PhyzLab Prep: Carts & Tracks

Introductory Dynamics System basics

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• Purpose •

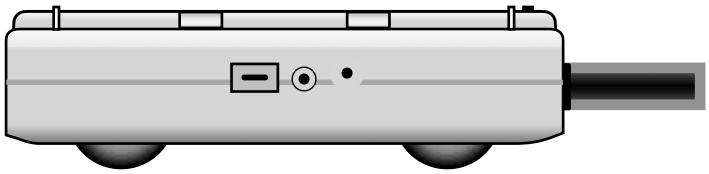
In this activity you will become familiar with the PASCO Introductory Dynamics System (IDS) and Smart Carts used in various lab activities throughout our physics courses.

• Apparatus •

___ PASCO IDS materials
- __ aluminum track
- __ 2 adjustable feet sets
- __ line level
- __ magnet-Velcro end stop

___ PASCO Smart Cart
- __ magnet bumper
- __ hook and bumper attachments

The PASCO Smart Cart: State-of-the-art dynamics cart. Bluetooth-enabled, loaded with force and motion sensors. In a word: ***expensive!***

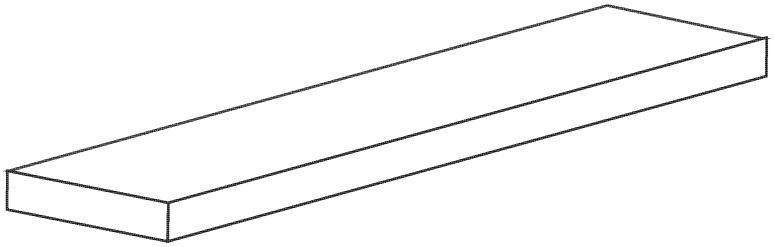


• Procedure •

1. THE TRACK

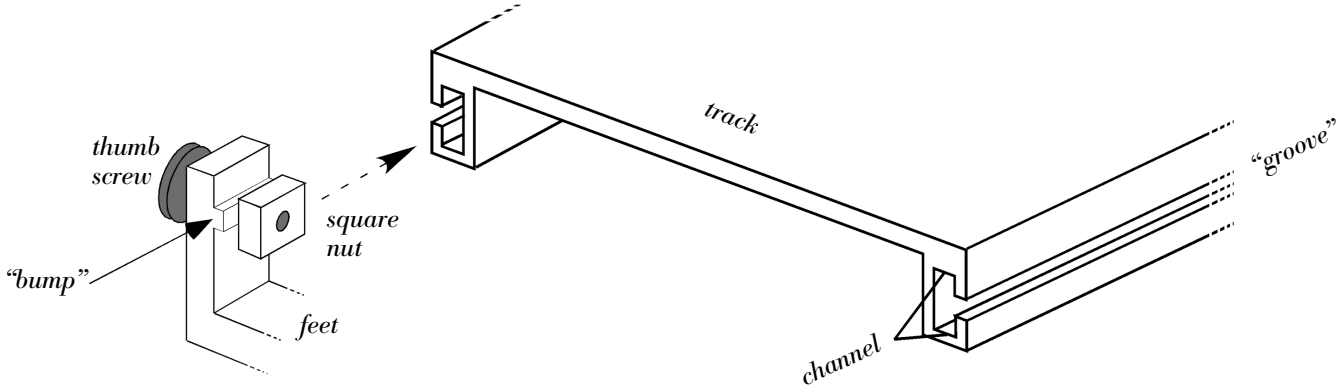
a. Examine the aluminum track. On the diagram below, draw the **wheel guides** (grooves that will guide the wheels of the carts) and **side channels**. Label them in the diagram.

b. Attach adjustable feet near both ends of the track, about 10 cm in. 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.

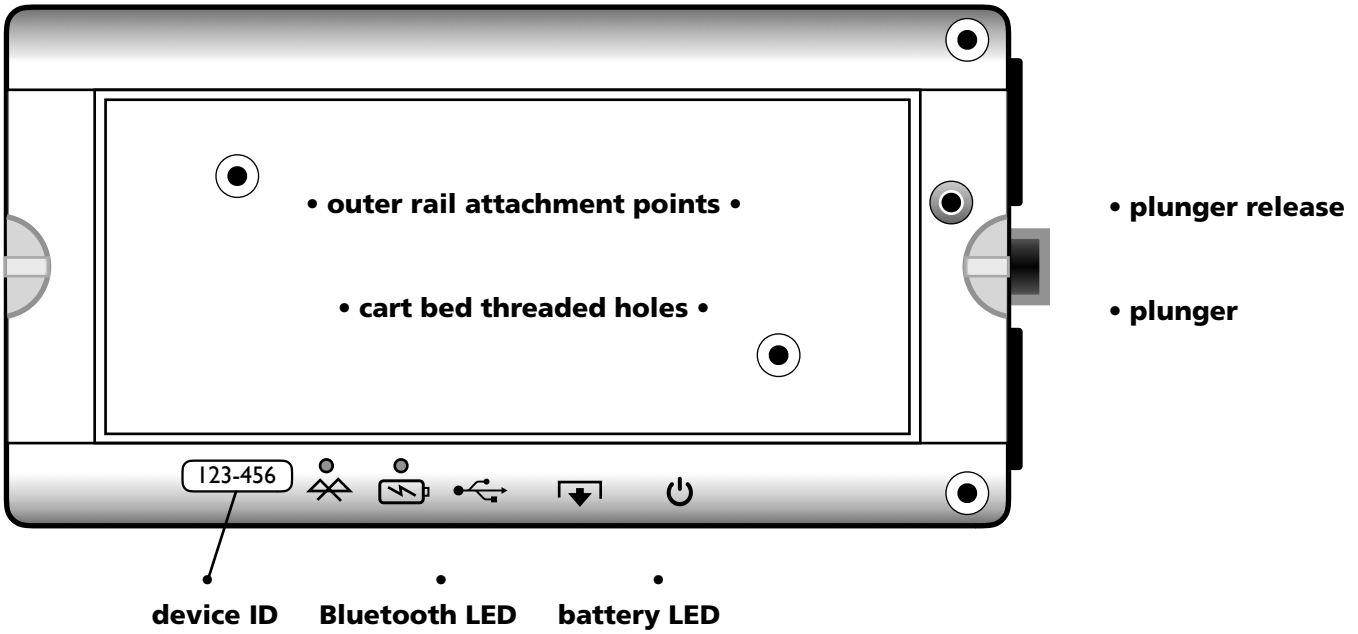


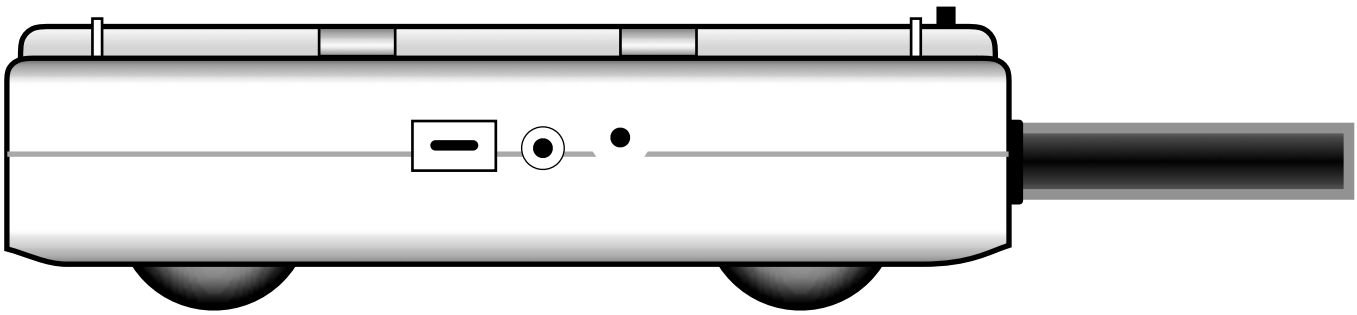
The square nut on the set of feet feeds into the side channel. **Never remove square nuts from their respective bolts without permission of the instructor. That goes for all square nuts on all apparatus all year!** The "bump" on the set of feet feeds into the side channel opening ("groove").

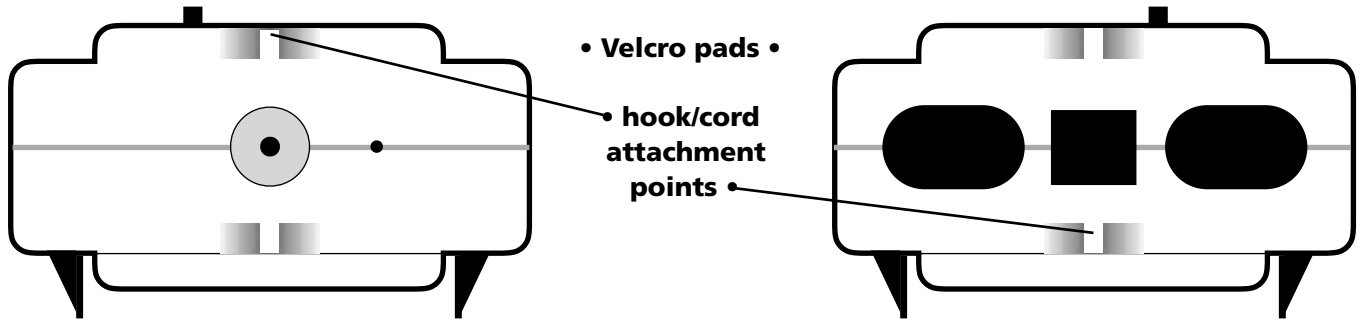
When you have both sets of feet correctly attached (and you've got the bump in the groove at both ends), adjust the feet so that the track is level. Check the level with the line level. Check both axes on the track (*x* and *y*). Then check the level by gently rolling a cart on the track. The cart should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

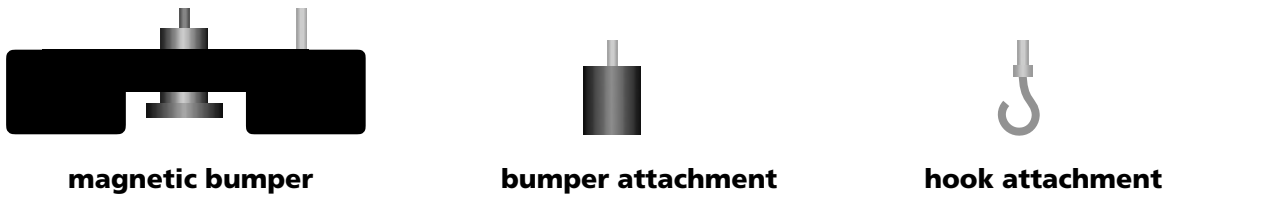


2. SMART CART GEOGRAPHY · **Note: to prevent cart roll-away accidents, place carts upside down (wheels up) or keep them in their storage box when not in use.** Identify the various parts of the Smart Cart. A few have been identified for you. Where possible, minimize the crossing of labeling lines.





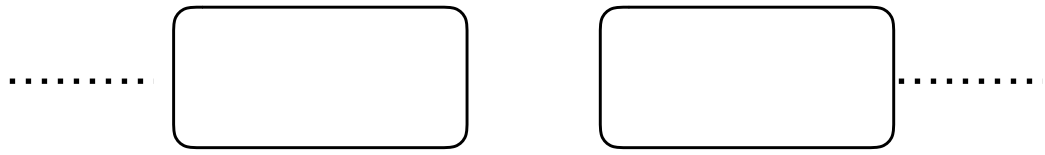




3. SMART CART USAGE · **Note: to prevent cart roll-away accidents, place carts upside down (wheels up) or keep them in their storage box when not using them.**

a. Plunger. Push the plunger release pin to release the plunger. The plunger has three force settings and a "tuck" setting to set the plunger face flush with the cart surface. Tuck also recesses the plunger release pin a bit. How do you set the plunger to "tuck"?

b. Two carts can be arranged to collide and stick to each other. How can this be done? (Collisions are always gentle.) Two carts are shown from above. They are about to collide and stick together. Label the location of the plunger and Velcro pads on each cart.



c. Attach a magnet bumper to each cart. What happens when the cart's magnetic bumpers collide gently now? Describe using words and pictures.

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 PhyzBlessing from your instructor.

d. Observe what happens when a cart **gently** collides with the Velcro end stop.