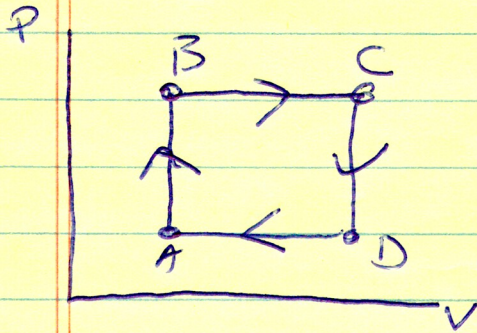


Cyclic Process

Series of Transformations that take a gas back to its original state. Represented as a closed loop



A → B Isochoric $\uparrow P \rightarrow \uparrow T$

Gas got hot so heat must have been added Q^+

B → C Isobaric Expansion $\uparrow V \rightarrow \uparrow T \rightarrow Q^+$

Gas does work, heat added

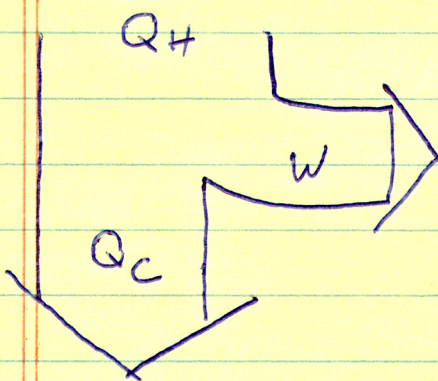
$$Q^+ = \Delta U + W \quad (\text{work done by gas})$$

C → D $\downarrow P \rightarrow \downarrow T \rightarrow$ loses heat to surroundings Q^-

D → A $\downarrow V \rightarrow \downarrow T$ Heat lost = work done on gas + loss of internal energy

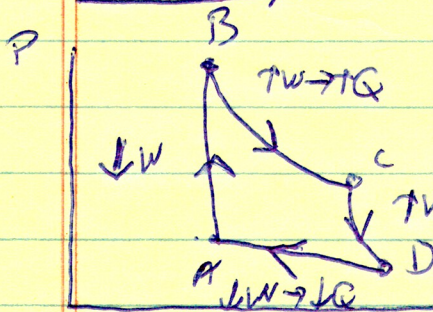
$$-Q = -\Delta U + -W$$

Energy Flow - Heat Engine



Heat Engine - Heat flows from hot source to cold source, and converts some energy to work

Carnot Cycle



* During Adiabatic Transformations, the cylinder is isolated from the surroundings (No Q)

A → B - ~~isobaric~~ Adiabatic \uparrow

Work done on gas makes it get hot W^-

B → C - Isothermal

Work done by gas \rightarrow heat gained $Q^+ = W^+$

C → D Adiabatic $\downarrow P \uparrow V$

Gas does work and cools down

D → A - Isothermal

$W^- - Q^-$ Work done on gas \rightarrow heat lost