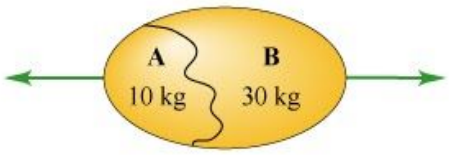
PAL Problem Set 16 for Phys 5A
(Linear momentum and impulse in 1D)

Always explain your answers and show your work.

Problem 1 - A giant "egg" explodes as part of a fireworks display. The egg is at rest before the explosion, and after the explosion, it breaks into two pieces, with piece B moving in the positive x direction. Piece A has a mass of 10 kilograms and moves to the left. Piece B has a mass of 30 kilograms and moves to the right.

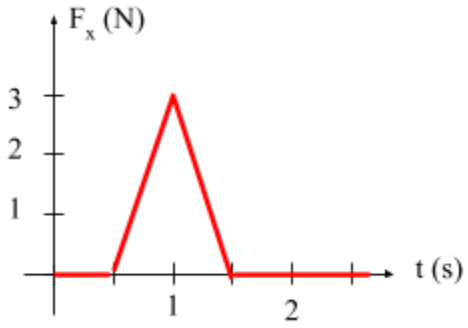


A. What is the magnitude of the momentum $|\vec{p}_{Ai}|$ of piece A before the explosion?

B. During the explosion, is the magnitude of the force of piece A on piece B greater than, less than, or equal to the magnitude of the force of piece B on piece A?

C. The component of the momentum of piece B, p_{Bxf} is measured to be +500 kg · m/s after the explosion. Find the component of the momentum p_{Axf} of piece A after the explosion.

Problem 2 - A 2.0 kg object moving to the right with speed of 0.5 m/s experiences the force shown. What is the object's velocity (magnitude and direction) after the force ends?



Problem 3 - A carnival game requires you to knock over a wood post by throwing a ball at it. You're offered a choice between a very bouncy ball and a very sticky ball of equal mass. Assume that you can throw them with equal speed and equal accuracy. You only get one throw. Which ball will you choose? Why?