A 3.25 gram bullet traveling at $v_{0b}$ m/s, strikes a 0.850 kg wooden block in a ballistic pendulum situation (see drawing). The block with the embedded bullet rises a vertical distance $h = 15.5$ cm.

A. \( \text{(12 pts.)} \) What is the speed $V$ of the block with the embedded bullet just after impact?

\[
V = \frac{1}{2} \left( m_{Bw} + m_B \right) V = \left( m_{Bw} + m_B \right) \frac{v_{0b}}{2}
\]

\[
V = \sqrt{\frac{1}{2} \left( 9.8 \text{ m/s}^2 \right) \left( 15.5 \text{ cm} \right)}
\]

\[
V = 1.74 \text{ m/s}
\]

B. \( \text{(12 pts.)} \) What is the speed $v_{0b}$ of the bullet just before hitting the wooden block?

\[
P_{\text{kin}}(\text{bullet}) = P_{\text{kin}}(\text{block})
\]

\[
\frac{1}{2} m_{Bw} v_{0b} = \left( m_{Bw} + m_B \right) V
\]

\[
v_{0b} = \frac{m_{Bw} + m_B}{m_{Bw}} V = \frac{0.85305 \text{ kg} \times 1.74 \text{ m/s}}{0.00325 \text{ kg}}
\]

\[
v_{0b} = 457 \text{ m/s}
\]

C. \( \text{(1 pt.)} \) If the bullet passed all the way through the block and kept going but at a reduced speed, would the block rise as high, higher, or the same 15.5 cm?

The block would not rise as high.