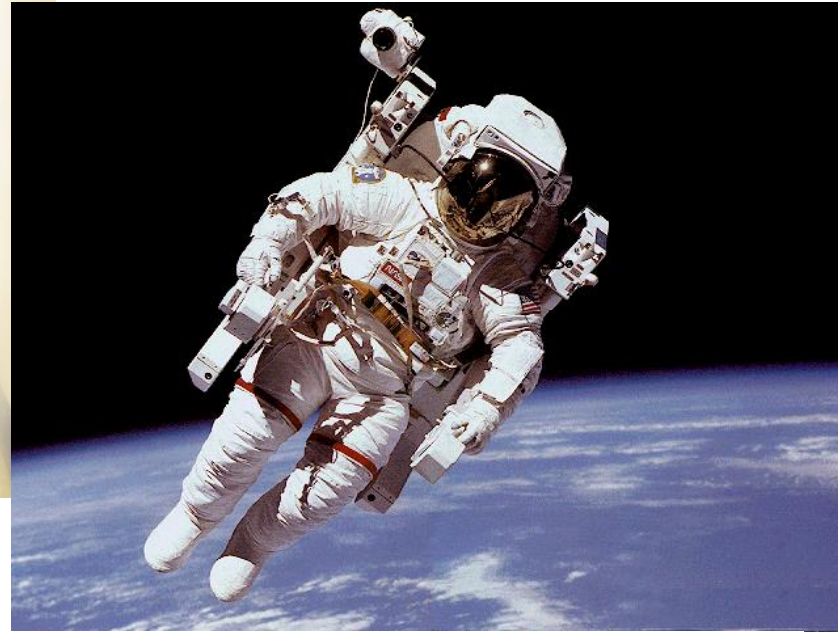


# "Astronaut Training" with Rideable Hoverboards: An Educational & Memorable Activity For All Ages



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# The case for rideable hoverboards

- Kinesthetic, engaging, educational
- Suitable for all ages
- Useful in many contexts
  - Physics curricular
    - Newton's Laws of Motion (six of them!), and more
  - Space connections
    - "Astronaut training," spacecraft control, and more
  - Outreach

Take-away: Every Space Grant (& physics teacher) (& ...) could benefit from having a couple rideable hoverboards.

# Rideable Hoverboard parts

- 4-foot diameter hoverboard, with skirt and bumper
  - Note – for some demonstrations you will want TWO
- Air source (leaf blower or shop-vac (with extension cord))
- Seat (optional, but strongly recommended – no standing!)

## My favorite accessories

- Bungee cords (on meter sticks)
- Push/pull rod (8-foot 1-inch diameter pvc pipe)
- Torque ladder/bar (with socket wrench or vise grips)
- Spinning bicycle wheel (gyroscope)
- CO<sub>2</sub> fire extinguisher (modified to be a thruster)



## Hovercraft - ME-9838



Great Demo

**Hovercraft**  
ME-9838 **\$549**

Items(s) Selected: Qty.

**Hovercraft** (ME-9838)  
1

**Total:** **\$549**

U.S. Educator Pricing Shown

Add Item(s) to Cart

**Important:** See Buying Guide for Required & Recommended Items.

An expensive but robust commercial solution: Pasco.com (board & blower only)

## Cordless Air Source - SE-8806



Great Demo

**Cordless Air Source**  
SE-8806 **\$139**

Items(s) Selected: Qty.


**Cordless Air Source** (SE-8806)  
1

**Total:** **\$139**

U.S. Educator Pricing Shown

Add Item(s) to Cart

I much-prefer a plug-in blower,  
like a wet-dry shop vac – just  
make sure it has a “blow” mode.  
Here is one from Home Depot.



You're shopping  
Minneapolis Ne

What can we help you find today?


My Account


Cart | 0 items

[All Departments](#) [Home Decor & Furniture](#) [DIY Projects & Ideas](#) [Home Services](#) [Specials & Offers](#) [Local Ad](#)

[Home](#) / [Tools](#) / [Wet & Dry Vacuums](#) / [Wet & Dry Vacuums](#)


Model # WD2025   Internet #100021998   Store SKU #335204   Store SO SKU #1000707316



**What's In The Box?**

- 1. 2.5 Gal. Wet-Dry Vacuum
- 2. 1-1/4" Hose
- 3. 1-1/4" Nozzle
- 4. 1-1/4" Nozzle
- 5. 1-1/4" Nozzle
- 6. 1-1/4" Nozzle
- 7. 1-1/4" Nozzle
- 8. 1-1/4" Nozzle
- 9. 1-1/4" Nozzle
- 10. 1-1/4" Nozzle

**1 1/4"**  
HOSE/ACCESSORY  
DIAMETER



Exclusive

Stinger >

2.5 Gal. 1.75-Peak HP Compact Wet Dry Vac

★★★★☆ (1,065) [Write a Review](#) [Questions & Answers \(85\)](#)

- Easy-to-carry & compact wet dry vacuum provides powerful suction
- 1-1/4" hose fits 1-1/4" accessories for easy cleaning
- Included nozzles add convenience for diverse cleaning challenges

**\$34<sup>97</sup>**

Feedback

For about half the cost of one hoverboard from Pasco, you can make two home-built hoverboards and two seats (and also buy two blowers!), if you have the time.





# Some Lesson/Demonstration Ideas

- Differences to expect when in outer space / Earth orbit
  - Misconception: “No gravity in outer space.” It is free-fall!
- Ways astronauts prepare to live and work in outer space
  - Hovercraft can simulate no-friction aspect of free-fall
- Newton’s Laws of Motions (3 “standard” & 3 “rotation”)
- Astronaut applications
  - Torque about a vertical axis (building in space)
  - Spinning wheel for steering (orientation/attitude control)
  - CO<sub>2</sub> “cold gas” rocket thruster (propulsion)
- Astronaut challenges like “go repair something over there”

# Challenges

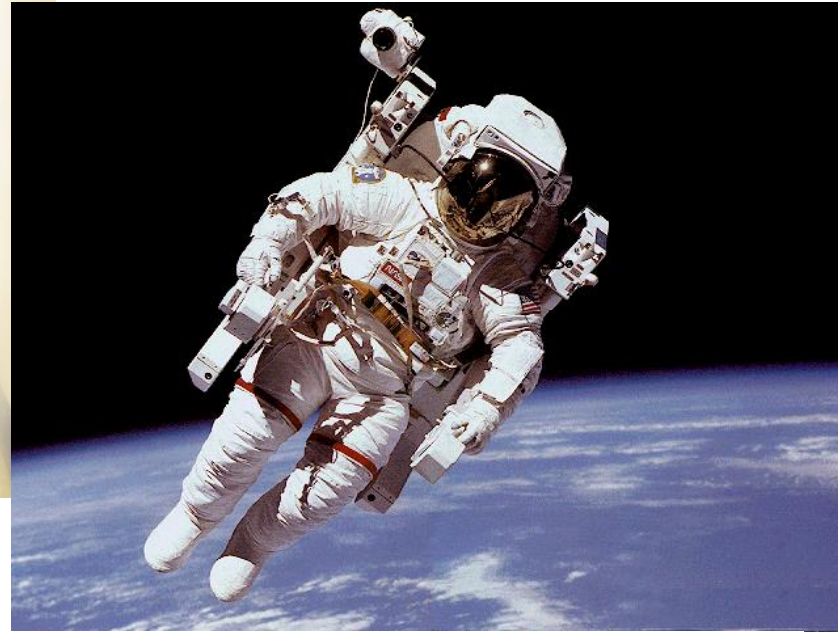
- Requires a hard floor (not carpet!) and some open space
- Noisy (might disturb people in nearby classrooms)
- Almost too popular (avoid battery-powered air source)
- CO<sub>2</sub> fire extinguisher (modified, consumable expense)

# Safety

- Slippery (hold while mounting/dismounting; sit down)
- Need tenders (don't over-run cord, start/stop gently)
- Spinning wheel: practice, don't touch skin, hair, jewelry
- CO<sub>2</sub> thruster: practice, short bursts, stay clear of exhaust



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