A 15.0 kg block is pushed up a ramp as shown by a student who exerts 135 N over 4.0 s.

a. Determine the power input by the student.

b. What is the efficiency of this process?
a) \[ P_{\text{in}} = \frac{W_{\text{in}}}{4.0s} = \frac{5675}{4.0s} = 142 \text{ W} \]

\[ W_{\text{in}} = Fd = (135N)(4.2m) = 567.5 \text{ J} \]

b) \[ \text{Eff} = \frac{U_{\text{out}}}{U_{\text{in}}} \times 100\% = \frac{367.5}{567} \times 100\% = 65\% \]

\[ U_{\text{out}} = \Delta E_p = mgh = (150 \text{ kg})(4.1m)(2.5m) \]
\[ = 367.5 \text{ J} \]