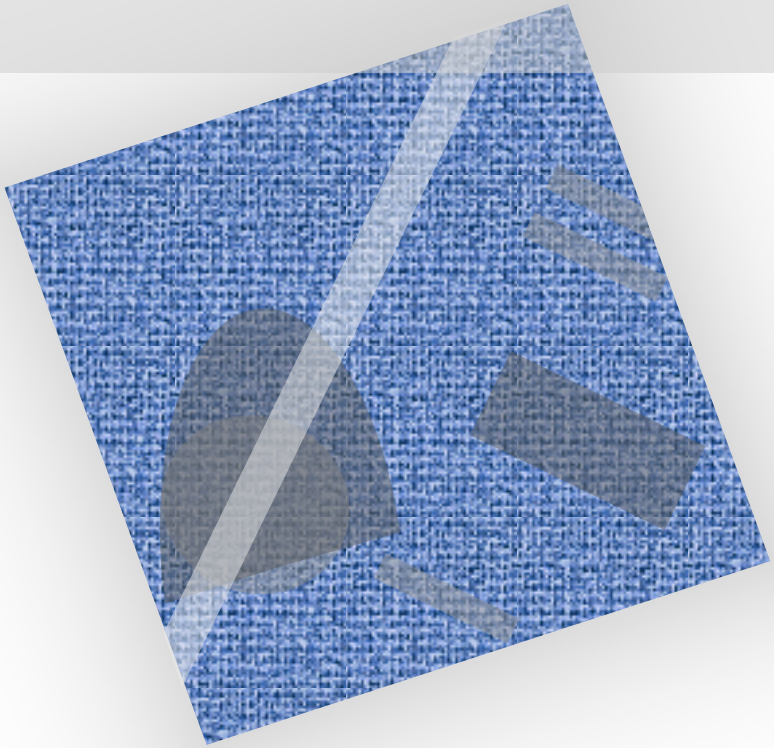
Heat



A Form of Energy

Temperature and Heat

- Kinetic energy is the energy of motion
- Temperature is the measure of the average kinetic energy of an object

Question

- **How is kinetic energy related to heat production?**

Thermometer

- **A instrument used to measure temperature**
- **Thermometers commonly have alcohol (with dye) or mercury**
- **Digital thermometers have replaced older ones**

Celsius Scale

- **Celsius is the metric scale for measuring temperature**
- **Water freezes at 0°C and boils at 100°C**

Kelvin scale

- **The Kelvin scale is a metric temperature scale measured in Kelvin units (K)**
- **Formula (273+ºC)= Kelvin**

Questions

- **What is the formula for converting a Celsius temperature to a Kelvin temperature?**
- **What is the boiling point of water on the Kelvin scale?**
- **What is the freezing point of water on the Kelvin scale?**

Absolute zero

- **The temperature in which all molecular motion stops (0 K)**

Questions

- Describe absolute zero.
- What is absolute zero on the Celsius scale?

Measuring Heat

- Increase in temperature
- Addition of heat
- A decrease in temperature
- Removal of heat

Calories

- Unit for measuring heat
- The amount of heat needed to raise 1 gram of water one degree Celsius

Temperature

- **Joule is another unit for measuring heat**
- **Mass and type of substance determine the amount of temperature change**

Specific Heat

- **The ability of a substance to absorb heat energy (specific heat)**
- **Different substances absorb heat at different rates**
- **The greater the mass of the object the more heat is absorbed**

What is a calorimeter?

- **Device used to measure the heat given off during chemical reactions**

Questions

- How can heat be measured?
- What is the unit used to measure heat?
- What is specific heat?

Heat and Phase Changes

- A phase change is a physical change that requires a change in heat energy
- Addition or removal of HEAT

Questions

- **What is freezing point, melting point, and boiling point?**

Heat expansion

- **The expansion of a substance due to heat**
- **Most solids, liquids, and gases expand as they are heated**

Expansion of water

- **Between 4ºC and 0ºC, water EXPANDS as it cools and turns into a solid**

Thermostat

- **A thermostat is a device that controls the temperature**
- **The switch of a thermostat is a bimetallic strip**

Bimetallic Strip

- **Two different metals that are bound together**
- **They expand at different rates when heated**
- **Used as a switch in a thermostat**

Internal energy

- **The energy within a substance**

Questions

- What is internal energy?
- What is a thermostat?
- Describe the switch of a thermostat.
- What happens to most substances when heat is added?

Molecules and Motion

- The motion of molecules produces heat
- The more motion, the more heat is generated

Heat Transfer

- The movement of heat from a warmer object to a colder one

Forms of heat transfer

- Three forms of heat transfer:
- Conduction
- Convection
- Radiation

Conduction

- Conduction involves the transfer of heat through direct contact
- Heat conductors conduct heat well, insulators do not

Convection

- **Takes place in liquids and gases as molecules move in currents**
- **Heat rises and cold settles to the bottom**

Radiation

- **Heat is transferred through space**
- **Energy from the sun being transferred to the Earth**

Questions

- What are the three types of heat transfer?
- How is conduction different from radiation?

What type of heat transfer is involved?

- **Heating a room with a fireplace**
- **Egg cooking in a frying pan**
- **Roof of a house becoming hot**

What type of heat transfer?

- Warm air mass bringing a change in the weather
- Wire getting hot from an electric appliance