



## Curiosity Guide #508

### Paper Airplanes

Accompanies Curious Crew, Season 5, Episode 8 (#508)

#### Design a Paper Plane Launch System

STEM Challenge

#### Description

Your challenge is to create a super-duper way to launch paper airplanes!

#### Materials

- Paint paddles
- Popsicle sticks
- Rubber bands
- Wood scraps
- Screws
- Nails
- Paper clips
- CDs
- Balloons
- Paper
- Batteries, including 9-volt
- Battery holders
- Cardboard
- Bottle caps
- Toy wheels
- 1000 RPM DC motors
- Foam board
- Adhesive Velcro
- Electrical switches
- Wire

## Tools

- Paper punch
- Stapler
- Wire strippers
- Drill
- Drill bits
- Hot glue gun and glue

## Additional supplies

- Paper or foam cups for target
- Paper airplanes

## Procedure

- 1) Use the available materials to design and build a system to launch a paper airplane.
- 2) Test the system.
- 3) Revise and redesign as necessary.
- 4) Keep a record of each design, the changes you made, what you expected to happen, and the results.
- 5) Can you aim the plane with your launcher?
- 6) Try hitting a pyramid of cups.

## My Results

## Explanation

In order for a plane to fly, there must be thrust, which is a forward push through the air. Generally, planes have engines. However, in the case of paper airplanes, the thrust comes from the energy that the thrower applies to the plane itself. Dart planes can be thrown with a lot of force because there is so little drag in the air compared to a larger glider with longer wings on the sides. Using a launch system, often powered with rubber bands, is another way to apply thrust to the plane. Stretching the rubber band turns the elastic potential energy into mechanical energy to launch the plane. In a battery-operated launch system, spinning rollers can grab and propel the plane forward at very high speeds. The spinning-roller design also helps with aiming the plane during launch. After launch, the plane acts as a glider. The plane immediately loses speed from drag or air resistance and gets pulled down by gravity. A well-designed plane will have enough lift under the wings to counteract gravity's pull down and will travel a good distance.

**Think about this.** The Crew discovered that rubber bands could be useful in developing a launch system for their paper airplanes, but power launchers can get pretty exciting too. Most power launchers use some kind of roller system that when turned on will grab the front of the plane's fuselage and roll it quickly forward and out the other end. Because the rollers are spinning so quickly, the plane can fly off at terrific speeds. Try aiming the plane at a cup tower! Be sure to play with the launcher outside. Remember, safety first!

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