Methods Of Heat Transfer

Conduction: This type of heat transfer occurs through direct contact. Faster moving particles collide with slower moving particles and transfer heat energy. Conduction works better in solids compared to liquids and gases. Not all solids conduct heat the same.

Teacher demo: Which metal spoke conducts heat better? Each spoke is made out of a different metal. The end of the spokes have some hardened wax which is holding onto a paper clip. When the metal hub is heated, heat will be conducted through the metal spokes. Whichever metal conducts heat the best will melt the wax sooner allowing the paper clip to fall off.

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Convection: Any liquid or gas can be made to flow, either in a container or from place to place. The transfer heat energy by large amounts of rising and falling liquids and gases is called a convection current. Hot fluids become less dense than their surroundings and rise while cooler fluids become more dense than their surroundings and sink.

Teacher demo: In a lava lamp, how does heat energy from the bottom of the lamp get to the top of the lamp? **Convection currents**

Radiation: The transfer of heat energy through air, a vacuum, or transparent materials (medium) in the form of electromagnetic waves called infrared radiation. Matter blocks the flow radiation, so in the vacuum of space, radiation is able to transfer heat energy better than through any other medium.

Teacher demo: The radiant heater is able to warm people and objects even though they are not in direct contact with each other and without the use of moving currents of air. Shiny surfaces reflect more heat radiation than dull or flat textured surfaces. Darker colored surfaces absorb more heat radiation then light colored surfaces. Based on this information, rank the following types of surfaces in order of heat absorption, beginning with the surface that would absorb the most heat and concluding with the surface that would absorb the least heat. Shiny black, shiny white, flat black, and shiny silver.

flat black shiny black shiny white shiny silver

Reducing Transfer Of Heat Energy

Insulators: A material that reduces or prevents the transfer of heat through it.

What do most insulators have in common? **Air spaces**.

The **air spaces** block heat transfer primarily by preventing convection.
A material's insulating ability is assigned an R value. The higher the R value, the more resistance to the transfer of heat energy, and therefore a better insulator.