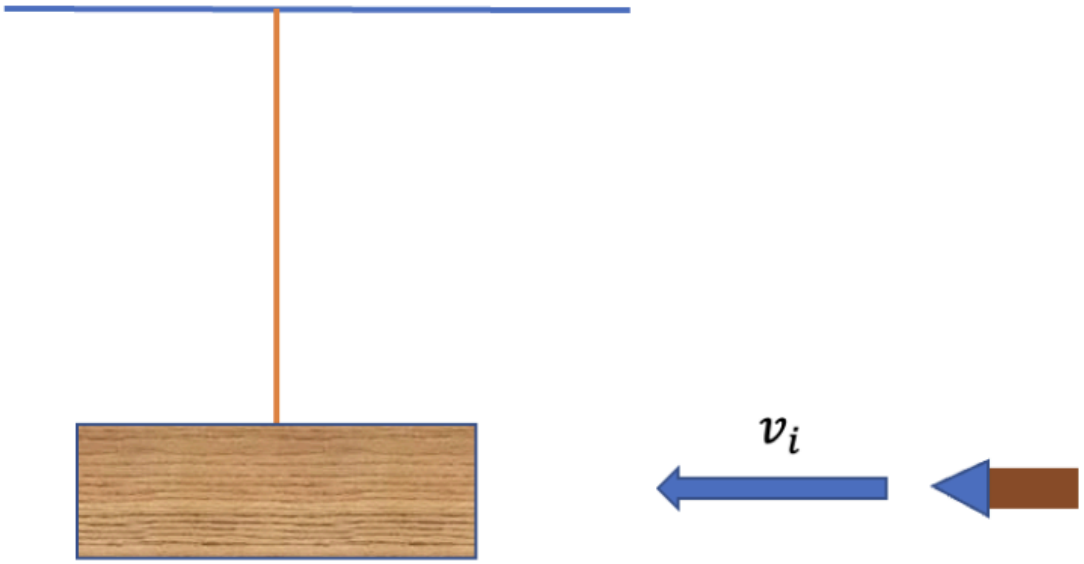
A string with a length of 0.8 meters hangs a board from a ceiling. A newly invented weapon shoots a bullet at an initial velocity of 120m/s that collides with a piece of wood of 1.5kg. After the collision, the woods start to oscillate, and the bullet leaves with a velocity of 100m/s. Calculate the maximum angle between the string and its initial position with the board.



Hint

- This is a problems that mixes conservation of energy, momentum, and motion together, so you need to apply multiple skills to solve this problems

    1. Use conservation of momentum to calculate the board's initial speed
    2. Use conservation of energy to calculate the change in height for the board
    3. Use trigonometry (the string's length) to write an equation to represent change in height (the value you obtained from step 2)
    4. Write an equation for the string's length by using the period formula for simple pendulum
    5. Calculate the time for the broad to reach its maximum height and plug in the value into the equation you write in step 4
    6. After substituting the value, calculate the board's maximum angle