23. (a) As the string reaches its lowest point, its original potential energy $U = mgL$ (measured relative to the lowest point) is converted into kinetic energy. Thus,

$$mgL = \frac{1}{2}mv^2 \quad \Longrightarrow \quad v = \sqrt{2gL}\ .$$

With $L = 1.20$ m we obtain $v = 4.85$ m/s.

(b) In this case, the total mechanical energy is shared between kinetic $\frac{1}{2}mv_b^2$ and potential mgy_b. We note that $y_b = 2r$ where $r = L - d = 0.450$ m. Energy conservation leads to

$$mgL = \frac{1}{2}mv_b^2 + mgy_b$$

which yields

$$v_b = \sqrt{2gL - 2g(2r)} = 2.42 \text{ m/s}\ .$$