



Thermodynamics

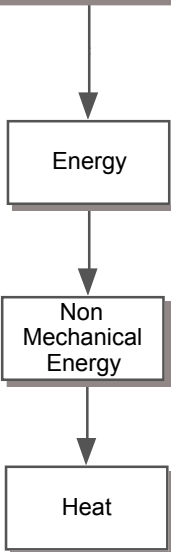
Enduring Understanding

The fluid interactions and thermodynamics process are governed by conservation laws.

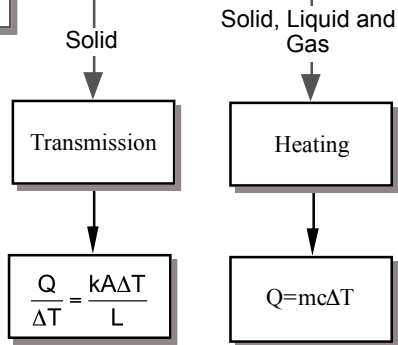
Essential Questions

- 5. Why is there not a delta in front of symbol Q for heat?
- 6. When is work done by a gas undergoing a thermodynamic process?

Fluids and Thermodynamics
AP Physics 1/2

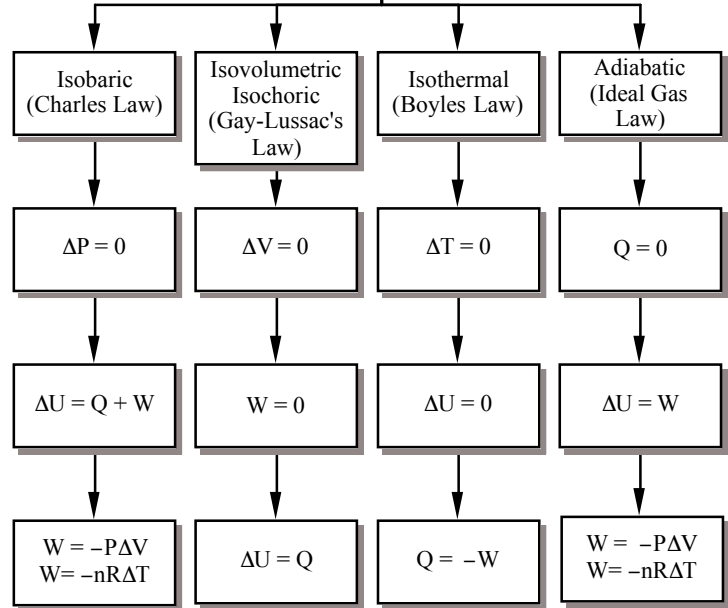


Laws of Thermodynamics
 Zeroth Law - $T_A = T_B; T_B = T_C; T_A = T_C$
 First Law - $\Delta U = Q + W$
 Second Law - Heat will not flow spontaneously from a cold object to a hot object. Any system which is free of external influences becomes more disordered (entropy increases) with time.
 Third Law - It is impossible to reduce the temperature of a system to absolute zero in a finite number of steps



Useful Conversions
 1 atm = 101300 Pa
 1000 L = 1 m³

$PV = nRT$
 $\Delta U = Q + W$
 $K = \frac{3}{2} k_B T$



Definitions
 +W = gas is compressed
 -W = gas expands
 +Q = gas gains heat
 -Q = gas loses heat

Graphs
 Work = area beneath P vs. V graph
 Clockwise = -W; Heat Engine
 Counterclockwise = +W; Refrigerator
 Adiabatic curve is STEEPER than Isothermal