Activ Physics simulation 8.10

Q3 $W = \int p\,dV = nRT \ln V_2/V_1 = \boxed{-3458\ J}$

$$\int \frac{dV}{V} = \ln V \Big|_{V_1}^{V_2} = \ln V_2 - \ln V_1 = \ln V_2/V_1$$

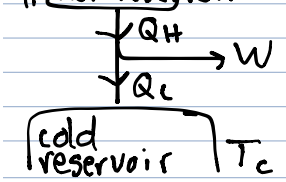
Q4 $Q = \Delta U + W_{by} = 0 + \boxed{-3458\ J}$

Q5 curve drops

2nd Law of thermodynamics

Sandman – Hollywood example of a violation of the 2nd Law
→ state of disorder never decreases

Heat Engines – convert (a portion of input) heat to work or mechanical E



If an engine is carried through a cyclic process, then initial and final energies are equal.

→ $U_2 = U_1 \Rightarrow \Delta U = Q - W = 0 \rightarrow \boxed{Q = W}$

$W = Q_{total} = Q_H + Q_c = |Q_H| - |Q_c|$

thermal efficiency: ratio of output work to heat input $e = \frac{W}{Q_H} = \frac{|Q_H| - |Q_c|}{Q_H}$

$= 1 - |Q_c|/|Q_H|$