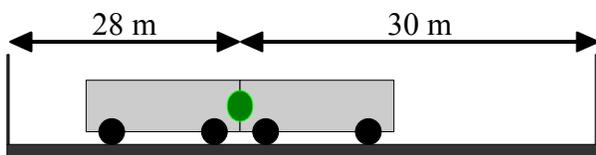


Lab Challenge: Find the Mystery Mass (15 pts)

The “textbook style” problem (5 points):

During a battle with HYDRA, Bruce Banner was crushed between two identical buses which have a mass of 10,000 kg each, and lengths of 12 m each. He transformed into **the Incredible Hulk** at the last moment, saving himself from death. The buses were motionless, with **the Hulk** trapped between them. He was 28 m away from one end of the lot and 30 m away from the other. **The Hulk** then pushed the buses apart with his titanic strength! He remained stuck in the front end of one bus as both careened across the lot in opposite directions. Incredibly, they struck the walls at the edge of the lot at exactly the same time. After the battle, Bruce watched a recording of all of this and was able to calculate his mass in **Hulk**-form.

(FYI, the Hulk's strength and mass actually depend on how angry he is.)



Before push: buses are motionless



After push: buses reach walls simultaneously

The lab problem (10 points):

- As in the “Pushy Carts” lab, you will have a track and two gray lab carts, one equipped with a spring-loaded plunger. Carefully measure the mass of both carts using a triple-beam balance.
- When you have your masses measured, TRADE IN your balance to get a cargo container.
- Load the container onto one of your carts and reproduce the “Pushy Carts” procedure to find the position from which your carts will hit the ends of the track simultaneously.
 - Your container may slide around, so make sure the “heavy” end is right up against the “inner” wall of the cargo area. That will keep it in place during the experiment.
- Based on the position where you get simultaneous hits, CALCULATE the mass of your cargo.
- When you are confident you've got it, bring your result and container back to Mr. Stonebraker. He will mass the cargo on a balance to check your result.