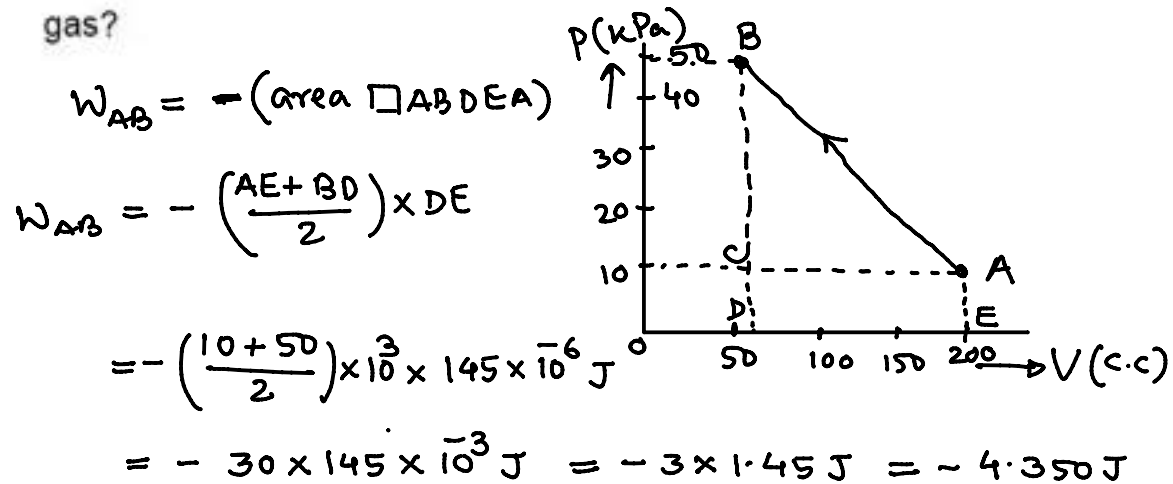**<u>NUMERICAL PROBLEMS ON FIRST LAW OF THERMODYNAMICS</u>**

EXAMPLE: The pressure of a gas changes linearly with volume from <u>10 kPa, 200cc</u> to <u>50 kPa, 55cc</u>. (a) Calculate the <u>work done</u> by the gas. (b) If no heat is supplied or extracted from the gas, what is the <u>change in the internal energy</u> of the gas?

$$W_{AB} = -(\text{area} \;\square ABDEA)$$

$$W_{AB} = -\left(\frac{AE + BD}{2}\right) \times DE$$

$$= -\left(\frac{10 + 50}{2}\right) \times 10^3 \times 145 \times 10^{-6} \; J$$

$$= -30 \times 145 \times 10^{-3} \; J \quad = -3 \times 1.45 \; J \quad = \sim 4.350 \; J$$

(b) $\Delta Q = 0$, $\Delta U = ?$

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

$P(kPa)$

B — 5.2
40
30
20
C — 10 · · · · · · · · A
D · · · · · · · · E
O   50   100   150   200 → $V(c.c)$

① 1