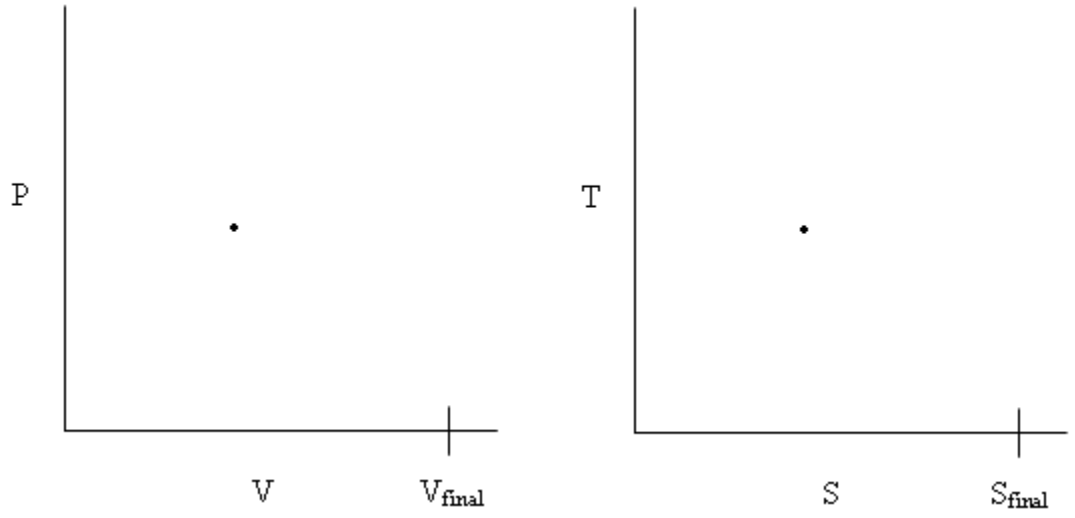
Visualizing Thermodynamic Processes with Diagrams

In this activity, you will identify how a given process looks on a PV and TS diagram, and what the signs (+, -, or 0) are for each process as it relates to work, heat, and change in internal energy. Because it is impossible to memorize everything, engineers use general information to deduce/construct specific information. It is **critical** to understand how a process looks so you can develop and interpret cycle diagrams. This includes understanding the meaning of iso_ words and how they relate to process paths on PV and TS diagrams. It also includes mastery in using diagrams and integral relationships to determine signs of work, heat, and change in internal energy.

1. Use the dot as the starting point for each process. NOTE: you are *not* drawing a cycle in this problem. Sketch the following processes on pressure-volume (P-V) and temperature entropy (T-S) diagrams. For processes that change in volume (V) or entropy (S), have each process end at V_{final} or S_{final}. Label the endpoint of each process with the appropriate letter. Assume ideal gas behavior.
   (a) isentropic expansion
   (b) isothermal expansion
   (c) isochoric heat addition
   (d) isobaric heat addition
   (e) reversible, adiabatic expansion



2. Which process paths are you most confident about? Why?

3. Which process paths are you least confident about? Why?

4. Give the sign (+, -, or 0) of the work, heat, and change in internal energy for each process. Assume ideal gas behavior. Hint: use integral relationships.

	W	Q	ΔU
(a) isentropic expansion			
(b) isothermal expansion			
(c) isochoric heat addition			
(d) isobaric heat addition			
(e) reversible, adiabatic expansion			

5. What are two foolproof tips for determining the sign of work, heat, and change in internal energy represented on PV and TS diagrams?