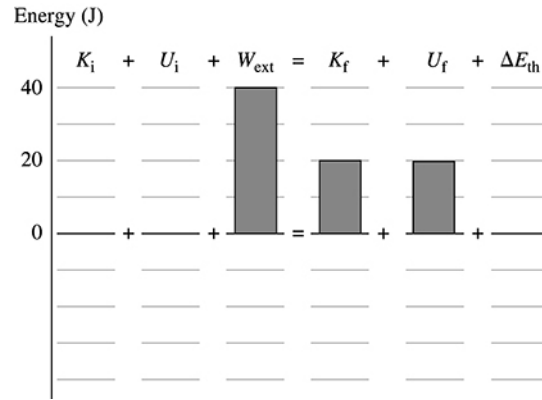


11.29. Visualize: The tension of 20.0 N in the cable is an external force that does work on the block $W_{\text{ext}} = (20.0 \text{ N})(2.00 \text{ m}) = 40.0 \text{ J}$, increasing the gravitational potential energy of the block. We placed the origin of our coordinate system on the initial resting position of the block, so we have $U_i = 0 \text{ J}$ and $U_f = mgy_f = (1.02 \text{ kg})(9.8 \text{ m/s}^2)(2.00 \text{ m}) = 20.0 \text{ J}$. Also, $K_i = 0 \text{ J}$, and $\Delta E_{\text{th}} = 0 \text{ J}$. The energy bar chart shows the energy transfers and transformations.



Solve: The conservation of energy equation is

$$K_i + U_i + W_{\text{ext}} = K_f + U_f + \Delta E_{\text{th}} \Rightarrow 0 \text{ J} + 0 \text{ J} + 40.0 \text{ J} = \frac{1}{2}mv_f^2 + 20.0 \text{ J} + 0 \text{ J}$$

$$\Rightarrow v_f = \sqrt{(20.0 \text{ J})(2)/1.02 \text{ kg}} = 6.26 \text{ m/s}$$