the example of holding ice, what evidence indicates that thermal energy transfers?
5. In the example of holding ice, where does the thermal energy come from? In the example of holding ice, where does the thermal energy go? Using the example of holding ice, explain when the thermal energy transfer stops.
6. Can you summarize how thermal energy moves from one object to another? Thermal energy always moves from substances with \_\_\_\_\_ temperatures to objects with \_\_\_\_\_ temperatures.