1. First (1st) Law of Thermodynamics
   1. [History](https://en.wikipedia.org/wiki/First_law_of_thermodynamics#History)

The *first law of thermodynamics* is sometimes considered to be an extension of the *law of conservation of energy*. The law of conservation of energy was discovered in the late seventeenth century for use in mechanical systems but more has been added with introduction of the first law of thermodynamics. Of the four laws, this “first” law of thermodynamics was actually the second to be discovered after the *second law of thermodynamics*. The investigation of the relationship between heat and work first began in the industrial age with the invention of the first engine, whose primary use was to pump water out from the coal mines. Over the course of half a century, the first law was empirically developed where the first statements of the law came in 1850 given by Rudolf Clasius. Rudolf Clasius’ statement of the first law referred to the cyclic thermodynamic process where, **“In all cases in which work is produced by the agency of heat, a quantity of heat is consumed which is proportional to the work done; and conversely, by the expenditure of an equal quantity of work an equal quantity of heat is produced”** (Clasisus, 1850).

* 1. [Summary](https://en.wikipedia.org/wiki/First_law_of_thermodynamics)

The first law introduces the important state variable, *internal energy* (*U*), which is also known as the *thermodynamic potential*. It also argues that energy may be converted from one of its existing forms to another form. Lastly, it introduces the concept that the transfer of thermal energy known as *heat* is a different type of energy that is produced during a process of *work*. Overall, this first law is a modification of the law of conservation of energy to be applicable for thermodynamic systems. The law of conservation of energy states the total energy of an isolated system is constant and that energy cannot be created or destroyed, only transformed from form to another. The first law typically follows the equation and definitions:

Together these variables form to provide an equation where **the change in internal energy of a closed system is equal to the amount of heat supplied by the system minus the work done by the system on its surroundings.** This small equation provides the framework for how heat and work in a system are related while also setting limits such as debasing arguments for perpetual motion machines.

* 1. Basic Mechanics

1. Relevant Examples