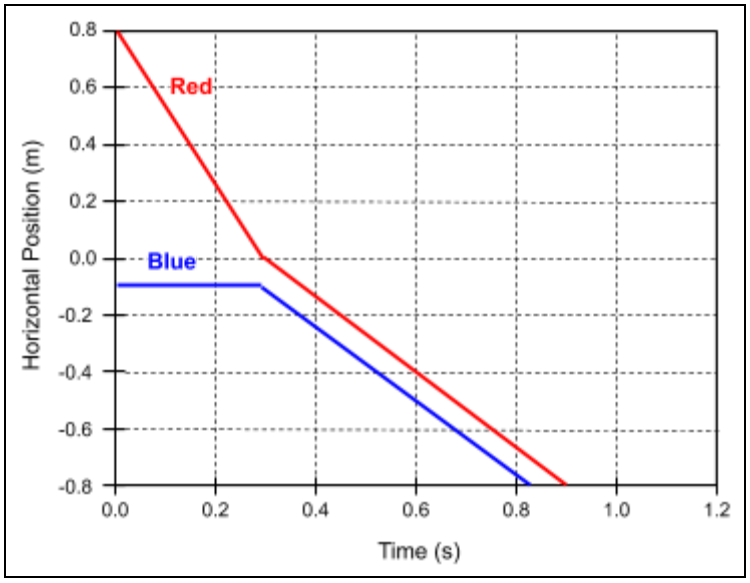
PAL Problem Set 17 for Phys 5A
(Linear momentum in 2D)

Always explain your answers and show your work.

Problem 1 - The figure below shows the result of a 1-dimensional collision between a red cart and blue cart. The two carts have the same mass.

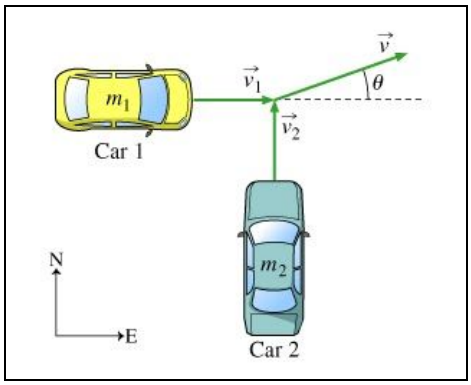


A. Sketch the situation at $t = 0s,\ 0.3s,\ 0.5s$

B. Is momentum conserved in this collision? Show your work and explain your reasoning.

C. Is kinetic energy conserved in this collision? Show your work and explain your reasoning.

Problem 2 - The two cars shown in the figure, of masses m_1 and m_2, collide at an intersection. Before the collision, car 1 was traveling eastward at a speed of v_1, and car 2 was traveling northward at a speed of v_2. After the collision, the two cars stick together and travel off in the direction shown.



Problem 3 - A 26 g ball of clay traveling east at 3.6 m/s collides with a 36 g ball of clay traveling north at 2.6 m/s. What is the momentum (magnitude and direction) of the resulting 62 g block of clay? What is its speed?

Problem 4 - Two objects collide and bounce apart. The figure shows the initial momentum of each object and the final momentum of object 2. Determine the x- and y-components of the final momentum of object 1.