CSD2301 Practice
9. **Momentum and Collisions**
Part 1

LIN QINJIE

Practice Question 1

A baseball with mass 0.145 kg is moving in the +y direction with a speed of 1.30 m/s, and a tennis ball with mass 0.0570 kg is moving in the -y direction with a speed of 7.80 m/s. What are the magnitude and direction of the total momentum of the system consisting of the two balls?

Practice Question 2

A 0.160 kg hockey puck is moving on an icy, frictionless, horizontal surface. At t = 0 the puck is moving to the right at 3.00 m/s. a) Calculate the velocity of the puck (magnitude and direction) after a force of 25.0 N directed to the right has been applied for 0.050 s. b) If instead, a force of 12.0 N directed to the left is applied from t = 0 to t = 0.050 s, what is the final velocity of the puck?

Practice Question 3

On a frictionless, horizontal air table, puck A (with mass 0.250 kg) is moving towards puck B (with mass 0.350 kg), that is initially at rest. After the collision, puck A has a velocity of 0.120 m/s to the left, and puck B has velocity 0.650 m/s to the right. a) What was the speed of puck A before the collision? b) Calculate the change in the total kinetic energy of the system that occurs during the collision.

Practice Question 4

On a greasy, essentially frictionless lunch counter, a 0.500 kg submarine sandwich, moving 3.00 m/s to the left, collides with an 0.250 kg grilled cheese sandwich moving 1.20 m/s to the right. a) If the two sandwiches stick together, what is the final velocity? b) How much mechanical energy dissipates in the collision?

Practice Question 5

Two cars, one a compact with mass 1200 kg and the other a large car with mass 3000 kg collide head-on at typical highway speeds. a) Which car has a greater magnitude of momentum change? Which car has a greater velocity change? Calculate the change in the velocity of the small car relative to that of the large car. b) Which car's occupants would you expect to sustain greater injuries? Explain.

Practice Question 6

A ball with mass M, moving horizontally at 5.00 m/s, collides elastically with a block of mass 3M that is initially hanging at rest from the ceiling on the end of a 50.0 cm wire. Find the maximum angle through which the block swings after it is hit.