1. Two identical pucks, each of mass m, float frictionlessly on a horizontal plane. A "catcher" is designed to hold both pucks a distance L apart. When so held, the combined system has a CM moment of inertia I, a center of mass midway between the two pucks, and a total mass M. Initially the catcher (minus one puck) is stationary and the missing puck is approaching the catcher with a velocity v_0 as shown below. The catcher will grab and hold the moving puck when the collision occurs. Notice that two origins are shown. Origin A is on the line of approach of the moving puck. Origin B is directly opposite the center of mass of the combined system.

   (a) What is the angular momentum of the entire system about origin A before the "catch"?

   (b) What is the angular momentum of the entire system about origin B before the "catch"?

   (c) What exactly will be conserved in the collision (e.g., kinetic energy, momentum, angular momentum, mass, ...)? Why was each conserved quantity constant? (i.e., what condition was met to guarantee conservation)

   (d) The answers to (a) & (b) above are different, but the physical outcome (rotating/translating catcher) cannot depend on origin. Explain how that can be (e.g., how can a spinning object have zero total angular momentum).

   (e) Find the final CM velocity and the angular velocity of the combined system following the "catch".

   (f) Place an **X** on the below diagram where (approximately) the center of mass is at the instant shown. Assume the collision happens at a time T after the instant shown. Place a **Y** where (approximately) the center of mass is at a time $2T$ after the instant shown (i.e., a time T after the collision).