Notes Chapter 6

Aim: Compare and contrast conduction, convection, and radiation.

Do Now: Take out a piece of paper and write your name on it.

Conduction-The transfer of heat energy by direct contact of particles.

Atoms MUST touch. If they don’t touch, heat doesn’t transfer.

Conduction works through solids, liquids and gases. *Works BEST through solids.*

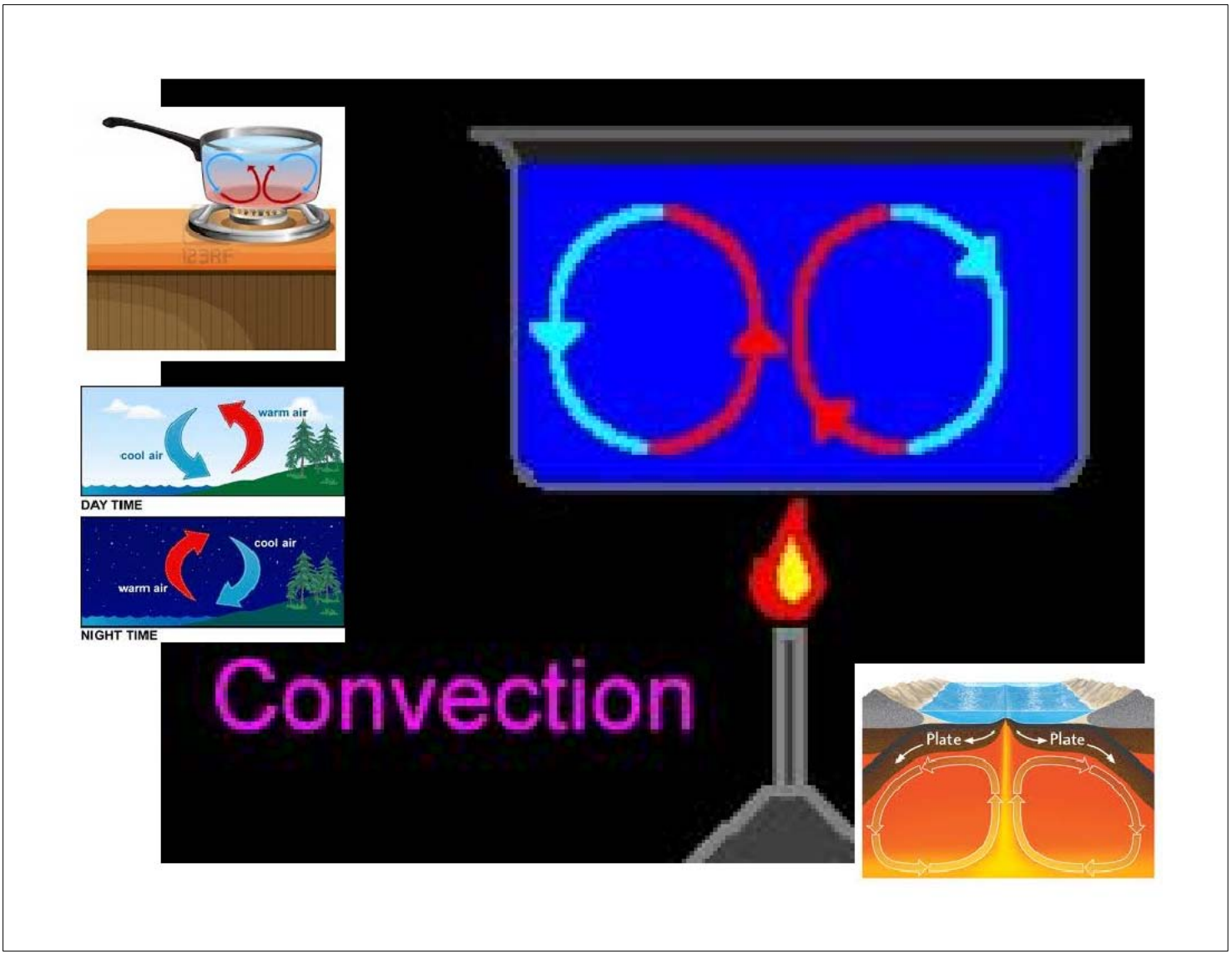
Metals conduct heat well.

Convection-The transfer of heat energy by the movement of matter.

Atoms must move and carry heat energy with them.

Convection works well in fluids (materials that can flow) like liquids and gases.

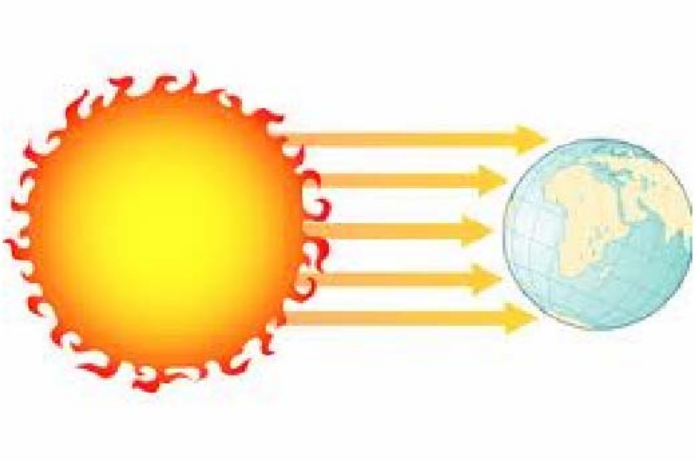
Fluids usually flow in circular current.

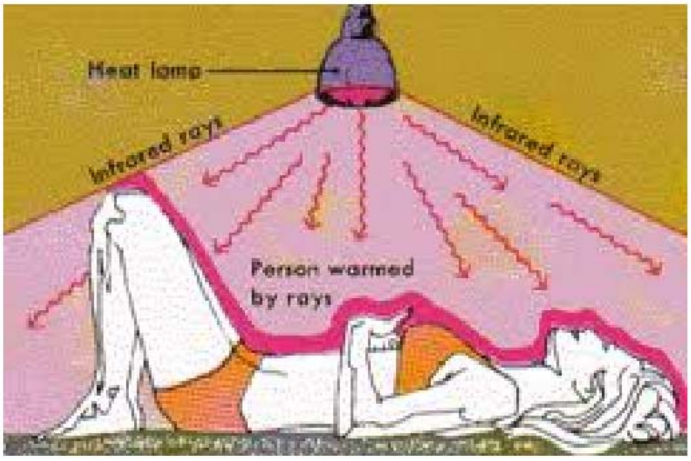

warm air
cool air
DAY TIME
cool air
warm air
NIGHT TIME
Convection
Plate
Plate

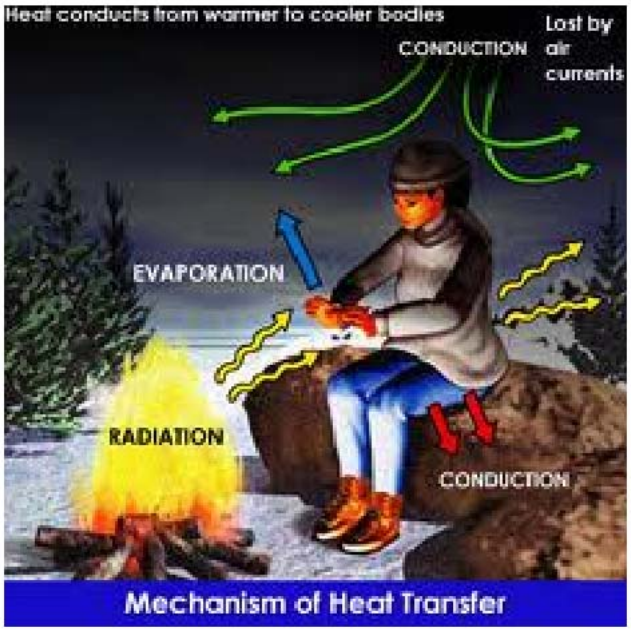
Radiation-The transfer of heat energy by invisible waves.

Radiation doesn't require matter to transfer heat energy.

Heat energy from the Sun radiates to Earth through space.




Heat lamp
Infrared rays
Infrared rays
Person warmed by rays


Heat conducts from warmer to cooler bodies
CONDUCTION
Lost by air currents
EVAPORATION
RADIATION
CONDUCTION
Mechanism of Heat Transfer

Insulator-Something that slows or prevents heat energy from transferring.

Good insulators are air, wood, plastic, and foam.

AIR is BEST!

Insulation is rated with an R-value.

Some R-values:

Brick - 0.08/cm

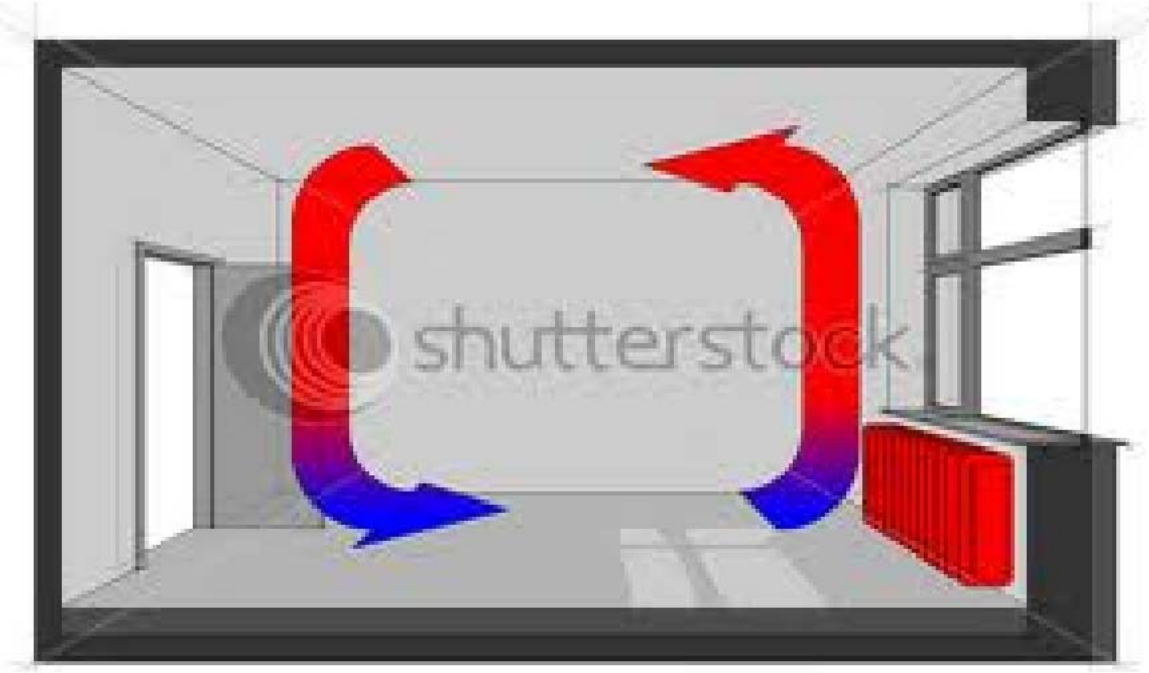
Wood - 0.6/cm

Fiberglass - 1.22/cm

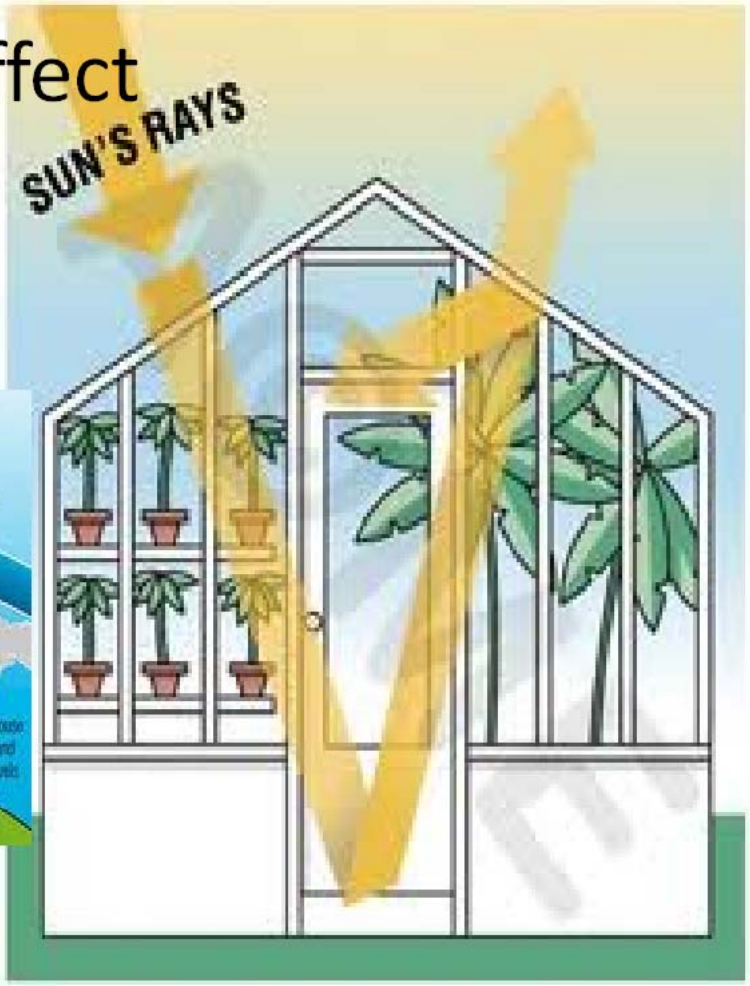
Air - 1.82-3.56/cm

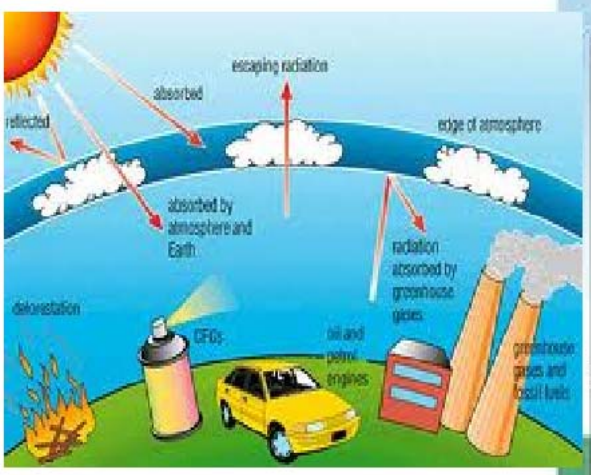

Attic
Walls
Floors
Crawl space
Basement

Radiators in your home actually conduct, convect and radiate heat.



Greenhouse effect





Notes 6-1

Aim: Compare heat, temperature and thermal energy.

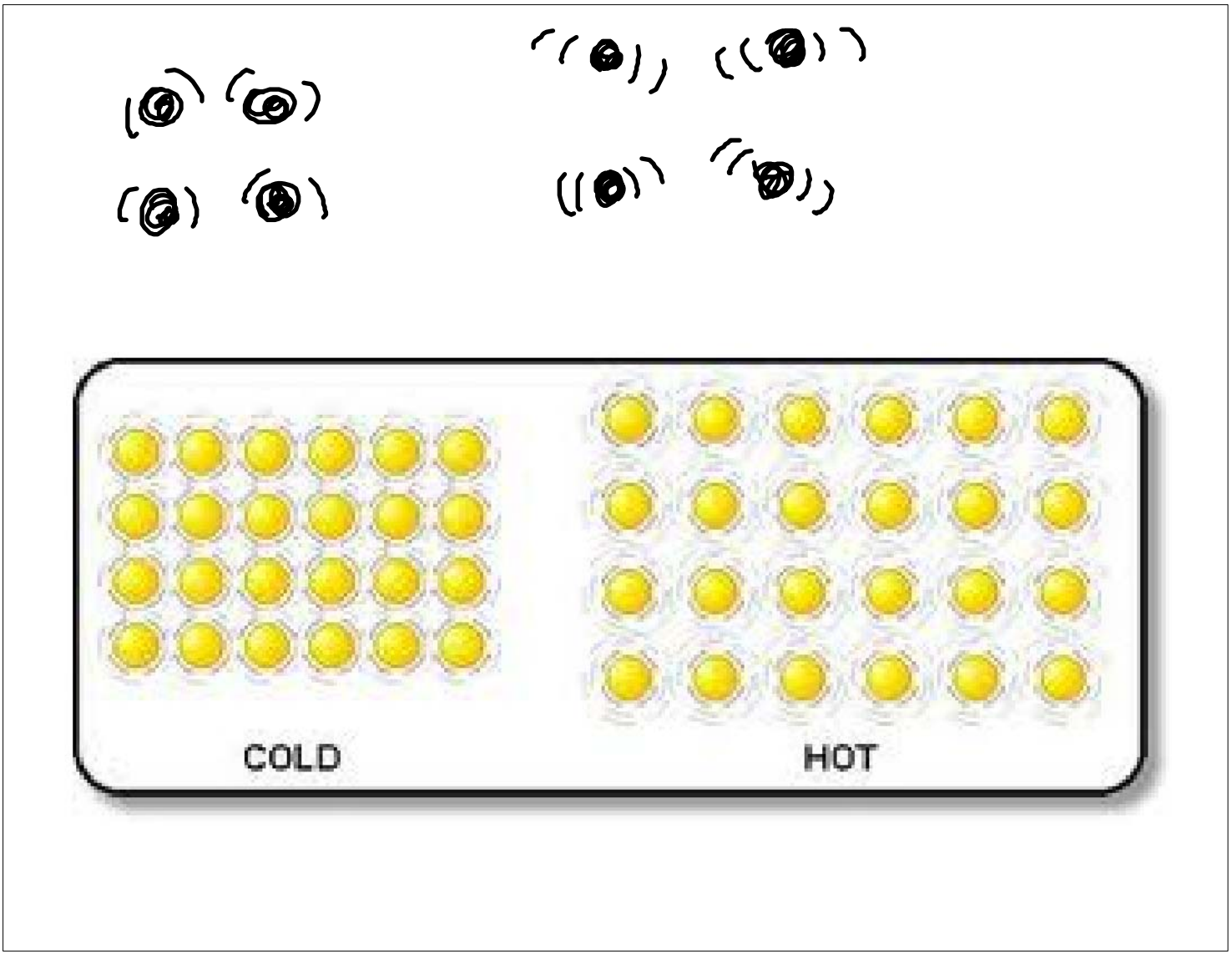
Do now: define heat energy

Heat is an energy that travels from a higher temperature to a lower temperature.

ANY DIRECTION.

Temperature is the measure of the average kinetic energy of the particles of a material.

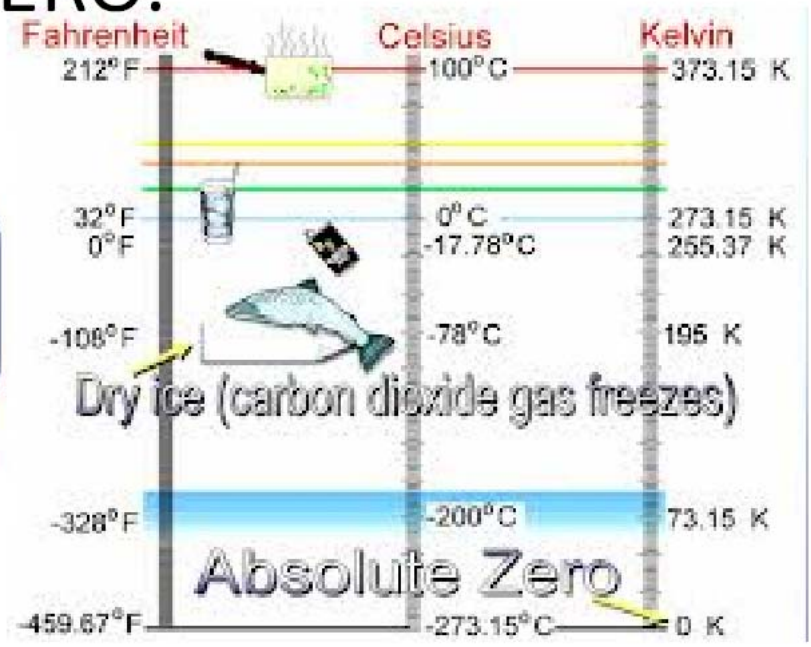
Atoms are always moving. The more energy they have, the more they move.


COLD
HOT

Kinetic theory of matter – All matter is made of particles that are always in motion. The more energy they have, the more they move.

When atoms of a solid move fast enough, they separate and the material becomes a liquid. A liquid can gain enough energy to become a gas.

When the temperature gets low enough, the atoms stop moving. ABSOLUTE ZERO.

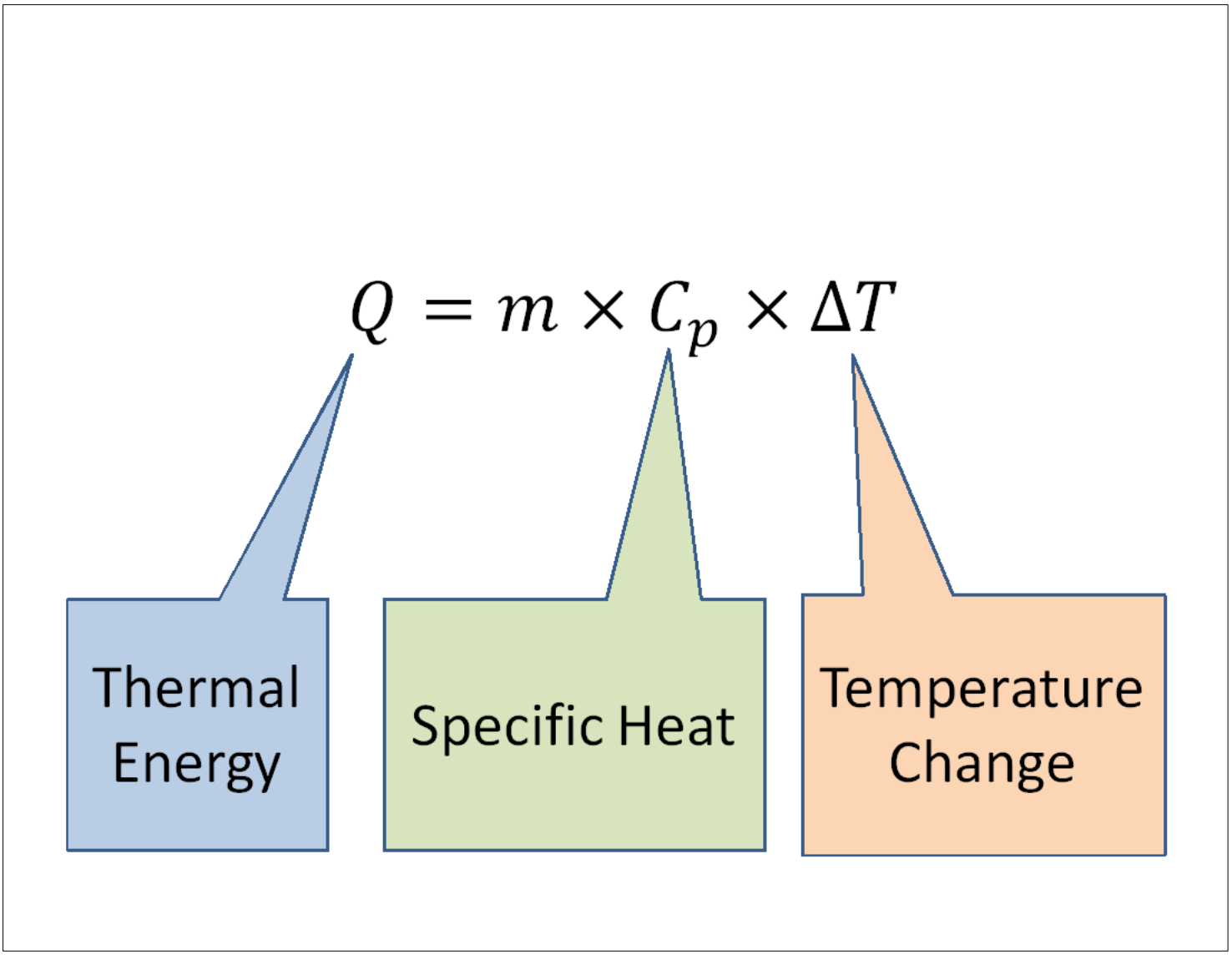


Thermal Energy is the total energy of all the atoms of an object.

An cold object with more atoms can have more energy than a smaller hot object.

Thermal Expansion- Objects usually expand when they are heated and contract when they are cooled.

How to get a ring off your finger


$Q = m \times C_p \times \Delta T$
Thermal Energy
Specific Heat
Temperature Change

Specific heat – The amount of heat necessary to raise the temperature of 1kg of a material 1 degree Celsius.

Material	Specific Heat	Material	Specific Heat
Water	4184	Sand	664
Alcohol	2450	Iron	450
Aluminum	920	Copper	380
Carbon	710	Clay	130

What is the energy required to raise the temperature of 5kg of sand from $20^{o}C$ to $30^{o}C$?