Homework Problem 8

Two pucks are on a frictionless, horizontal air-suspension table.

Case 1

Puck A (m_A = 0.25 kg) is moving toward Puck B (m_B = 0.40 kg), which is initially at rest. After the collision, Puck A has a speed of 0.12 m/s and is moving to the left, and Puck B has a speed of 0.65 m/s and is moving to the right.

Make a sketch of the event – before and after.

Find the velocity of Puck A before the collision.

Find the change in the total kinetic energy of the system that occurs during the collision.

Case 2

Puck A (m_A = 0.25 kg) and Puck B (m_B = 0.40 kg) are moving towards each other. Puck A is initially moving at a speed of 3.00 m/s to the right, and Puck B is moving with a speed of 1.50 m/s to the left. After the collision, Puck A has a speed of -1.25 m/s and is moving to the left.

Make a sketch of the event – before and after.

Find the velocity of Puck B after the collision.

Find the change in the total kinetic energy of the system that occurs during the collision.

Homework Problem 8

Case 1

$m_A\, v_{Ai} = m_A v_{Af} + m_B v_{Bf}$

$(0.25\ \text{kg})\, v_{Ai} = (0.25\ \text{kg})\left(-0.12\ \frac{\text{m}}{\text{s}}\right) + (0.40\ \text{kg})\left(0.65\ \frac{\text{m}}{\text{s}}\right)$

$v_{Ai} = 0.92\ \frac{\text{m}}{\text{s}}$

Kinetic Energy

Initial	0.106 J
Final	0.086 J
ΔK = -0.02 J	

Case 2

$m_A\, v_{Ai} + m_B\, v_{Bi} = m_A v_{Af} + m_B v_{Bf}$

$(0.25\ \text{kg})\left(3.00\ \frac{\text{m}}{\text{s}}\right) + (0.40\ \text{kg})\left(-1.50\ \frac{\text{m}}{\text{s}}\right) = (0.25\ \text{kg})\left(-1.25\ \frac{\text{m}}{\text{s}}\right) + (0.40\ \text{kg})\, v_{Bf}$

$v_{Bf} = 1.16\ \frac{\text{m}}{\text{s}}$

Kinetic Energy

Initial	1.575 J
Final	0.464 J
ΔK = -1.11 J	