

MIND TREKKERS

Trash bag and Vacuum, Air Pressure Lesson Plan

Amount of time Demo takes: 1-3 Min

times per hr: 25

Container: Box of trash bags + vacuum

Materials:

1. Vacuum with hose (1)
2. Extension cord for vacuum if needed (1)
3. Large sturdy trash bags, large enough for a person to fit in. Contractor size, 140 gallons. (4-5 per day)
4. Volunteer :)

Set up instructions:

1. Vacuum plugged in.
2. Trash bags available, area clear in case person falls over.

SAFETY!

1. Garbage bag only goes up to neck, do not cover someones face.
2. Keep area clear in case they fall over.

Lesson's big idea:

This demonstrates the amount of air pressure that surrounds us, by allowing participant to feel it.

Instructional Procedure

1. Ask volunteer to remove shoes and step inside garbage bag, kneeling or sitting. Knees together and elbows in. The way they sit will help preserve the bags for multiple uses, if they can move a lot they will be able to break through bag if they try.
2. Ask the volunteer to hold the vacuum hose away from clothes and from the plastic bag.
3. Ask another volunteer or you hold plastic bag tight enough to form a snug seal around their neck. The better the seal the better the demo works.
4. Turn on vacuum. It should quickly suck all the air of the bag, making it so your volunteer is "vacuum sealed" in by lowering the air pressure inside the bag, the air pressure outside is greater and presses on them.
5. Have them try to move.
6. Turn vacuum off and explain the science.
7. At sea level, the Earth's atmosphere presses 14.7 pounds per square inch. Air has weight. The pressure inside the plastic bag is lowered by the vacuum to ~12.5 PSI and the atmosphere on the outside of the bag is 14.7 PSI, with a difference of 2.2 PSI, there is more pressure outside.

8. FUN FACT! The force on 1,000 square centimeters (a little larger than a square foot) is about a ton!

Assessment:

1. Can you feel the pressure of Earth's atmosphere?
2. How many pounds per square inch is Earth's atmosphere pushing on you?

Conclusion:

The weight of the atmosphere is on our shoulders, we just don't notice it. When the pressure is lower inside the trash bag than the pressure outside the trash bag you notice this change and can feel the atmospheric pressure.

Clean Up:

Clean up between demonstrations if needed. When completely finished gather all materials listed for this demonstration and make sure everything is accounted for. If something was used up, broken or damaged. Let someone know so it can get replaced or fixed.

References:

[Youtube video link of demo](#)

[Another lesson plan, pictures of demo](#)

http://kids.earth.nasa.gov/archive/air_pressure/index.html

National Standards

K-4 Content Standard D, Earth and space science, Properties of earth materials

5-8 Content Standard D, Earth and space science, Structure of the earth system

9-12 Content Standard D, Earth and space science, Energy in the earth system

Trash Bag and Vacuum lesson plan bullet points:

- This demonstrates the amount of air pressure that surrounds us, by allowing participant to feel it.
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