First Law Questions

$$Q = \Delta U - W$$

Work done <u>on</u> system

<u>Increase</u> in internal energy of system

Heat flow <u>into</u> system

P

P_1 1

2

P_3 3

V_1 V_2 V
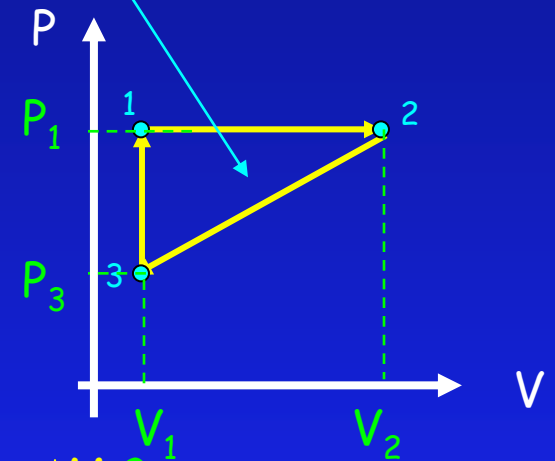
Some questions:

● Which part of cycle has largest change in internal energy, ΔU ?

   $2 \rightarrow 3$ (since $U = 3/2\ pV$)

● Which part of cycle involves the least work **W** ?

   $3 \rightarrow 1$ (since $W = -p\Delta V$)

● What is change in internal energy for full cycle?

   $\Delta U = 0$ for closed cycle (since both p & V are back where they started)

● What is net heat into system for full cycle (positive or negative)?

   $\Delta U = 0 \Rightarrow Q = -W$ = area of triangle (>0)