

DiscoverE Challenge: Slow It Down

Student Instructions:

Challenge

Design an aircraft that falls as slowly as possible before landing on a target.

These instructions are also presented in a short video by Collins Aerospace engineer and retired NASA astronaut Joan Higginbotham. Watch on YouTube here: <https://youtu.be/oZXi1UApCPE>

Collect Your Materials

- 5 sheets of paper (8.5x11 inch)
- 1 index card (3x5 inch)
- 4 paper clips
- Scotch tape
- Scissors
- Sketch book
- Timer

Introduction

When engineers design parachutes or hot air balloons, they use air resistance, also known as **drag**, to slow down the descent in order to land gently in a specific location.

1. Identify the Problem

- The most critical step of any engineering challenge is to **understand the problem** you are trying to solve.
- How can you **design an aircraft that uses drag** to land as slowly as possible onto a target?
- Here are the **specs**:
 - Your aircraft must be dropped from a height of at least six feet.
 - It must land within the target area that you mark on the floor.
 - A reasonable target is a circle of 36-inch diameter, but you can change the size to make it more or less challenging.

2. Brainstorm Designs

- What do objects that fall gently and relatively slowly have in common? Think about **feathers, maple seeds or balloons** – are there clues in their shape or weight?
- Experiment with your materials and maybe sketch some ideas to help determine your best design for building.
- Ask yourself:

- How might you fold your paper to slow its fall? How do the locations of the paper folds make a difference?
- Do you think your aircraft would drop more slowly or quickly if it is designed to spin? Try it out!
- Can you use paper clips to stabilize the falling aircraft's pathway into the target?

3. Build and Test Your Design

- When you start building your aircraft, you can test it along the way by dropping it from lower heights.
- When you're ready for the 6-foot drop, get a timer and take a few test flights.
 - Time each fall and note how close to the target your aircraft falls.

4. Make Changes and Try Again

- Did your aircraft fall like you thought it would? Are there improvements you can make to increase the amount of time it takes?
- Redesign your aircraft and test again!

5. Share Your Results with a teacher, parent/guardian, or DiscoverE

- Share photos or a video of your aircraft in action!
- Send to DiscoverE at social@DiscoverE.org or post on Instagram/Twitter using the hashtag **#DiscoverEChallenge**