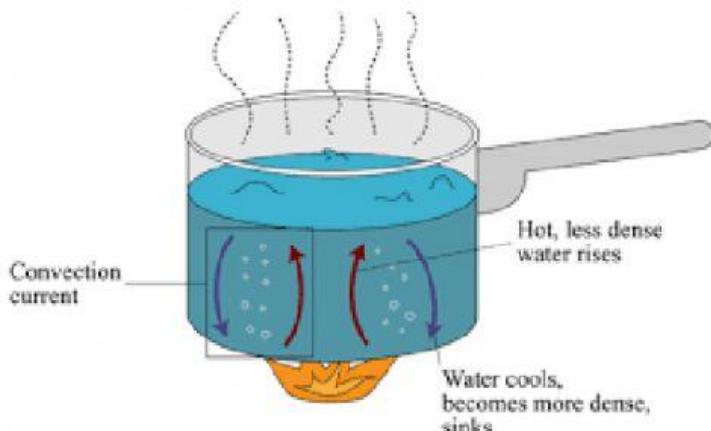
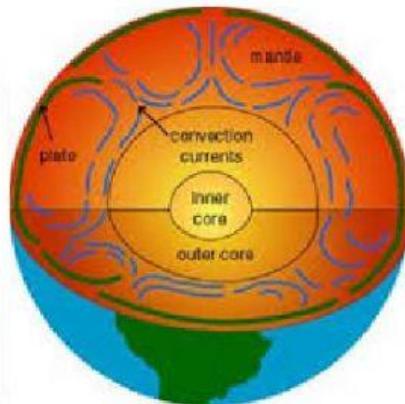
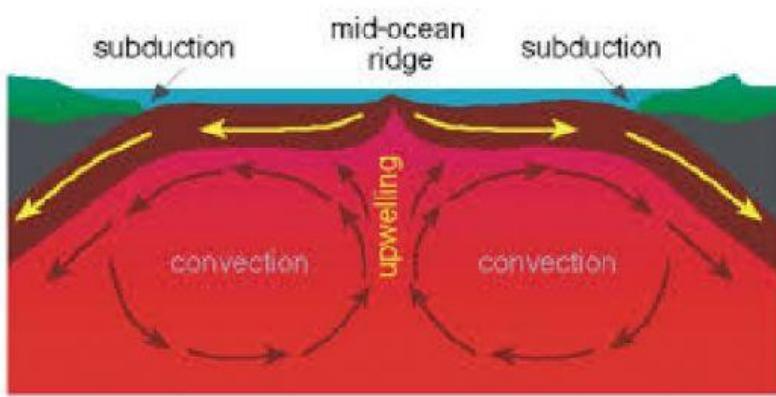


## Convection

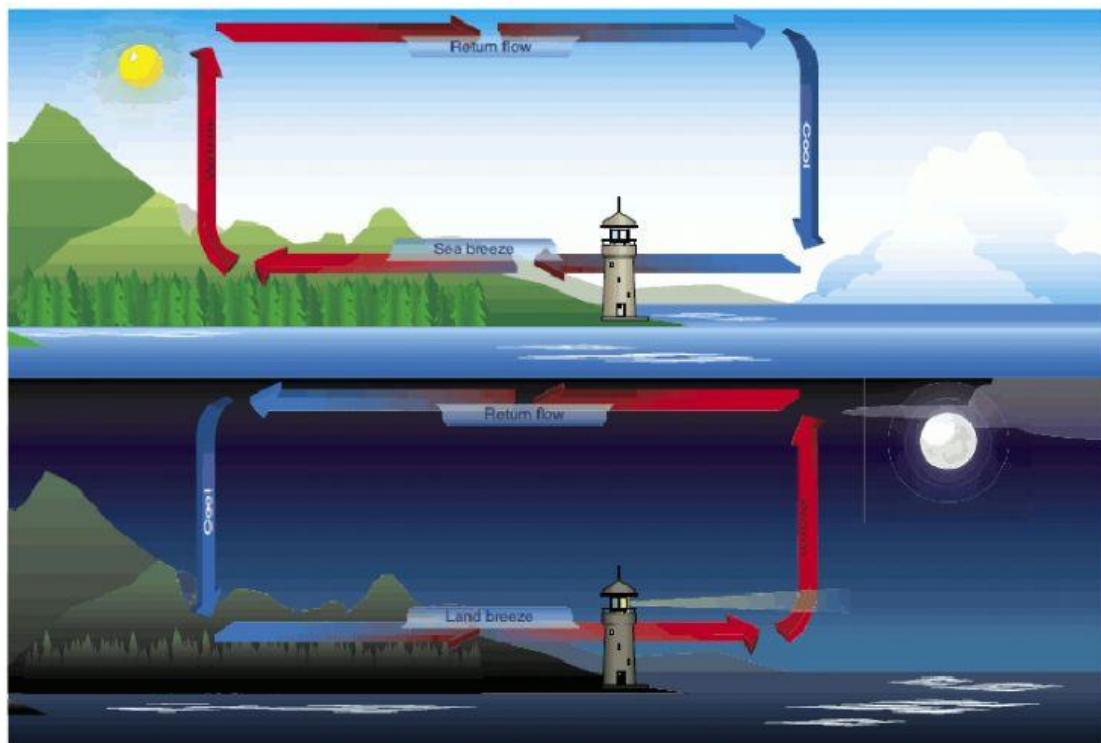
- the second way that heat is transferred is through convection
- **convection** is the transfer of thermal energy through circulating currents in a fluid
  - o e.g. heating water in a pot
    - the bottom of the pot is in direct contact with the element on the stove
      - heat energy from the element is transferred to the pot and then to the water at the bottom of the pot through conduction
    - the water that heats at the bottom of the pot starts to move faster and the particles move farther apart
      - the hotter water becomes less dense and starts to rise
    - as the less dense water rises, it starts to cool
      - as it cools it becomes more dense and starts to sink again
    - this creates a convection current that cycles through the fluid



- convection currents can occur in liquids and gases (recall that both of these are fluids)
- convection is important in geological processes
  - o the mantle is warmed by the core of the earth
  - o the warmer mantle is less dense and rises towards the crust
  - o near the crust, it cools and starts to sink down again
    - this creates a convection current
  - o the movement of the mantle underneath the plates of the crust results in plate tectonics



- because of its high **heat capacity**, water acts as a **heat sink**
  - a **heat sink** is something that absorbs heat but does not heat up much as a result
  - this also creates **convection currents** called sea (or lake) breezes and land breezes
    - **sea breeze**
      - during the day, the sun shines on the land and the water
        - the land (lower heat capacity) heats up quickly and the water (higher heat capacity) heats up slowly
        - the air over the warm land rises, creating a low pressure zone which the cool air from the water fill in (creating the breeze)
    - **land breeze**
      - during the night, the sun stops shining
        - the land (lower heat capacity) cools down quickly and the water (higher heat capacity) cools down slowly
        - the low pressure zone is now above the warmer water, and this creates a breeze coming from the land
  - places that are located close to large bodies of water have higher temperatures in the winter and lower temperatures in the summer
    - e.g. compare the climate of Vancouver to the climate of Toronto

**Assignment:**

1. In your own words, explain how thermal energy is transferred in a pot of heating water.
2. How is the particle theory involved in the idea of convection currents?
3. Where might you find convection currents in your daily life?
4. How are convection currents involved in natural processes?