

How is thermal energy transferred?

Heat can travel from one place to another in three ways: Conduction, Convection and Radiation. Both conduction and convection require matter to transfer heat, but radiation can travel through space.

If there is a temperature difference between two systems heat will always find a way to transfer from the higher to lower system.

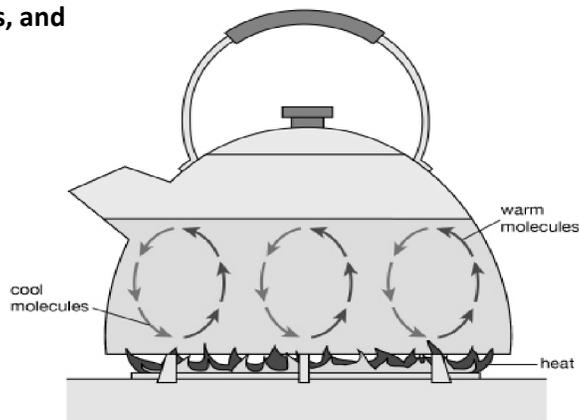
CONDUCTION: Conduction is the transfer of heat between substances that are in direct contact with each other. The better the conductor, the more rapidly heat will be transferred. Metal is a good conductor of heat. Conduction occurs when a substance is heated, particles will gain more energy, and vibrate more. These molecules then bump into nearby particles and transfer some of their energy to them. This then continues and passes the energy from the hot end down to the colder end of the substance.



Thermal energy from the coffee is transferred to the spoon.

CONVECTION: Thermal energy is transferred from hot places to cold places by convection. Convection occurs when warmer areas of a liquid or gas rise to cooler areas in the liquid or gas. Cooler liquid or gas then takes the place of the warmer areas which have risen higher. This results in a continuous circulation pattern. Water boiling in a pan is a good example of these convection currents. Another good example of convection is in the atmosphere. The earth's surface is warmed by the sun, the warm air rises and cool air moves in.

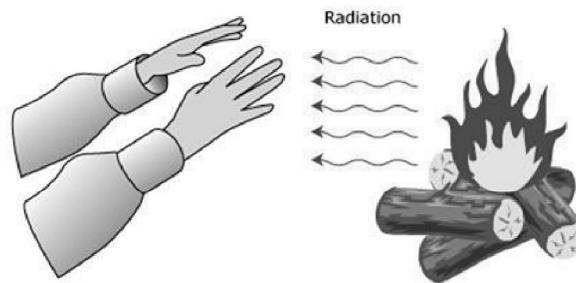
Hot water rises, cools, and falls in a teakettle.



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RADIATION: Radiation is a method of heat transfer that does not rely upon any contact between the heat source and the heated object as is the case with conduction and convection. Heat can be transmitted through empty space by thermal radiation often called [infrared radiation](#). This is a type [electromagnetic radiation](#). No mass is exchanged and no medium is required in the process of radiation. Examples of radiation are the heat from the sun, or heat released from the filament of a light bulb.



Thermal energy travels from a campfire to your hands.

