

## HEAT TIMELINE

7000 BC - Fire is created  
100 BC - Central Heating (Romans)  
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1200's - Chimney  
1300's - Fireplace  
1700's - Cast-iron stoves/heaters  
Late 1700 - Central Heating w/ coal  
1800's - Forced air furnace  
1900's - Electrical heaters

## HEAT THEORIES

Up to 1600, people thought heat was a combination of fire and air.

The Caloric Theory proposed that heat was an invisible fluid, called a caloric, because it flowed from a hot object to a cold object.

The Particle Theory suggests that heat has no mass, but is a form of energy provided by the movement of particles that make up matter.

## SUSTAINABILITY

People utilize heat technologies for food, water, clothing, shelter and physical activity.

Basic needs are influenced by the environment and the technologies available to satisfy these needs, as well as the cultures that utilize them.

Furnace  
Air conditioner  
Thermal clothing  
Sterilization/Pasteurization  
Cooking  
Microwave

Sustainable choices need to be made to maintain the heat resources we have today.

## STATES OF MATTER

Matter is found in three states:

Solid: Particles of matter that are closely attracted to each other, forming a definite shape.

Liquid: Particles have loose attractions to each other and can slip and slide past each other.

Gas: Particles have little attraction to each other and fill space.

## PARTICLE MODEL

MATTER IS MADE UP OF TINY PARTICLES

THESE TINY PARTICLES ARE ALWAYS MOVING

WHEN HEAT ENERGY IS ADDED TO THE PARTICLES THEY MOVE FASTER

PARTICLES OF MATTER HAVE SPACE BETWEEN EACH PARTICLE

THERE ARE ATTRACTIONS BETWEEN PARTICLES

## KINETIC ENERGY

KINETIC ENERGY IS THE ENERGY OF PARTICLE MOVEMENT

SOLID - Particles have low kinetic energy and strong attractions to each other giving this state of matter definite shape and volume.

LIQUID - Particles have kinetic energy with loose attractions to each other, allowing the particles to slip past each other filling the container they are in.

GAS - Particles have high kinetic energy and weak attractions to each other giving this state of matter no shape and fill whatever space they are in.

## HEAT AND PARTICLE MODEL

Increasing or Decreasing Kinetic Energy (HEAT) will change the state of the particles

SOLIDS - increasing the kinetic energy of the particles can cause solids to change state (melting)

LIQUIDS - increasing the kinetic energy of the particles can cause solids to change state (evaporate) - decreasing the kinetic energy of the particles can cause liquids to change state (freezing)

GASES - decreasing kinetic energy of gas particles can cause gases to change state (condense)

## TEMPERATURE

TEMPERATURE is a measure of how HOT or COLD matter is, the average Kinetic energy of all the particles in a substance.

THERMAL ENERGY of matter is the total KINETIC energy of all the particles contained in the substance.

HEAT is the energy that moves (transfers) from one substance to another because of a difference in the kinetic energy of the two substances.

## THERMOMETERS

THERMOMETERS are devices used to measure the kinetic energy of the particles of a substance.

200 BC - Thermoscope

1590's - Galileo Thermometer

1714 - 1<sup>st</sup> thermometer scale was created by Fahrenheit

1742 - Celcius scale developed

1970 - Digital thermometer

1990 - Infrared thermometer