The Practise Ground

Class 11-12 Physics

Laws of Thermodynamics

Heat, work and efficiency

1

$$Q = \Delta U + W$$

First law

Heat supplied = change in internal energy + work done by the gas

2

$$W = P\,\Delta V$$

Work at constant pressure

Positive when the gas expands

3

$$PV = nRT$$

Ideal gas equation

R = 8.314 J/(mol K)

4

$$\eta = 1 - T_2 / T_1$$

Carnot engine efficiency

T_1 is hot, T_2 is cold, both in kelvin

Two more ideas

Second law: heat does not flow by itself from a cold body to a hot one.

Isothermal: ΔU = 0. Adiabatic: Q = 0.

Quick example

An engine works between 600 K and 300 K.

η = 1 − 300 / 600 = 0.5

At most 50% of the heat becomes work.

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