

49. (a) We assume his mass is between $m_1 = 50$ kg and $m_2 = 70$ kg (corresponding to a weight between 110 lb and 154 lb). His increase in gravitational potential energy is therefore in the range

$$\begin{array}{ccccc} m_1gh & \leq & \Delta U & \leq & m_2gh \\ 2 \times 10^5 & \leq & \Delta U & \leq & 3 \times 10^5 \end{array}$$

in SI units (J), where $h = 443$ m.

- (b) The problem only asks for the amount of internal energy which converts into gravitational potential energy, so this result is the same as in part (a). But if we were to consider his *total* internal energy “output” (much of which converts to heat) we can expect that external climb is quite different from taking the stairs.