



$$2\left(\frac{1}{2}mv^2\right) = 2(mc\Delta\theta) + 2mL_f + 2mL_v \rightarrow v^2 = 2(c\Delta\theta + L_f + L_v)$$
$$\rightarrow v^2 = 2(12 \times 2220 + 333700 + 2490000) \rightarrow v \cong 2387.6 \text{ m/s}$$