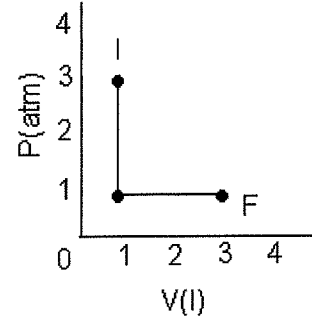
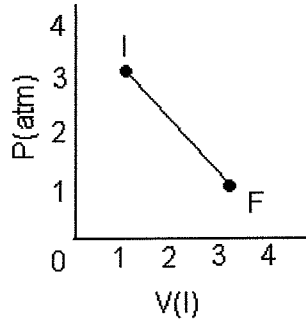
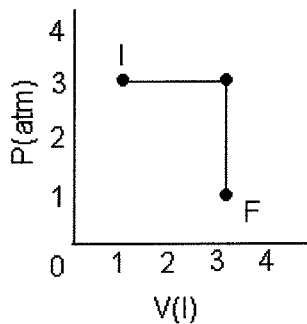
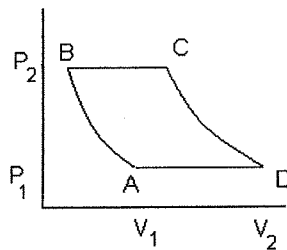


Physics 111 Homework Set #2

- Water at the top of Niagra falls has a temperature of 10°C . If it falls 50 m and all of the potential energy is converted into heat, calculate the temperature of the water at the bottom of the falls.
- What is the final equilibrium temperature when 10 g of milk at 10°C is added to 160 g of coffee at 90°C . (Assume that both the coffee and the milk have the specific heat of water and neglect the cup.)
- A water heater is operated by solar power. If the solar collector has an area of 6.0m^2 and the power delivered by sunlight is 550 W/m^2 , how long does it take to increase the temperature of 1m^3 of water from 20°C to 60°C .
- A 3 g copper penny at 25°C drops 50 m to the ground. (a) If 60% of the initial potential energy goes into increasing the temperature of the penny, determine its final temperature. (b) Does the result depend on the mass of the penny?
- A gas expands from I to F along the three different paths shown. Calculate the Work done in Joules by the gas along each path.



- An ideal gas undergoes a process that consists of 2 isobaric and 2 isothermal steps as shown. Find the net work done by the gas in going through a complete cycle $A \rightarrow B \rightarrow C \rightarrow D \rightarrow A$.



- A system undergoes a process in which its internal energy decreases by 500 J. If at the same time, 220J of work is done on the system, find the thermal energy transferred to/from it.
- Five moles of an ideal gas expands isothermally at 127°C to 4 times its initial volume. Find the work done by the gas and the thermal energy transferred to the system in Joules.
- An ideal gas at 300 K undergoes an isobaric expansion at 2.5 kPa. If the volume increases from 1m^3 to 3m^3 and 12.5 kJ of thermal energy is transferred to the gas, find ΔU and the final temperature of the gas.

- 10) A glass window pane has an area of 3.0m^2 and a thickness of 0.6cm . If the temperature difference between its faces is 25°C , how much heat flows through it in one hour?
- 11) The surface of the sun has a temperature of approximately 5800K . Taking the radius of the sun to be $6.96 \times 10^8\text{m}$, calculate the total energy radiated by the sun each day. (Assume that $e=1$.)
- 12) Around a crater formed by an iron meteorite 75kg of rock has melted under the impact of the meteorite. The rock has a specific heat of $0.5\text{ kcal/kg}^\circ\text{C}$, a melting point of 500°C , and a latent heat of 48.0kcal/kg . The original temperature of the ground was 0°C . If the meteorite hit the ground while moving at 600 m/s , what is the minimum mass of the meteorite? Assume no heat loss to the atmosphere or surrounding rock. Neglect the heat capacity of the meteorite.
- 13) An ideal gas initially at P_0, V_0, T_0 is taken through the cycle shown. (a) Find the net work done per cycle. (b) What is the net heat added to the system per cycle? (c) Obtain a numerical value for the work done per cycle for 1 mole of gas initially at 0°C .

