



## Air Puck

P4-2150

### TEACHER'S NOTES:

The Air Puck glides best on hard floors. Low carpet can also be used. The rubber bumper on the Air Puck helps it bounce elastically off hard barriers, such as walls or boards.

### CHANGING THE BATTERIES:

To change the batteries, remove the white circular cover located underneath the Air Puck. It is held in place by the three inner most screws located near the outer edge of the solid white cover. The air puck runs on 4 "AA" batteries.

### EXPERIMENTS:

Note: Some experiments recommend the use of a sonic motion sensor. The puck will need an attached "flag" or other object for the motion sensor to sense. Take care not to block the air intake area with this object.

1. **Newton's First Law (Law of Inertia):** Demonstrate how the puck glides smoothly in a straight line until acted on by an outside force. The usual outside force of friction is greatly reduced for the puck.
2. **Motion on an inclined plane:** Use a motion sensor to measure the acceleration of the puck as it glides down a wide inclined plane. Compare this acceleration to calculated acceleration, and to the acceleration of other objects, such as a sliding block, rolling car, or rolling ball. Attach some mass to the puck (make sure it still glides smoothly) and repeat the measurement.

3. **Collisions and conservation of momentum and energy:** Use two or three Air Pucks to investigate the behavior of objects in collisions. Use a motion sensor for quantitative measurements. For inelastic collisions, attach some hook-and-loop (Velcro) fastener to the bumpers.

## RELATED PRODUCTS:

**Newtonian Demonstrator (P1-6001).** Classic 5-ball demonstration of Newton's Laws and conservation of momentum and energy.

**Bullseye Level (P6-2604).** First, use the level to make sure your Air Puck is moving on a level surface. Then attach it to the Air Puck itself and use it as a simple accelerometer!

**Teaching Physics with Toys (P8-0500).** This easy-to-use workbook gives you dozens of activities for grades K-9 that use simple, fun toys.





# Air Puck Physics Kit

P4-2155

## CONTENTS:

- 2 Air Powered Pucks
- 1 Air Puck Launcher
- 1 pair hook and loop bands
- Air Puck and Air Puck Physics Kit instruction sheets

## INSTRUCTIONS:

**Launcher:** You can use the front or back pegs and one or two bands to achieve different launch speeds. Hold the launcher down firmly with one hand while you pull the puck completely back with the other hand.

**For Inelastic Collisions:** Stretch the two bands around each of the two Pucks. When the pucks collide, they will stick together instead of bouncing apart.

## EXPERIMENTS:

- Friction vs. Frictionless:** Compare the Air Puck's motion to that of a block of wood or sliding rubber tire. Discuss the effects of friction on the different surfaces.
- Law of Inertia:** Since the Air Puck's motion is nearly frictionless, it makes an excellent example for teaching Newton's First Law. The puck moves in a straight line at a constant speed until an outside force acts on it. Try to make the puck slow down, speed up, or turn! What types of forces can you use without touching the puck?
- Centripetal Motion:** Attach a long elastic band to the puck and loop the free end around a round table leg. Push the puck in a circle and observe the effect of increasing speed on the stretch in the elastic band.

4. **Collisions and Conservation of Momentum:** The pucks' rubber bumpers make excellent elastic collisions – with each other or solid objects like walls. Add the hook and loop bands to make inelastic collisions. More tips for collisions:
  - a. Add mass by affixing rings of modeling clay. The clay must be evenly distributed around the puck, and must not block the air intake. Be careful not to add so much that the puck doesn't glide smoothly.
  - b. Analyze the motion with video analysis. Commercial programs are available, or you can simply view frame-by-frame video (filmed from directly above) on a monitor and mark the positions of the pucks as they move through each frame. Students can create a “cm per frame” analysis of relative speed.
  - c. Analyze the motion with computers. Add flags to the pucks so that their motion can be captured by sonic motion sensors. This system works best for linear motion.

## SUBMIT YOUR IDEAS!

Do you have a solution for using the Air Puck for quantitative labs? Send it to [mail@arborsci.com](mailto:mail@arborsci.com).

## RELATED PRODUCTS:

**Air Track and Air Source with Accessories** (P4-2710). For studying linear frictionless motion.

**Dynamics Carts** (P3-3530). Traditional apparatus for studying motion and collisions.

**Liquid Accelerometer** (P3-3525). Colored water in this transparent cell shows the magnitude and direction of linear or centripetal acceleration. Fits on our dynamics carts.

