15B - Heat engines – An ideal gas in a cylinder is our model for a simple heat engine. Assume no friction with the piston, and that the gas is ideal.

A heat engine:

Define:

Q – Heat flow into the cylinder.

ΔU – (Change of ) Internal energy of gas.

W – Work done by the gas.

Q = ΔU + W

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| Example 1: Doane Doodat lets a gas expand doing 17 J of work so rapidly that no heat flows into or out of the gas. What is the change in internal energy? Does the temperature rise or fall? Physically how does this happen? (Temperature rises) (Piston moves out) Q = ΔU + W (Heat flows in) (Internal energy increases) (The gas does work)  |
| Example 2: Unita Ryad does 45 J of work compressing a gas in a cylinder. 23 J of heat flow out of the gas. What is the change in internal energy of the gas???? What happens to the temperature? (Temperature rises) (Piston moves out) Q = ΔU + W (Heat flows in) (Internal energy increases) (The gas does work)  |