

Please place all answers on the answer sheet provided.

This is due Friday, February 10, 2012

## 1

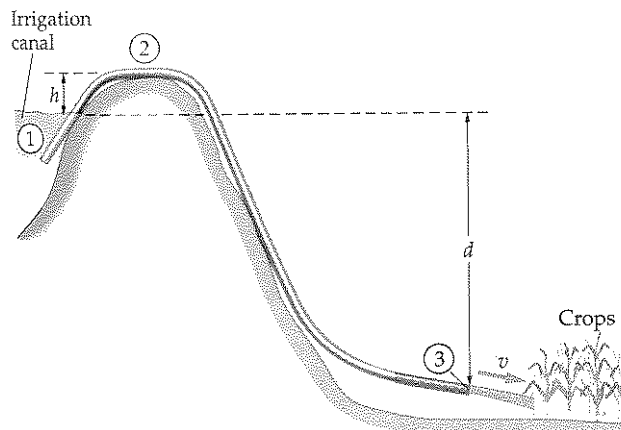
\*\* On a vacation flight, you look out the window of the jet and wonder about the forces exerted on the window. Suppose the air outside the window moves with a speed of approximately 150 m/s shortly after takeoff, and that the air inside the plane is at atmospheric pressure. (a) Find the pressure difference between the inside and outside of the window. (b) If the window is 25 cm by 42 cm, find the force exerted on the window by air pressure.

## 2

\*\* A garden hose with a diameter of 0.65 in has water flowing in it with a speed of 0.55 m/s and a pressure of 1.2 atmospheres. At the end of the hose is a nozzle with a diameter of 0.25 in. Find (a) the speed of water in the nozzle and (b) the pressure in the nozzle.

\*\* **IP** A siphon is a device that allows water to flow from one level to another. The siphon shown in Figure 15-34 delivers water from an irrigation canal to a field of crops. To operate the siphon, water is first drawn through the length of the tube. After the flow is started in this way it continues on its own. (a) Using points 1 and 3 in Figure 15-34, find the speed  $v$  of the water leaving the siphon at its lower end. Give a symbolic answer. (b) Is the speed of the water at point 2 greater than, less than, or the same as its speed at point 3? Explain.

## 3

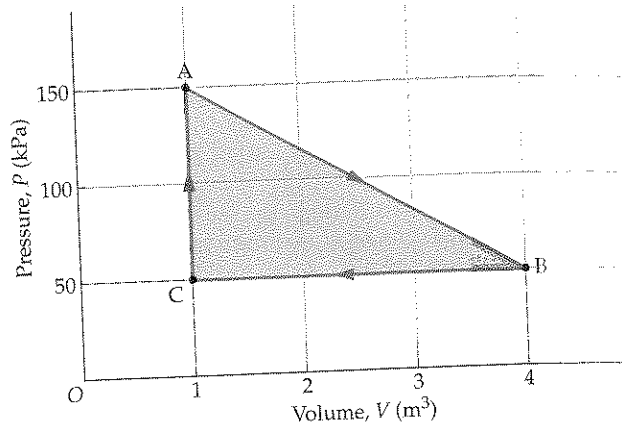


## 4

\*\* A cylinder contains 4.0 moles of a monatomic gas at an initial temperature of 27 °C. The gas is compressed by doing 560 J of work on it, and its temperature increases by 130 °C. How much heat flows into or out of the gas?

5

24. \*\* An ideal gas follows the three-part process shown in Figure 18-25. At the completion of one full cycle, find (a) the net work done by the system, (b) the net change in internal energy of the system, and (c) the net heat absorbed by the system.

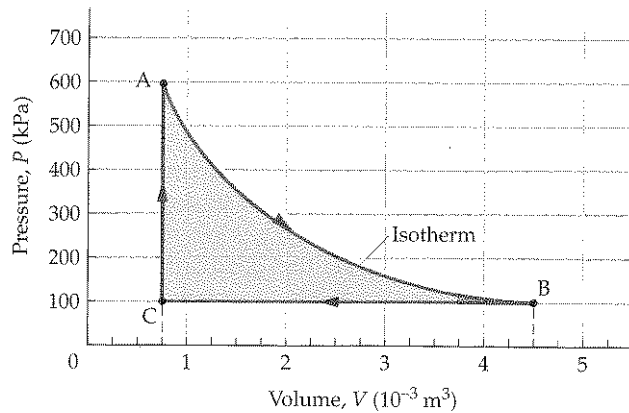


86. \*\*\* One mole of an ideal monatomic gas follows the three-part cycle shown in Figure 18-29. (a) Fill in the following table:

	$Q$	$W$	$\Delta U$
A $\rightarrow$ B			
B $\rightarrow$ C			
C $\rightarrow$ A			

(b) What is the efficiency of this cycle?

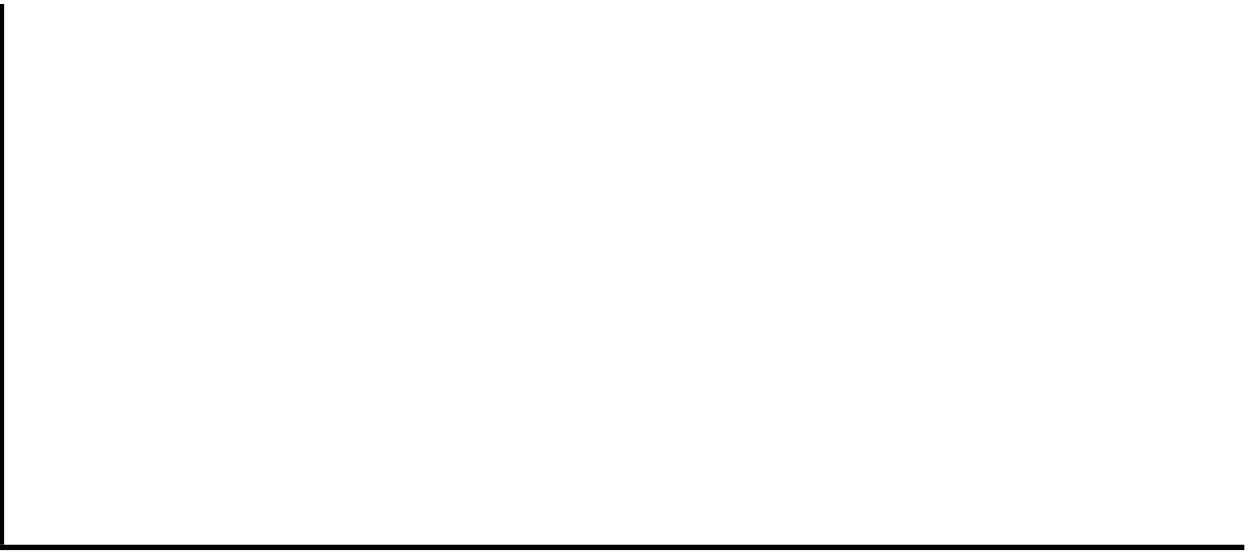
6



7

- \*\* IP Two metal rods of equal length, one aluminum the other stainless steel, are connected in parallel with a temperature of  $20.0^\circ\text{C}$  at one end and  $118^\circ\text{C}$  at the other end. Both rods have a circular cross section with a diameter of  $3.50\text{ cm}$ . (a) Determine the length the rods must have if the combined rate of heat flow through them is to be  $27.5\text{ J per second}$ . (b) If the length of the rods is doubled, by what factor does the rate of heat flow change?

**1**



**2**



**3**



4

5

6

	$Q$	$W$	$\Delta U$
A $\rightarrow$ B			
B $\rightarrow$ C			
C $\rightarrow$ A			



**7**