Launch items with an air cannon

Materials

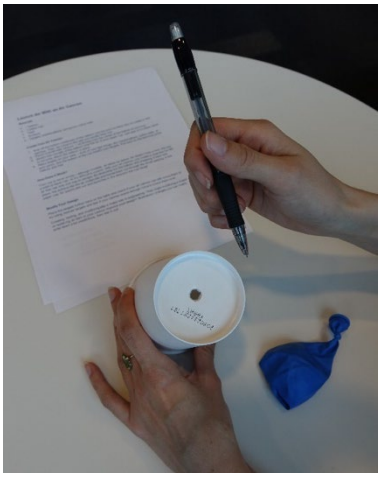
- 1 balloon
- 1 paper cup
- Tape
- Scissors
- Ammo: marshmallows, pompoms, cotton balls, etc.

Create Your Air Cannon

1. Snip off the bottom centimeter of the balloon (not the end you blow into) to create a new opening.

   Then, tie a knot in the part you usually blow into.

2. Punch a small hole (around 1 cm) into the center of the bottom of your cup with a pen.

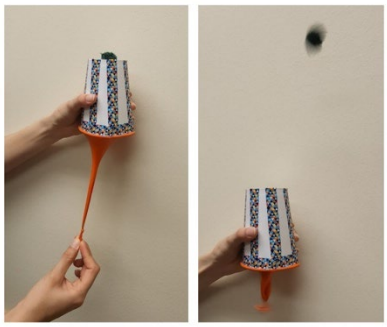


3. Stretch the cut side of the balloon over the lip of your paper cup. Use tape or a rubber band to securely attach the balloon in place.

4. Decorate your cup and find some ammo. These items must be lightweight—consider marshmallows, cotton balls, or pompoms.

5. With the balloon side of your cup towards the ground and the ammo resting on the hole you punched, pull back on the tied knot of the balloon to fire!

How Does It Work?



Your cup is never empty—although invisible, air takes up space. Air doesn't hold a form the way a solid or liquid can, so it's difficult to control. With your air cannon, you create a chamber for the air that has only one way to escape. By stretching out the balloon and snapping it back into place, the surface hits the air molecules and forces them out through the small opening in the paper cup. Air quickly jets out and launches your ammo in the direction the cup faces!

Modify Your Design

Try using heavier ammo, and test if your cannon exerts enough force to pop them up.

Creating, testing, and modifying play a major role in engineering. How might modifying a shape or replacing an item in your cannon improve your design so that you can use heavier ammo? Brainstorm changes you can make, write down your predictions, then test it out.

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Teacher/Parent Guide

Additional Materials (optional)

- Gloves, paper bag, plastic bag to swap out balloon
- Ruler or yardstick to measure distance from cannon

Additional Challenges and Hints for Students (optional)

As your student tries to create a stronger cannon, suggest the following changes as necessary:

Launch Mechanism

A balloon works here because it's airtight and stretchy, but there are other options. Try removing the balloon and taping an airtight bag (like a plastic grocery bag) to the lip of the cup. For this launch mechanism to work, you'll need to trap air in the bag then squeeze the bag to force air out from the small opening.

How can you inflate the bag?

Size

Size your cannon up or down by using different-sized cups. Make a prediction on which will knock down more targets, then measure the two sizes and see if your prediction was correct.

Opening

Using tape, cover the hole in the bottom of your cup and carve out a new, smaller hole. Will this make your cannon weaker or stronger?

STEM Lessons

Engineering Processes

- Creating a prototype
- Testing the design
- Modifying as necessary

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