17.10. **Visualize:**

$$E_{\text{th i}} \quad + \quad W \quad + \quad Q \quad = \quad E_{\text{th f}}$$

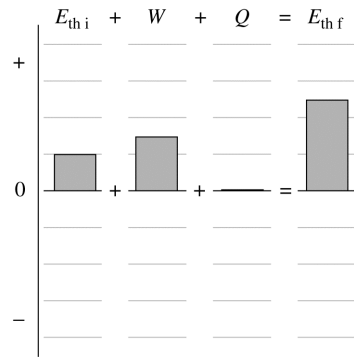**Solve:** This is an adiabatic process of gas compression so no heat energy is transferred between the gas and the environment. That is, $Q = 0$ J. According to the first law of thermodynamics, the work done on a gas in an adiabatic process goes entirely to changing the thermal energy of the gas. The work W is positive because the gas is compressed.