



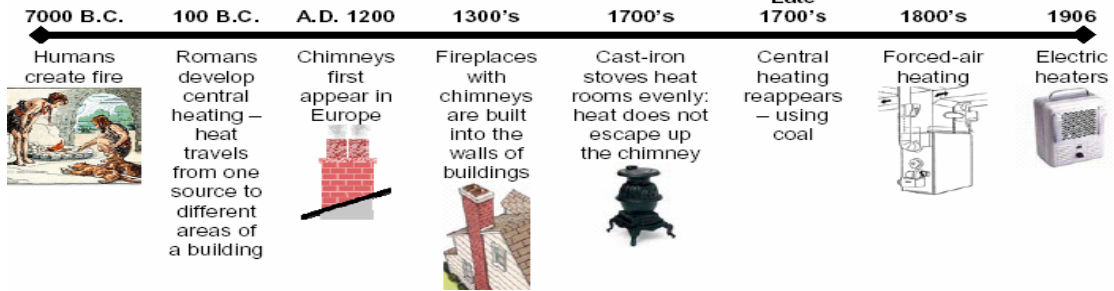
Grade 7 - Unit 3 – Heat and Temperature Concepts

History of Heat

Combination of fire  and air 
 Invisible fluid (Caloric Theory)
 A form of Energy

Heat Technologies

Control Shelter Conditions
 (Local and Central Heating Systems)
 Clothing in Extreme Environments
 Food Storage and Preparation
 (Refrigeration and Air-conditioning)
 Thermostats and Thermograms



Heat Sources

Natural

Sun (Solar) Earth's Core Fossil Fuel Decay

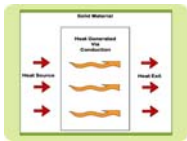
Alternatives

Wind Power Nuclear Energy Hydro-electric Power Tidal Power

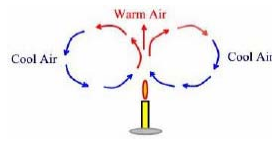
Heat Transfer

HEAT (Kinetic Energy Transfer) & TEMPERATURE (Average Kinetic Energy of the particles)
 Heat always transfers from objects with higher thermal energy to objects with less thermal energy

Conduction



Convection



Radiation



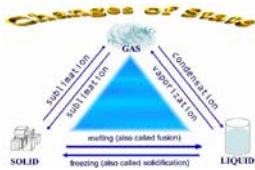
INSULATORS

Substances that prevent the transfer of Thermal Energy from one substance to another

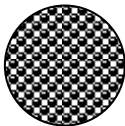
Heat Loss – R-Value

Heat Transfer Causes Particles in a Substance to Gain or Lose Kinetic Energy and Change Volume (Expand or Contract) or Change State

States of Matter

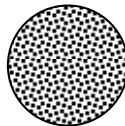


Solid



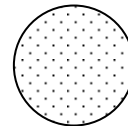
Solids have a definite shape and volume

Liquid



Liquids take the shape of the container they are in

Gas



Gas has not set shape, it fills the space it is contained in

Particle Model of Matter

All Matter is made up of tiny particles

The particles are always moving

The particles have space between them

Heat makes the particles move faster

Heat (Thermal) Energy

Home

Consumption
 Transportation

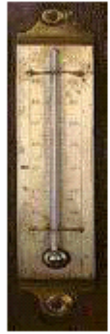
Industry

Cogeneration

Conservation

Energy Efficiency

History Of Thermometers



200 B.C. The first thermometers were called thermoscopes

1590's Several inventors invented a version of the thermoscope at the same time, Italian inventor Santorio Santorio was the first inventor to put a numerical scale on the instrument. Galileo Galilei invented a rudimentary water thermometer in 1593 which, for the first time, allowed temperature variations to be measured.

1630's Early thermometers (like the one Galileo invented) did not have any scale (markings with numbers) to determine precise temperature.

1650's

1701

Ole Romer created one of the first practical thermometers, which used red wine as the temperature indicator. The temperature scale for his thermometer had 0 representing the temperature of a salt and ice mixture (at about 259 K), $7\frac{1}{2}$ representing the freezing point of water (273.15 K), and 60 representing the boiling point of water (373.15 K).

Daniel Gabriel Fahrenheit (1686-1736) was the German physicist who invented the alcohol thermometer in 1709

1714

In 1714, Fahrenheit invented the first mercury thermometer, the modern thermometer. And in 1724, he introduced the temperature scale that bears his name - Fahrenheit Scale.



1742

The 1st precise scale was developed by Anders Celsius in 1742. He used 'degree' as the unit of temperature. Centigrade means "consisting of, or divided into, 100 degrees". All of his standards for comparison, to make his markings (on his scale), were based on the properties of water.

0° was assigned the temperature at which ice melts at sea level

100° was assigned the temperature at which liquid water boils at sea level

The region between (above and below, as well) these two extremes was separated into 100 equal units (degrees)

The two fixed temperatures that Celsius chose can be used to calibrate a thermometer. The Celsius temperature scale is also referred to as the "centigrade" scale.

The term "Celsius" was adopted in 1948 by an international conference on weights and measures

1852

Lord Kelvin invented the Kelvin Scale in 1848. The Kelvin Scale measures the ultimate extremes of hot and cold. Kelvin developed the idea of [absolute temperature](#), what is called the "Second Law of Thermodynamics", and developed the dynamical theory of heat.

Absolute zero is the coldest possible temperature - 273° and is used by scientists. The markings on the scale are not called degrees, but are simply called kelvins.

(0° Celsius is equal to 273.15° Kelvin)

1861

The electrical-resistance-thermometer was invented in Germany. It used an electrical current to measure temperature.

English physician, **Sir Thomas Allbutt** invented the first medical thermometer used for taking the temperature of a person in 1867.

1970's

Theodore Hannes Benzinger invented the ear thermometer.

David Phillips invented the infra-red ear thermometer in 1984.

1990's

Dr. Jacob Fraden, invented the world's best-selling ear thermometer, the Thermoscan® Human Ear Thermometer.