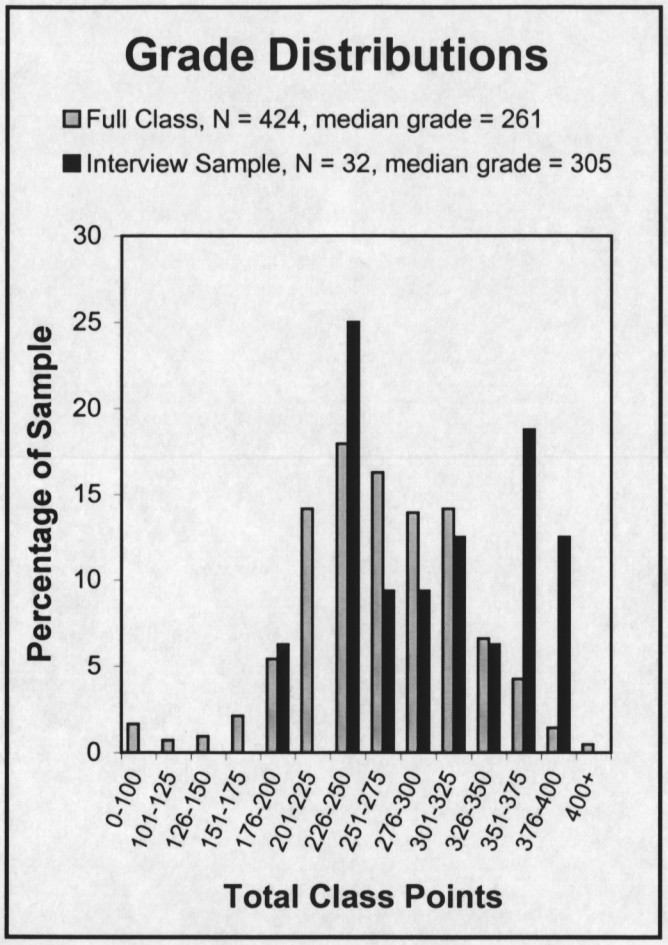
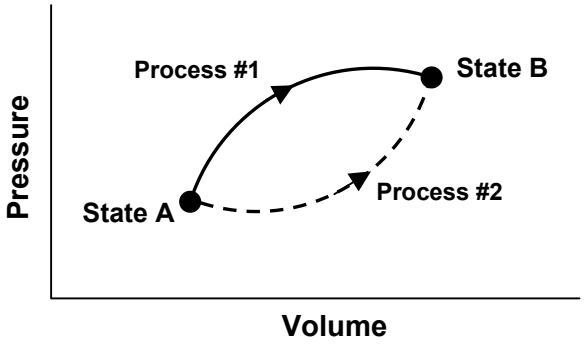


Figure 1
Meltzer, AJP

This *P-V* diagram represents a system consisting of a fixed amount of ideal gas that undergoes two ***different*** processes in going from state A to state B:



[In these questions, ***W*** represents the work done ***by*** the system during a process; ***Q*** represents the heat ***absorbed*** by the system during a process.]

1. Is *W* for Process #1 ***greater than, less than,*** or ***equal to*** that for Process #2? Explain.

2. Is *Q* for Process #1 ***greater than, less than,*** or ***equal to*** that for Process #2? Please explain your answer.

3. Which would produce the largest change in the total energy of all the atoms in the system: ***Process #1, Process #2,*** or ***both processes produce the same change?***

Figure 2

Meltzer, AJP

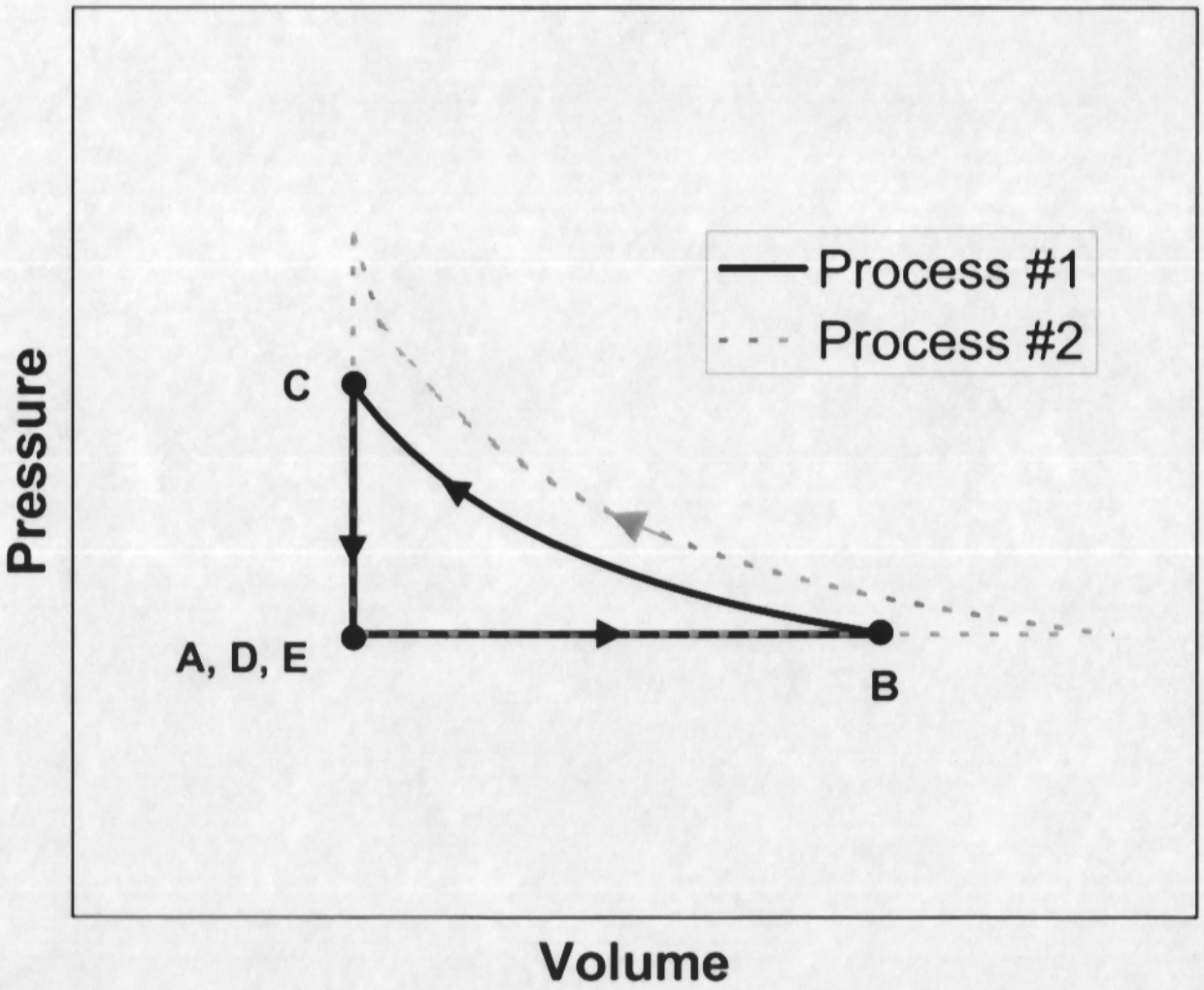


Figure 3
Meltzer, AJP

A system consisting of a quantity of ideal gas is in equilibrium state "A." It is slowly heated and as it expands, its pressure varies. It ends up in equilibrium state "B." Now suppose that the same quantity of ideal gas again starts in state "A," but undergoes a **different** thermodynamic process (i.e., follows a different path on a *P*-*V* diagram), only to end up again in the same state "B" as before. Consider the net work done by the system and the net heat absorbed by the system during these two different processes. Which of these statements is true?

A. The work done may be different in the two processes, but the heat absorbed must be the same.

B. The work done must be the same in the two processes, but the heat absorbed may be different.

C. The work done may be different in the two processes, and the heat absorbed may be different in the two processes.

D. Both the work done and the heat absorbed must be the same in the two processes, but are not equal to zero.

E. Both the work done and the heat absorbed by the system must be equal to zero in both processes.

***Responses* (*N* = 407):**

(A) 28% (B) 14% (C) 33%

(D) 20% (E) 3% No response: 2%

Figure 4

AJP, Meltzer