PROBLEM 3

A bullet of mass \( m \) strikes a block of wood of mass \( M \) on an inclined plane, and is embedded in it. The coefficient of friction between the block and the plane is 0.55. The block slides up the plane a distance \( d \). Find the original velocity of the bullet.

\[
\frac{(M+m)}{2} \frac{V_0^2}{\mu} = (M+m)gd\sin\theta + (M+m)gd\cos\theta
\]

\( \mu = 0.55 \)

\[
V_0 = \sqrt{2gd(\sin\theta + \mu \cos\theta)}
\]

\[
MV_0 = (M+m)V_0
\]

\[
V_0 = \frac{M+m}{m} \sqrt{2gd(\sin\theta + \mu \cos\theta)}
\]

\[
V_0 = \frac{M+m}{m} \sqrt{2gd(\sin\theta + 0.55 \cos\theta)}
\]

\(\text{for algebra} \)