

Convection Currents and the Mantle

How is heat transferred?

What causes convection currents?

How is heat transferred?

- Heat transfer – the movement of energy from a warmer object to a cooler object.
- There are three types of heat transfer:
 - Radiation
 - Conduction
 - convection

How is heat transferred?

- Radiation
 - The transfer of energy through empty space.
 - Heat transfer by radiation takes place with no direct contact between a heat source and an object.
 - Radiation enables sunlight to warm Earth's surface.



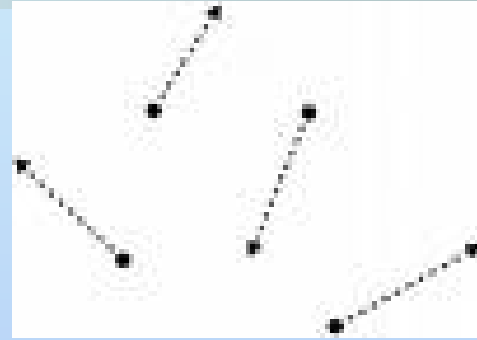
How is heat transferred?

- Conduction
 - Heat transfer by direct contact of particles of matter.



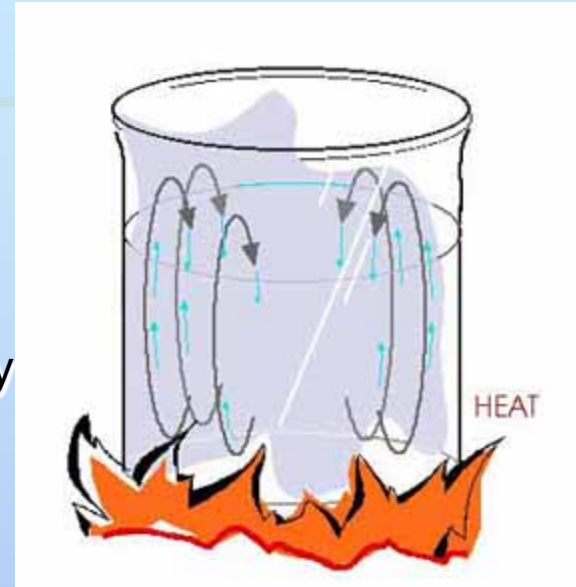
How is heat transferred?

- Convection
 - Heat transfer by the movement of a heated fluid.
 - Fluids include liquids and gases.
 - Heat transfer by convection is caused by differences of temperature and density of a fluid.
 - Density is a measure of how much mass there is in a volume of a substance.

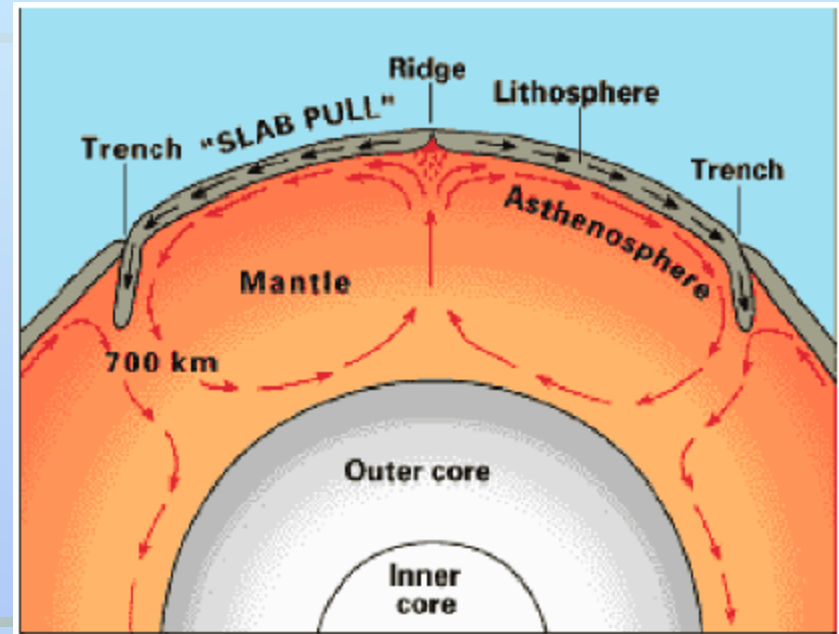
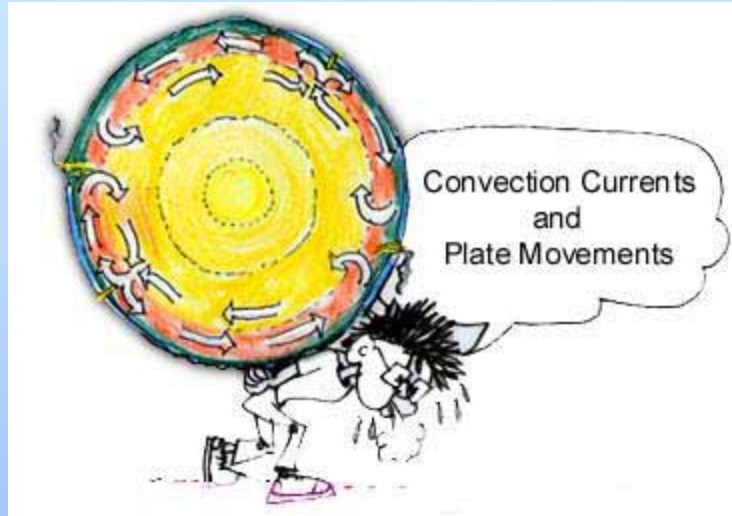


What causes convection currents?

- **Convection**
- When a liquid or gas is heated, the particles move faster.
- As the particles move faster, they spread apart.
- Because the particles of the heated fluid are farther apart, they occupy more space.
- The density decreases. (rises)
- But when a fluid cools, its particles move more slowly and settle together more closely.
- As the fluid becomes cooler, its density increases. (sinks)



What causes convection currents?



NIGHT TIME

What causes convection currents?

■ Convection in Earth's Mantle:

- Earth's mantle responds to heat.
- The heat source for these currents is heat from Earth's core and from the mantle itself.
- Hot columns of mantle material rise slowly through the asthenosphere.
- At the top of the asthenosphere, the hot material spreads out and pushes the cooler material out of the way. (less dense)
- This cooler materials sinks back into the asthenosphere. (more dense)
- Over and Over, the cycle of rising and sinking takes place.

