

70. (a) The rate of change of the gravitational potential energy is

$$\frac{dU}{dt} = mg \frac{dy}{dt} = -mg|v| = -(68)(9.8)(59) = -3.9 \times 10^4 \text{ J/s} .$$

Thus, the gravitational energy is being reduced at the rate of  $3.9 \times 10^4 \text{ W}$ .

- (b) Since the velocity is constant, the rate of change of the kinetic energy is zero. Thus the rate at which the mechanical energy is being dissipated is the same as that of the gravitational potential energy ( $3.9 \times 10^4 \text{ W}$ ).