1.4 Heat and Work

Temperature – gives relative tendency for energy flow
Energy – measure of amount of damage that can be done

Heat & work – how energy is added/removed from system
Heat – spontaneous flow of energy from high T to low T
Work – all other methods, usually active agent manipulating system

U – total energy inside system; internal energy
see prev page → a 1g lead ball at 300 K travelling at 100 m/s has $U = 37$ and $KE = \frac{1}{2} 10^{-3} kg (100 m/s)^2 = 5 J$

Q = amount of heat that enters system
W = amount of energy that <u>enters</u> system by work

$\Delta U = Q + W$

** Important: many authors use W for work done <u>by</u> the system $\Rightarrow \Delta U = Q - W$

** Important: For infinitesimal changes, book will use dU but not dQ or dW because these are already changes.
Stupid pedagogical problem that I will conform to.
Some authors use $đQ$ and $đW$ to indicate infinitesimal transfer of energy as heat and work

$\Delta U = Q + W$ is conservation of energy – 1st Law of Thermodynamics

Heat transfer can occur by <u>conduction</u>, <u>convection</u>, or <u>radiation</u>

Prob 1.27 Give example where no heat added but T increases.
" " heat is " " T stays same.