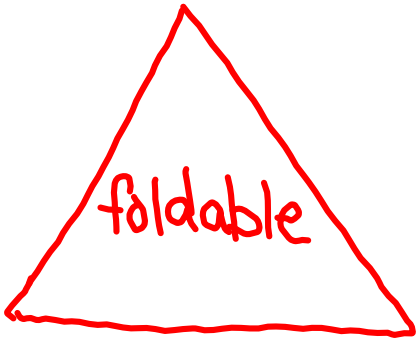
Heat Energy

- Also called thermal energy
- Heat always flows from warmer to cooler substances until the temperatures reach equilibrium (equal)
- Heat can be transferred in 3 ways:
  1. Radiation
  2. Convection
  3. Conduction



3 Types of Heat Transfer

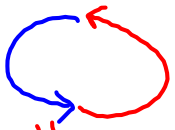
① RADIATION

- when heat travels through empty space (indirect contact)
- heat comes in the form of electromagnetic waves
- darker colors absorb heat while light colors reflect heat
- H_2O can absorb heat

EXAMPLES

In class:	Real World:
• match over flame	• sunburn
• balloon with and without H_2O over flame	• making sun tea
• jar of H_2O in the window and shade	• roasting hot dog/marshmallow over a campfire
• jars of H_2O with different colors	• car heating up after sitting with windows up
• sun-made recycled crayons	• being under stage lights

② CONVECTION

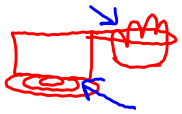


- when heat travels through fluids (liquids/gases)
- warm becomes less dense and rises, cold becomes more dense and sinks
- ★ - responsible for uneven heating of the Earth, which causes winds, which move weather systems

EXAMPLES

In class:	Real World:
• lava lamp • spinning whirl over light • Teabag Rocket	• boiling water • water at the top of pool vs. bottom • heater heating a room

③ CONDUCTION



- when heat travels through solids in direct contact
- some materials are good conductors and let heat pass through easily (metals)
- some materials are good insulators and do NOT let heat pass through easily (non-metals)

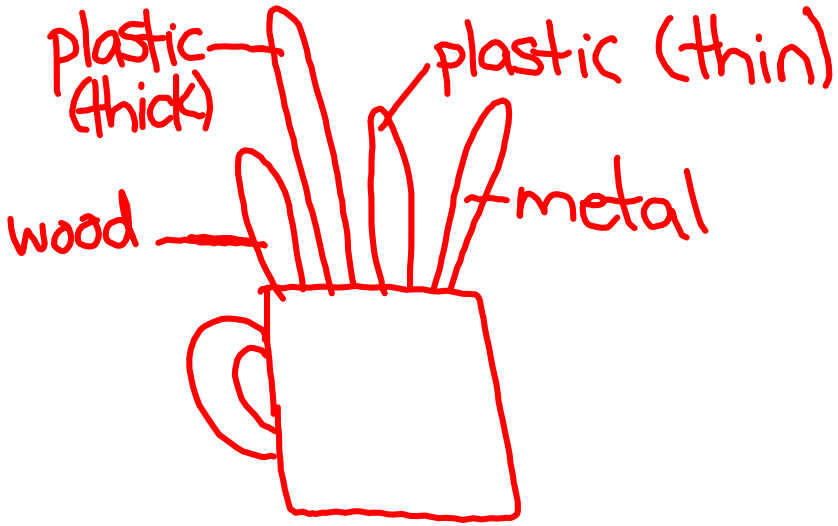
EXAMPLES

In Class:	Real World:
• hand boilers	• touching stove/ heater
• Mallows on the spoon	• pouring cold water on hot body
• sides of chalk container	• hot seat belt/ leather seats
• stove-top popcorn	• curling iron/ straightner
• Magic Ice blocks	• ironing clothes
• Spoonful of heat	
• Jars with coverings	

Conductors vs. Insulators

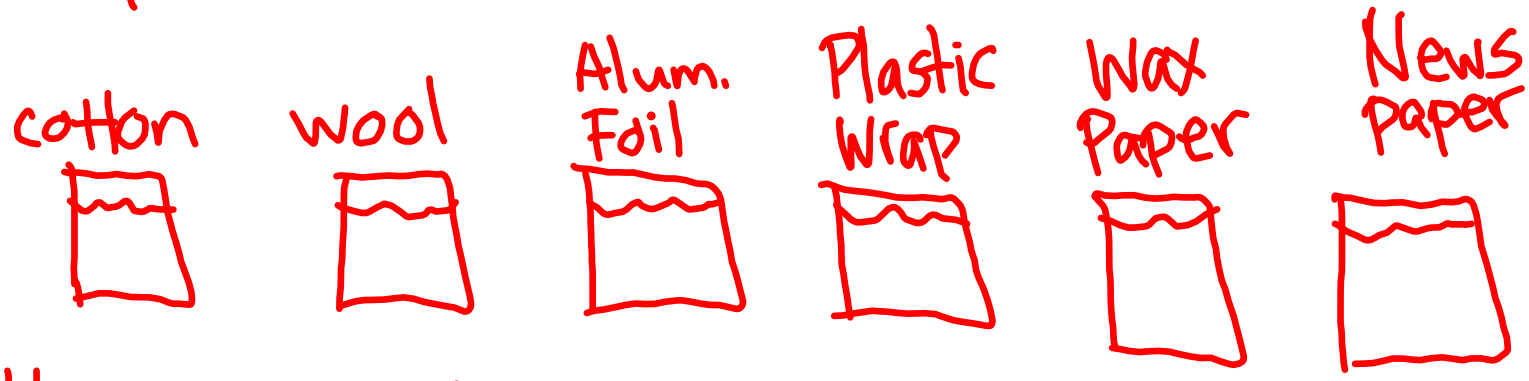
4/17/15

Experiment #1 - Spoonful of Heat



Hypothesis: The ____ spoon will heat up the fastest. The ___ spoon will heat up the slowest.

Experiment #2- Hold It In!



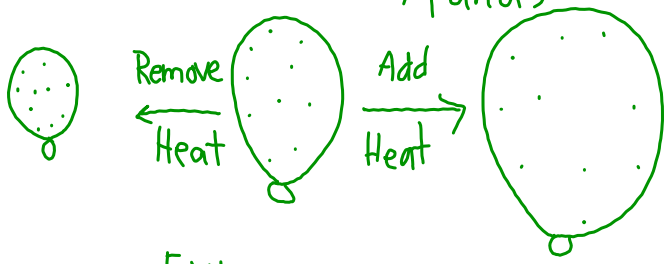
Hypothesis: The jar that will keep the heat the longest will be covered with ____. The jar that will loose the heat fastest will be covered with ____.

Heating and Cooling Matter

4/22/15
7/15

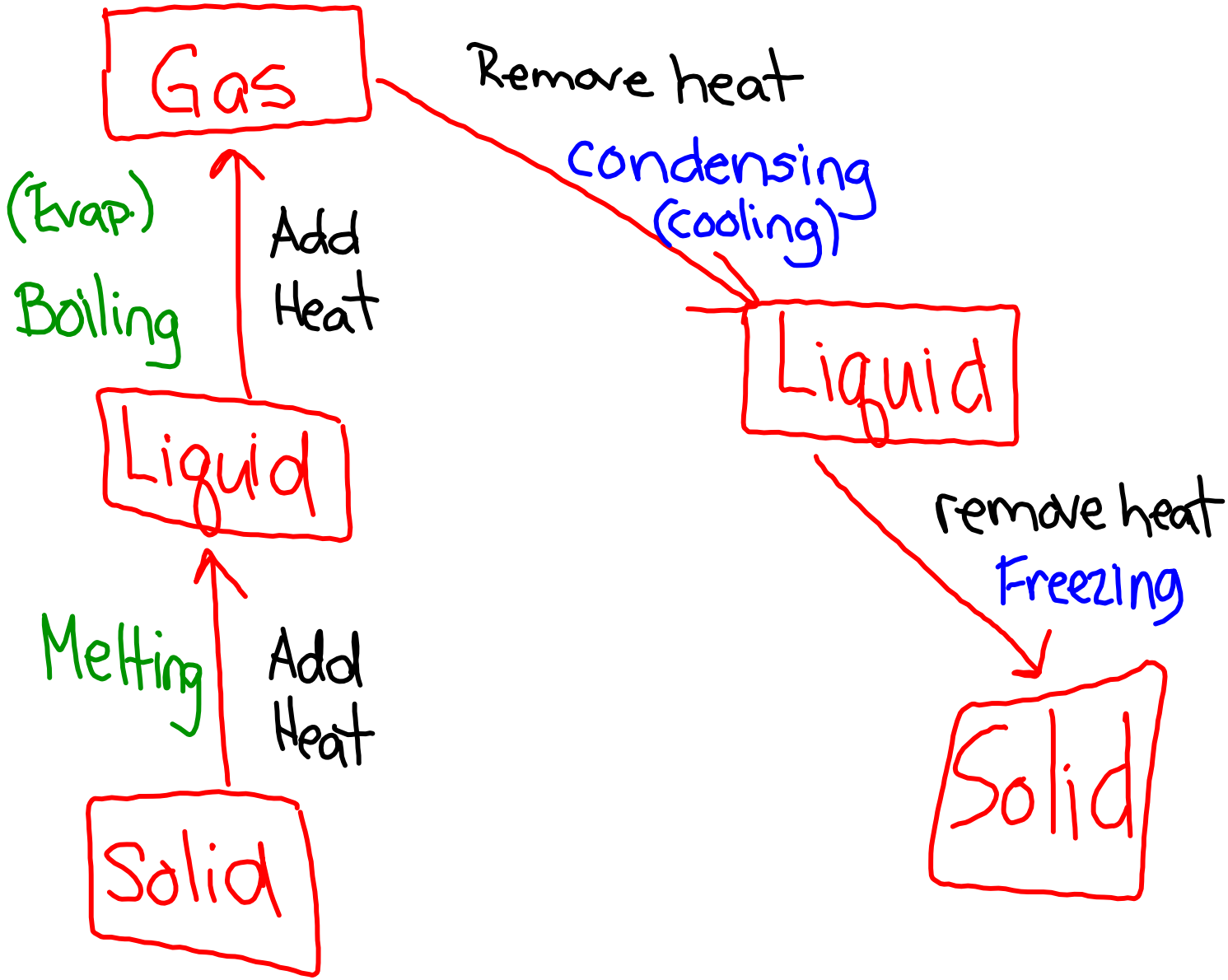
- When matter is heated, it expands or it gets bigger
- When matter is cooled, it contracts or gets smaller

* When H_2O freezes, it expands



EXAMPLES

In-class	Real-World
• Automatic Balloon Inflator/Deflator • Frozen balloon in Plaster of Paris • Hand boilers	• space between railroad tracks, cement blocks, and liquids in bottles will exp./cont. • thermometer • pot holes and cracks in the road


Gas
Remove heat
condensing
(cooling)
(Evap.)
Boiling
Add
Heat
Liquid
Liquid
remove heat
Freezing
Melting
Add
Heat
Solid
Solid