Physics

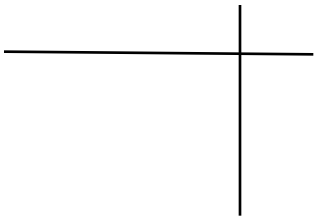
name_____ hr___

2D Conservation of Momentum

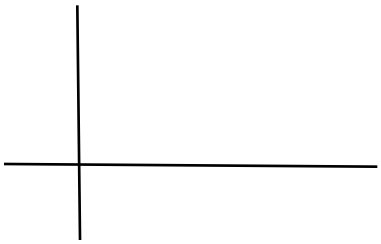
sheet # _____

1.) A **1500.0 kg** car traveling **North @ 40.0 m/s** hits a **3000.0 kg** truck traveling **East @ 60.0 m/s**. They become-for the most part--one big tangled mass. At what speed and in what direction does this combined mass travel?

Draw the car and truck B.C.

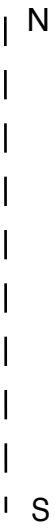


Draw the car and truck A.C.

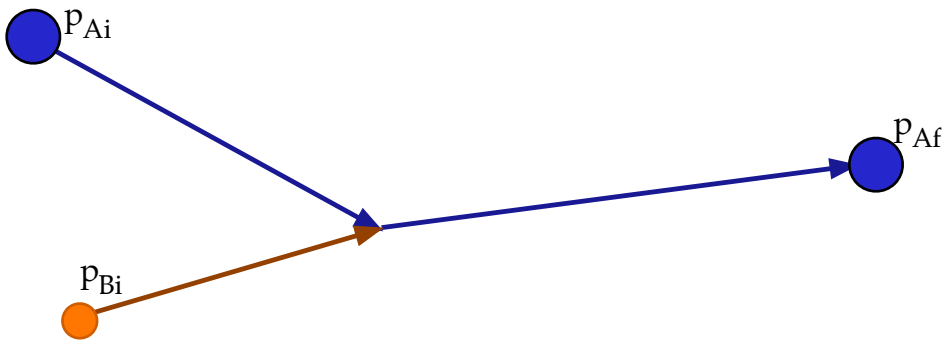


2.) Two hover discs with the same mass hit during a game of Glance Ball in the hallway. Disc A is initially moving at **10m/s South**, disk B is initially static. Immediately after the collision, A glances off a veers to the right at an angle of **30°** to its original direction of motion. Properly describe the velocity vectors of discs A and B after the collision.

Required Drawing:

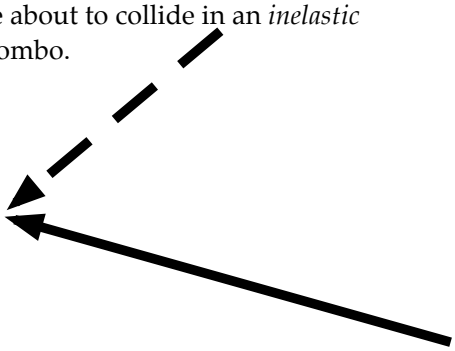


3.) Now it gets harder in a hurry: Let's take two different sized hover discs and push them into a glancing blow: **0.75kg Disc A** is initially moving at **2.53m/s @ 28.8° S of E**. **0.25kg Disc B** is moving along at **6.12m/s @ 16.3°N of E**. After the perfectly elastic collision, A is moving at **3.27m/s @ 7.5° N of E**. In what direction and at what speed is disc B moving? Once you determine p_{Bf} sketch its vector on the drawing below.

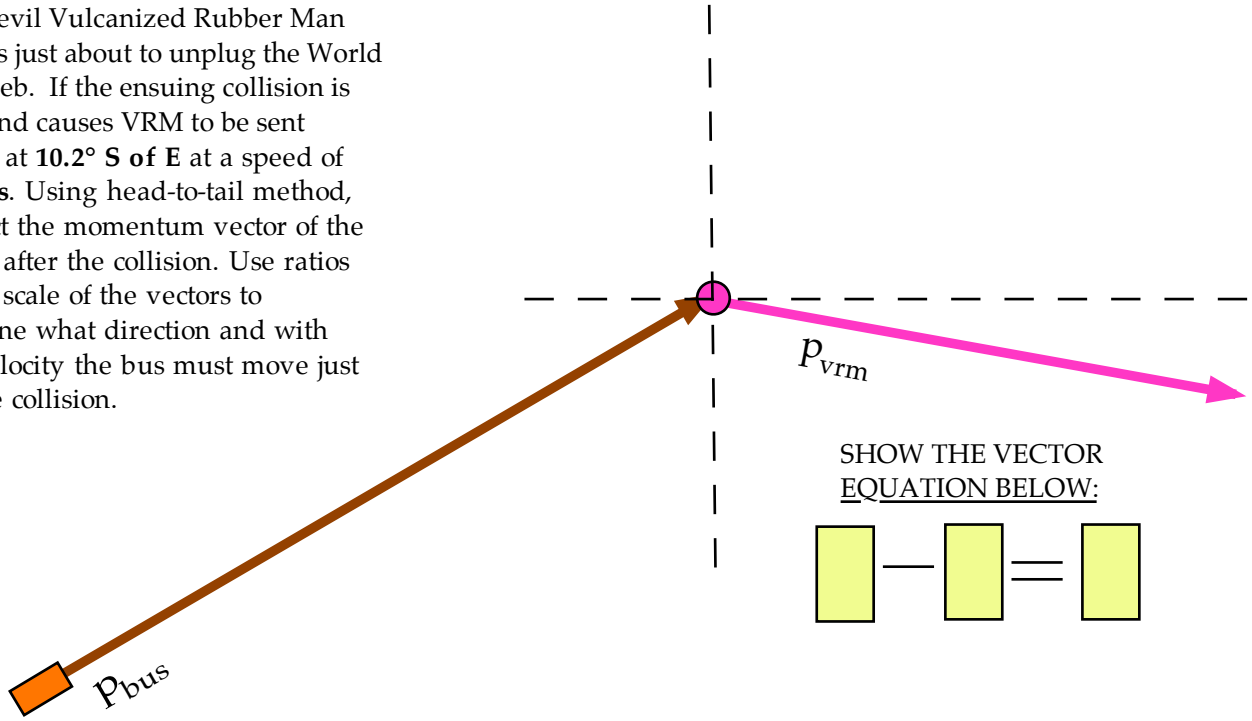


Okay, that #3 was a nightmare. Now I am going to show you a faster and better method. Remember all that Head-to-Tail method madness we used to do? Well, now it's going to start to pay off:

4.) The following vectors represent the initial momenta of two objects that are about to collide in an *inelastic collision*. Use a ruler to CONSTRUCT the resulting momentum vector of the combo.

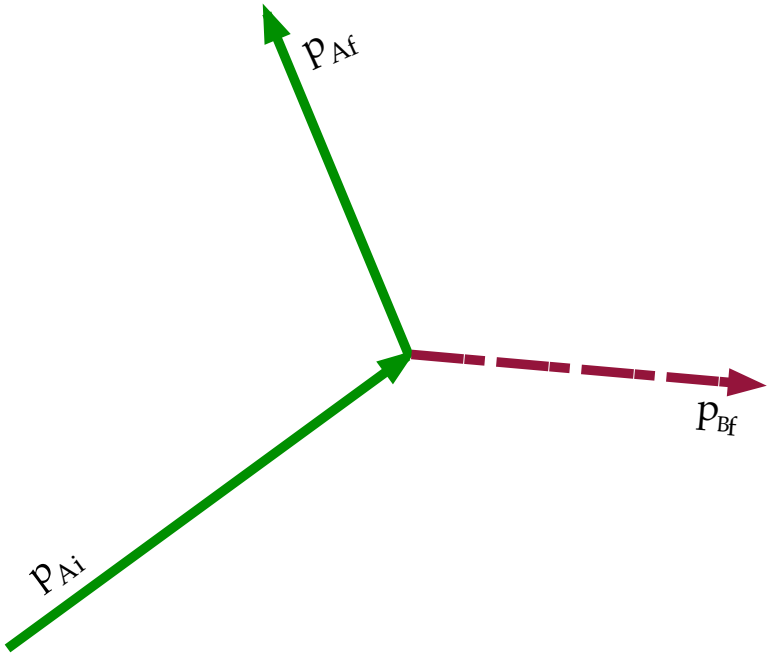


5.) Joe Dynamo jumps behind the wheel of a New York City bus with a billion dollars worth of gold bars on board and drives the **22 Mg** system **35m/s @ 30.0° N of E**. He slams into the **stationary 400. kg** evil Vulcanized Rubber Man who was just about to unplug the World Wide Web. If the ensuing collision is ***elastic*** and causes VRM to be sent moving at **10.2° S of E** at a speed of **1342 m/s**. Using head-to-tail method, construct the momentum vector of the bus just after the collision. Use ratios and the scale of the vectors to determine what direction and with what velocity the bus must move just after the collision.



SHOW THE VECTOR EQUATION BELOW:

6.) Back to Advanced Glance Ball (meaning the discs have different masses). The vectors below represent Disc A and Disc B's momenta just AFTER collision. Also, Disc A's momentum vector is shown just BEFORE the collision. Use the Head-to-Tail method and the concept of Conservation of Momentum to *construct* the initial momentum vector for Disc B.



SHOW THE VECTOR EQUATION BELOW: