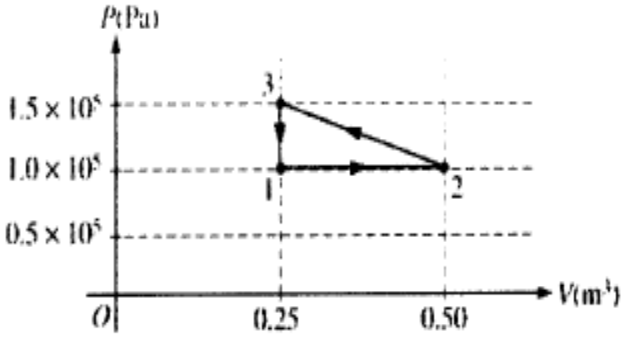
AP Physics
Heat & Thermo

Name:_____
Period: 2-3A 3B-4 5-6A 6B-7




A cylinder with a movable frictionless piston contains an ideal gas that is initially in state 1 at 1 x$10^5$ Pa, 373 K, and 0.25 $m^3$. The gas is taken through a reversible thermodynamic cycle as shown in the *PV* diagram above.

(a) Calculate the temperature of the gas when it is in the following states.

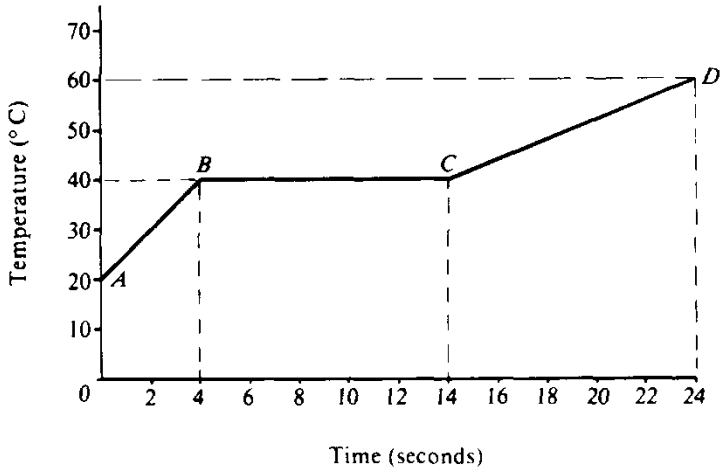
i. State2

ii. State 3

b) Calculate the heat transferred TO THE gas from State 2 to State 3.

c) Calculate the net work done ON THE gas during the cycle from State 1→2→3→1.

d) Calculate the net heat transferred TO THE gas during the cycle from State 1→2→3→1.




A 0.040-kilogram sample of a material is initially a solid at a temperature of 20° C. Heat is added to the sample at a constant rate of 150 Watts until the temperature increases to 60° C. The graph above represents the temperature of the sample as a function of time.

a. Calculate the specific heat of the solid sample in units of joules per kilogram°C.

b. Calculate the latent heat of fusion of the sample at its melting point in units of joules per kilogram.

c. How much time would it take to melt 2.5-kg of the same material if it was all solid at 40°C?

d. 0.5 kg of the same material, at 25°C is added to water at 10°C. If the material and the water reach an equilibrium temperature of 23°C, how much water was there? ($c_{water}$ = 4186 J/kg°C ; $c_{ice}$ = 2090 J/kg°C; $L_{f\ water}$ = $3.33 \times 10^5$ J/kg; $L_{v\ water}$ = $2.26 \times 10^6$ J/kg )