

Thermal Energy

Section I: Temperature & Heat

When we measure the temperature of something, we are measuring how hot or cold it is.

Temperature is the measure of the average kinetic energy of the particles in an object. The more kinetic energy it has, the hotter it is.

Thermometers are often used to measure temperature. The liquid inside of it expands when it gets warmer and contracts when it cools.

Temperature can be measured using three common scales: Celsius, Fahrenheit, and kelvin. The SI unit for temperature is kelvin (K).



The snaking cut on the roadway above allows the road to expand and contract without cracking.

Thermal expansion is the idea that almost all substances expand when they are heated and contract when cooled. The exception to this is water. **Thermal energy** is the sum of the kinetic and potential energy of all the particles in an object. The thermal energy of an object increases as the temperature increases. Thermal energy and temperature are similar in that they both reflect the kinetic energy of particles moving matter.

However, temperature reflects the average kinetic energy, whereas thermal energy reflects the total kinetic energy.

Heat is the thermal energy that flows from something at a higher temperature to something at a lower temperature. Energy from heat is comprised of vibrating particles. The more they vibrate, the hotter a material becomes. **Specific heat** is the amount of heat needed to raise the temperature of 1kg of some material by 1C.

Review:

1. What is temperature the measure of?
2. Explain thermal expansion.
3. What is specific heat?