

# PhyzLab Prep: Carts & Tracks

## Introductory Dynamics System basics

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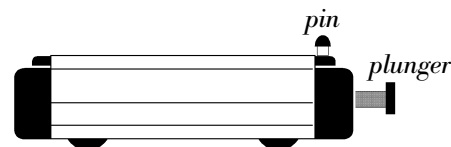
### • Purpose •

In this activity you will become familiar with the PASCO Introductory Dynamics System (IDS) used in various lab activities throughout our physics courses.

### • Apparatus •

- \_\_\_ PASCO IDS materials
- \_\_\_ aluminum track
- \_\_\_ 2 adjustable feet sets
- \_\_\_ 2 aluminum carts
- \_\_\_ line level
- \_\_\_ magnet-Velcro end stop

**The PASCO Dynamics Cart:**  
Top of the line: precision, low-friction bearings, three-setting plunger, retractable wheels, magnetic bumpers, Velcro bumpers; in a word: expensive!

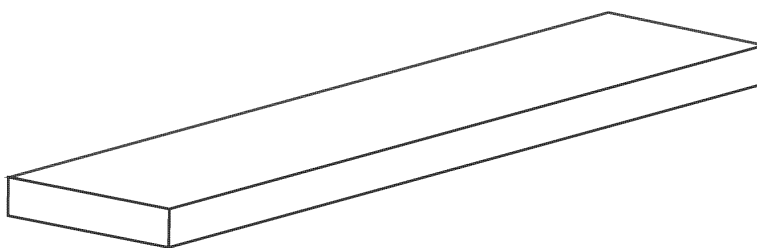


### • Procedure •

#### 1. THE TRACK

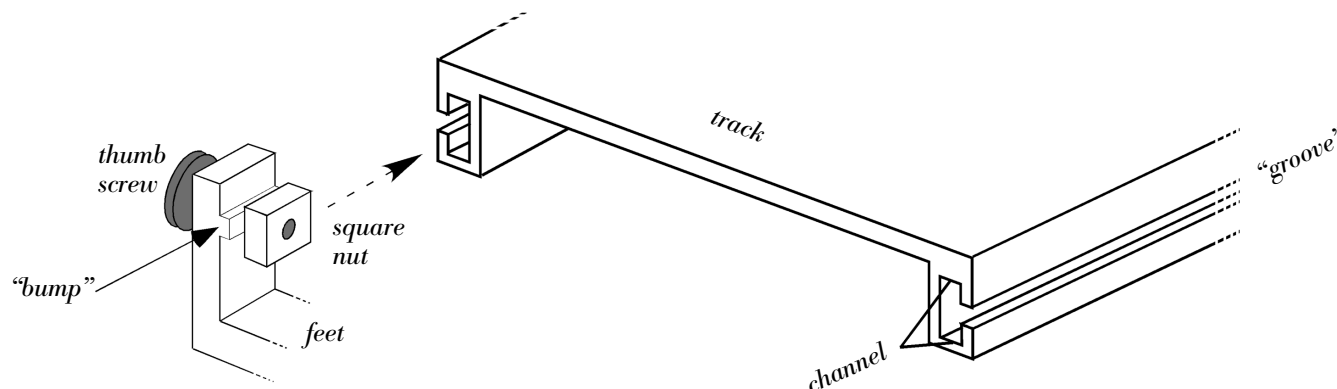
a. Examine the aluminum track. On the diagram below, draw the **wheel guides** (grooves that will guide the wheels of the carts) and **side channels**. Label them in the diagram.

b. Attach adjustable feet to both ends of the track. The feet are round, they come in pairs, and are attached to threaded "legs." The legs can be made taller or shorter by turning the feet clockwise or counterclockwise.



The square nut on the set of feet feeds into the side channel. **Never remove square nuts from their respective bolts without permission of the instructor. That goes for all square nuts on all apparatus all year!** The "bump" on the set of feet feeds into the side channel opening ("groove").

When you have both sets of feet correctly attached (and you've got the bump in the groove at both ends), adjust the feet so that the track is level. Check the level with the line level. Check both axes on the track ( $x$  and  $y$ ). Then check the level by gently rolling a cart on the track. The cart should roll equally well in either direction. When your track is level, ask your instructor for a "PhyzBlessing."




2. COLLISION CART (No Plunger) · **Note: to prevent cart roll-away accidents, place carts upside down (like turtles) when not using them.**

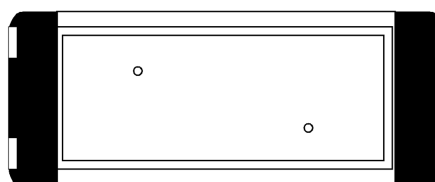
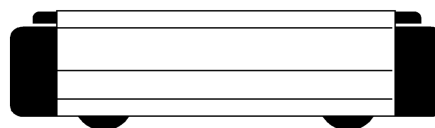
a. Wheel Test. Spin each wheel of the collision cart, one at a time. It should spin quietly and for several seconds. If it does not, ask your instructor for assistance.

b. Bumpers. The cart has four bumper locations (shown as white boxes on the black end caps in the diagrams). Each bumper location may have a magnet, Velcro, neither, or both. **Show** each bumper type using the **graphic icons** shown to the right of its name.

• magnetic bumper 

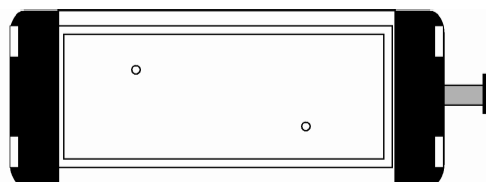
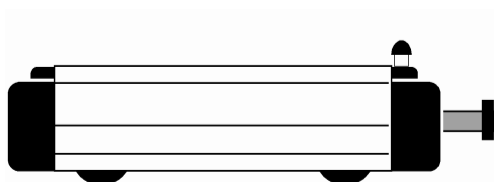
• “hook” Velcro (spikey) 

• “pile” Velcro (fuzzy) 

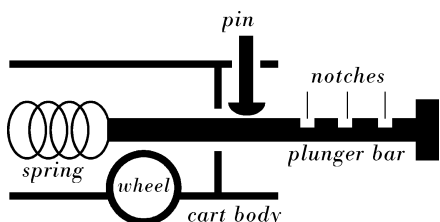


3. PLUNGER CART

a. Examine the Plunger Cart. Test the wheels and label the bumpers as you did with the collision cart.



b. How is the plunger set and how is it released? What keeps the plunger in when it is set and how is the plunger triggered when release is desired? Discuss in terms of the plunger, notches, spring, and pin shown in the diagram below. (The diagram is a cut-away view of the plunger in its released or “sprung” mode.) Draw a similar diagram showing the plunger in its set, or “cocked,” position.



4. THE END STOP

a. Examine the magnet-Velcro end stop. Notice the nut and bolt assembly. **You may loosen the assembly, but never disconnect the nut and bolt.**

b. Attach the end stop to the track so rolling carts will collide with the Velcro (not the magnets). Feed the nut into the side channel. Pay attention to the small bump on the end stop where the bolt passes through to the nut. Make sure the bump fits into the groove of the channel. Slide the end stop a few centimeters farther into the channel. Then tighten the bolt to secure the end stop to the track. When the end stop is correctly attached to the track, the magnet-Velcro arm is parallel to the track surface. If the arm is not parallel to the track, loosen the bolt, adjust the end stop (set the bump into the groove), and retighten.

c. When the end stop is correctly secured, obtain a PhysBlessing from your instructor.

d. If time allows, observe what happens when a cart **gently** collides with the Velcro end stop. Then reverse the end stop so that the magnets face the track and observe what happens when a cart **gently** collides with the end stop.