Conservation of Momentum in Inelastic Collisions

A 500 g hockey puck moves to the right at 6.0 m/s. It is currently to the left of a smaller 150 g hockey puck moving to the right at 1.0 m/s. The pucks have Velcro around their edges; they will stick when they collide. What is the final velocity after collision? (Ignore any friction or possible rotational motion.)

PART I: IN THE "LAB" FRAME

1. First, draw and label a diagram of the situation.

2. Create a table of variables for the known and unknown quantities.

$m_A =$

$m_B =$

$\vec{u}_{A1} =$

$\vec{u}_{B1} =$

$m_f =$

$\vec{u}_2 =$

3. Setup your equation for conservation of momentum, solve in terms of variables.

4. Plug in the numbers to calculate your final answer.

PART II: IN THE SMALLER PUCK'S FRAME

Now imagine the situation from the inertial reference frame of the smaller puck.

1. First, draw and label a diagram of the situation.

2. Create a table of variables for the known and unknown quantities.

$m_A =$

$m_B =$

$\vec{u}'_{A1} =$

$\vec{u}'_{B1} =$

$m_f =$

$\vec{u}'_2 =$

3. Setup your equation for conservation of momentum, solve in terms of variables.

4. Plug in the numbers to calculate your final answer. Your first answer will be in the smaller puck's reference frame (*before* it accelerated).

5. What is the velocity in the lab reference frame? (Hint: What are u, u', and v?)

PART III: SUMMARY

1. Were the momentum vectors of each puck the same in each reference frame?

2. If not, were you still able to solve the problem and get consistent answers using either frame? What does that tell you about momentum in different reference frames?