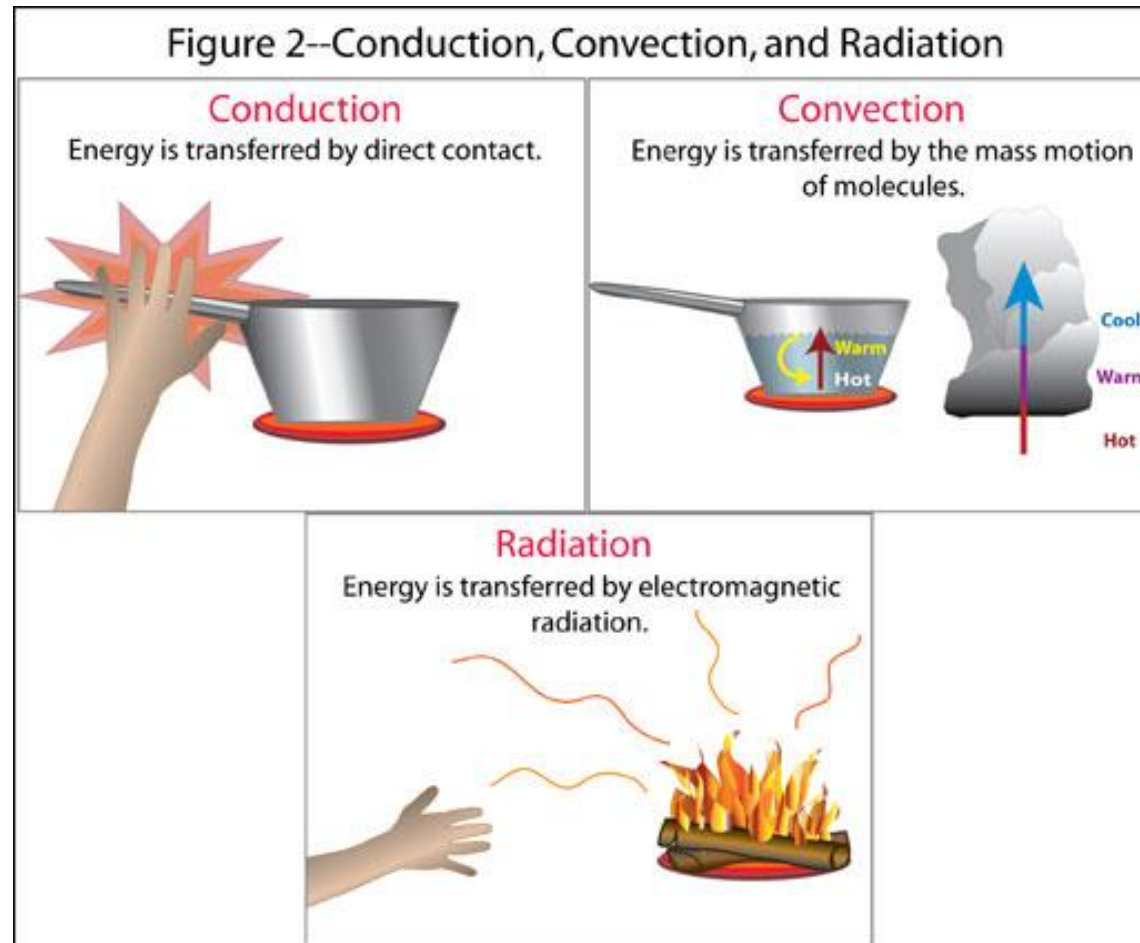


# Heat Transfer

## Conduction, Convection and Radiation



# Heat

- A form of energy associated with the motion of atoms or molecules.
- Transferred from higher temperature objects to objects at a lower temperature.

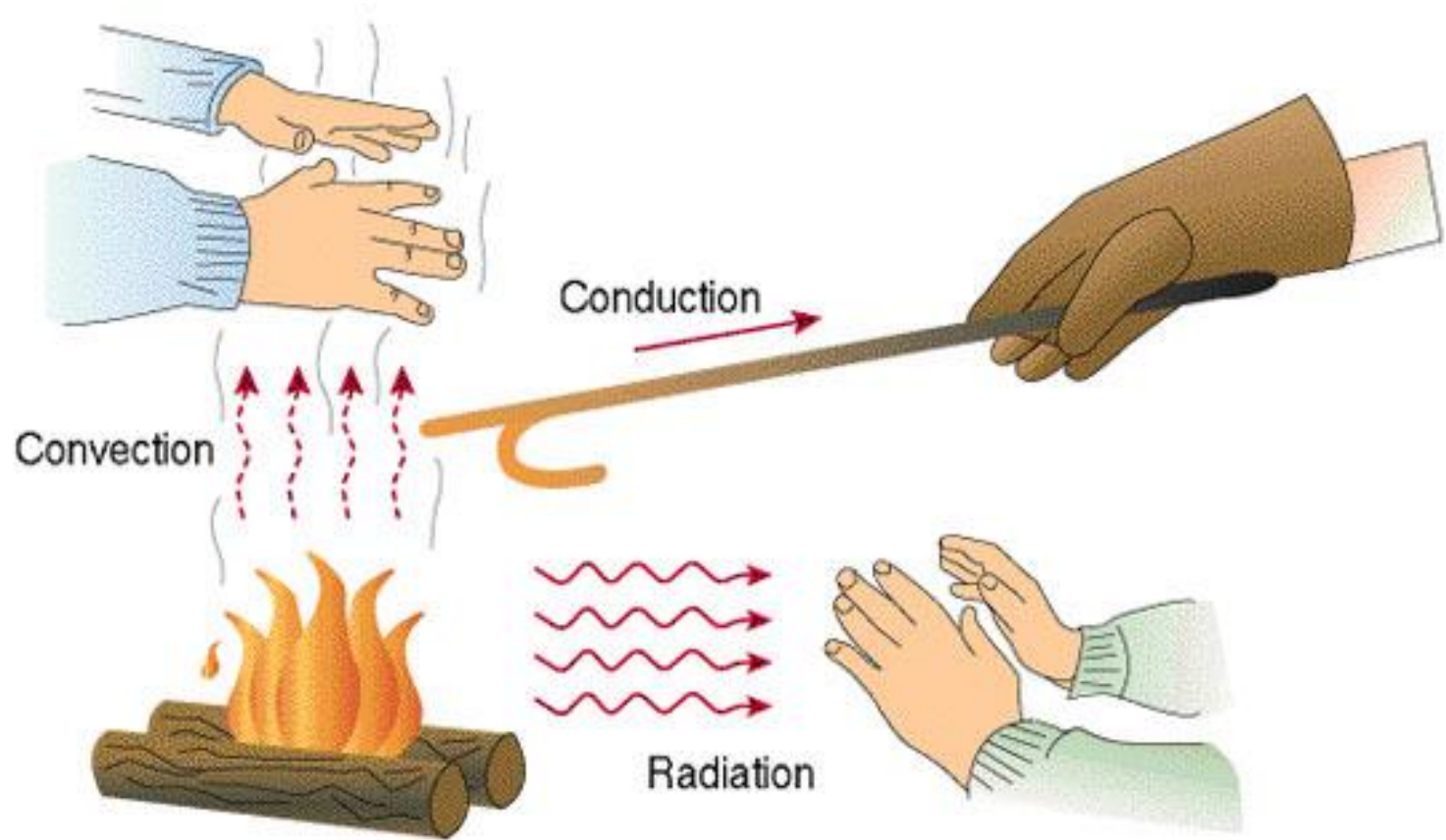
# How is Heat Transferred?


There are THREE ways heat can move.

–Conduction

–Convection

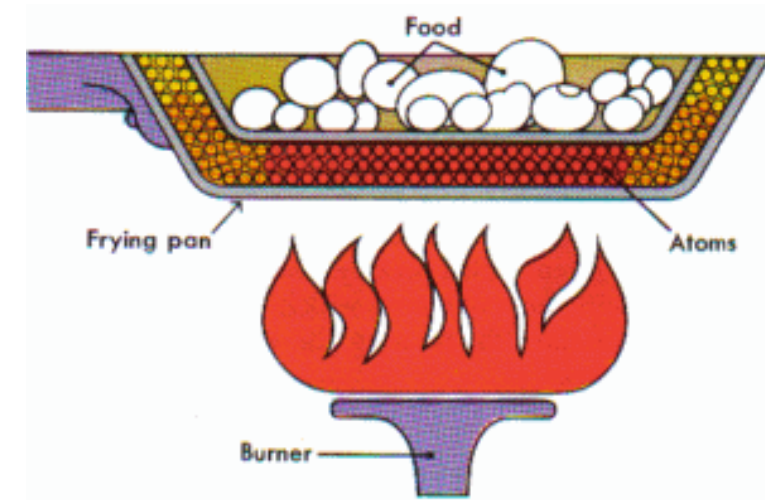
–Radiation





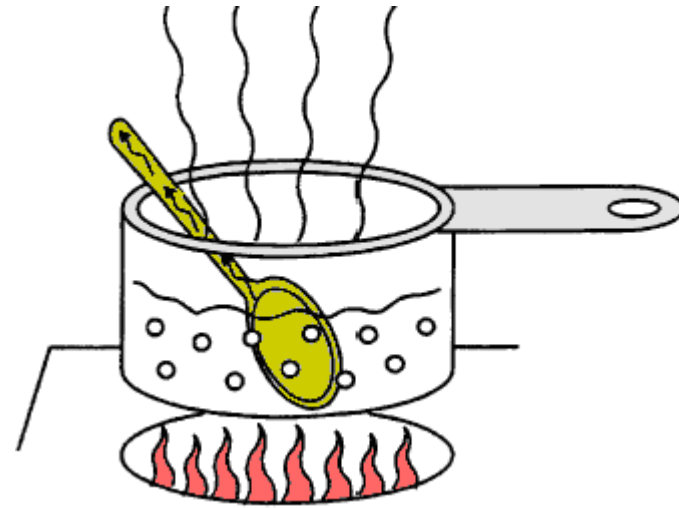
# Conduction

- Transfer of heat through direct contact (**TOUCH**)
- Heat is transferred from one particle of matter to another in an object **without the movement of the object.**
- Occurs anytime objects at different temperatures are touching each other.
- As long as the objects are in contact, transfer of heat will continue until the temperature of the objects is the same.



# Conduction Example

If you leave a metal spoon in a pan of soup that you are heating on the stove, it may burn your fingers. The spoon is in direct contact with the hot soup and heat is transferred to the spoon.

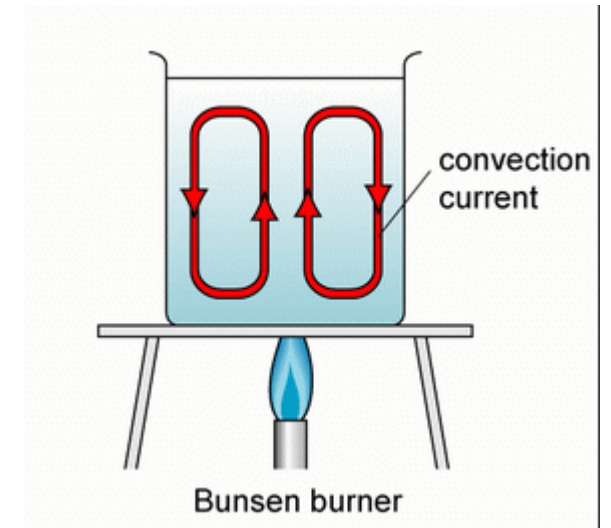
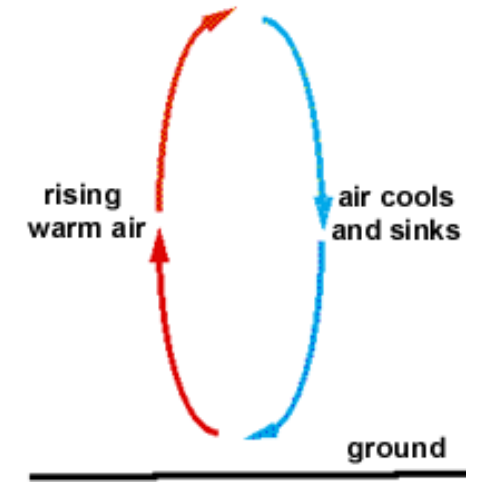


# Convection

- The transfer of energy in a fluid (liquid or gas).
- When part of a gas or liquid is heated, the particles move faster and spread out more.
  - bump into other particles, causing them to heat up and move faster
- Moves in a circular pattern called **convection currents**

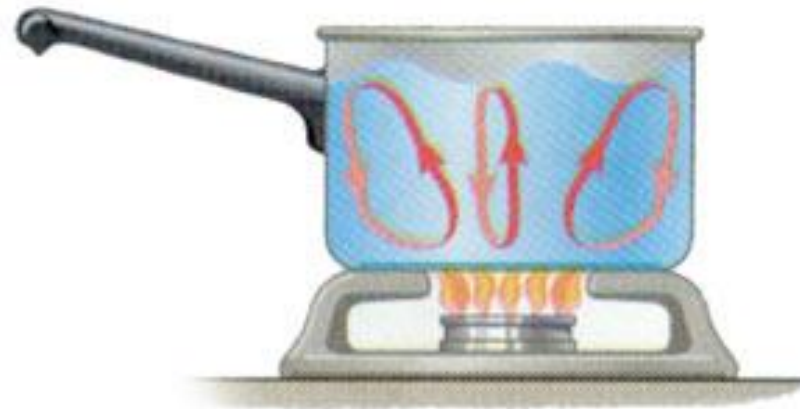
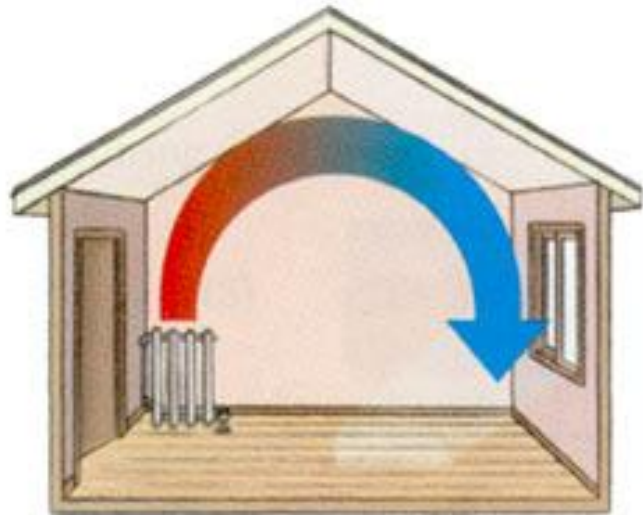
# Convection Currents

- When particles in the air spread out, they become **less dense** and rise above the unheated, more dense particles around them.
- The **denser** masses of the gas or liquid **move in (sink)** to fill the space left by the heated particles.
- The particles that **move away** from the source of heat become cooler and more dense then sink repeating the current.



# Examples of Convection

- Have you ever noticed that the air near the ceiling is warmer than the air near the floor? Or that water in a pool is cooler at the deep end?
- **Examples:** air movement in a home, pot of heating water.





# Radiation

- Energy transferred in the form of electromagnetic waves
- Radiation DOES NOT need matter to transfer heat
- **Radiation = Radiates** (heat escaping the sun)



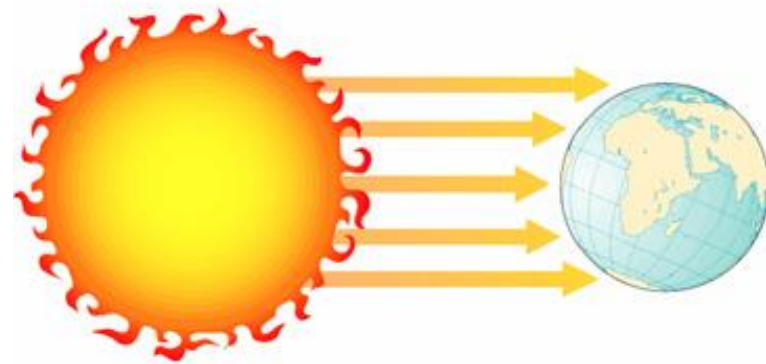
# Radiation May Come From Other Sources

- Have you ever sat too close to a campfire while cooking marshmallows? You're enjoying the warmth .... only to notice that your skin is really warm?



# Examples of RADIATION

1. Fire
2. Heat Lamps
3. Sun



- <https://www.youtube.com/watch?v=k9M4y6w0Ehw>