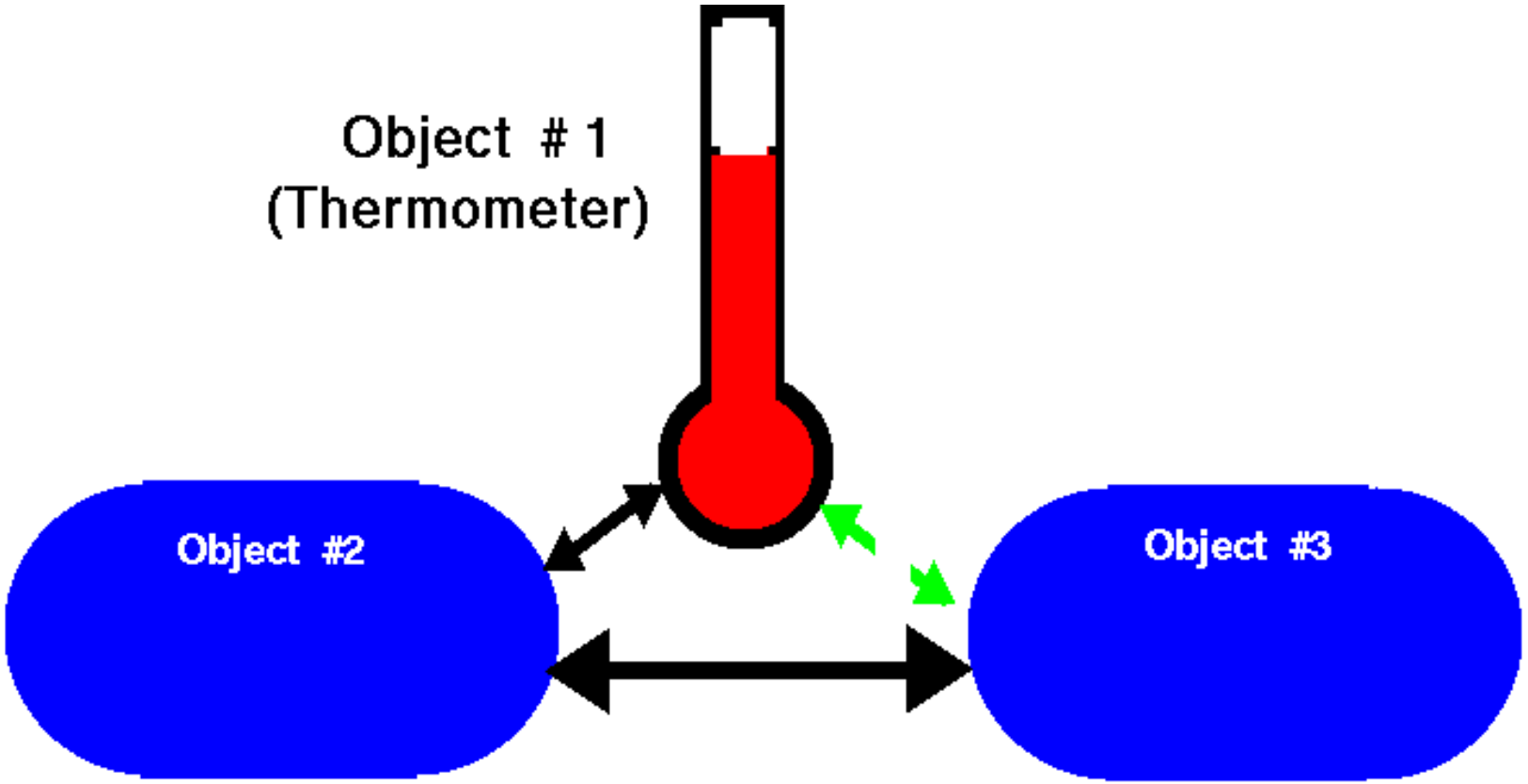
Zeroeth Law of Thermodynamics

- The zeroth law of thermodynamics begins with a definition of ***thermal equilibrium***
  - it is observed that some property of an object, like the pressure in a volume of gas, the length of a metal rod, or the electrical conductivity of a wire, can change when the object is heated or cooled. If two of these objects are brought into physical contact (with exchange of heat) there is initially a change in the property of both objects. But, eventually, the change in property stops and the objects are said to be in thermal equilibrium.
  - thermal equilibrium leads to the large scale definition of ***temperature***. When two objects are in thermal equilibrium they are said to have the same temperature. During the process of reaching thermal equilibrium, ***heat***, which is a form of energy, is transferred between the objects. The details of the process of reaching thermal equilibrium are described in the ***first*** and ***second*** laws of thermodynamics.
- The zeroth law of thermodynamics is an observation. ***When two objects are separately in thermal equilibrium with a third object, they are in equilibrium with each other.***

Zeroeth Law of Thermodynamics



When two objects are separately in thermodynamic equilibrium with a third object, they are in equilibrium with each other.

Objects in thermodynamic equilibrium have the same temperature.

http://www.grc.nasa.gov/WWW/K-12/airplane/thermo0.html

Thermometry

$t(x) = a + bx$

Equation defines a temperature scale in terms of specific thermometric properties (volume of a liquid, electrical resistance of metal or semiconductor, electromotive force generated at junction of dissimilar metals, etc.) – single valued, continuous, monotonic function of some thermometric system property .

The constant '*a*' determines the zero of the temperature scale and constant '*b*' determines the size of a unit of temperature (degree).

	Fahrenheit	*Celsius*	*Kelvin*
Boiling Point of Water	*212 °F*	*100 °C (99.98 °C)*	*373 K*
Freezing Point of Water	*32 °F*	*0 °C (-0.0001 °C)*	*273 K*
Absolute Zero	*-459 °F*	*-273 °C*	*0 K*

Common Temperatures

Key scale relations

	Kelvin	Celsius	Fahrenheit
Absolute zero (precisely, by definition)	0 K	−273.15 °C	−459.67 °F
Boiling point of liquid nitrogen	77.4 K	−195.8 °C	−320.3 °F
Sublimation point of dry ice.	195.1 K	−78 °C	−108.4 °F
Intersection of Celsius and Fahrenheit scales.	233.15 K	−40 °C	−40 °F
Melting point of H_2O (purified ice)	273.1499 K	−0.0001 °C	31.99982 °F
Water's triple point (precisely, by definition)	273.16 K	0.01 °C	32.018 °F
Normal human body temperature (approximate average)	310. K	37.0 °C	98.6 °F
Water's boiling point at 1 atm (101.325 kPa)	373.1339 K	99.9839 °C	211.971 °F

http://en.wikipedia.org/wiki/Celsius

Temperature