Let's Go Flying

Grade Level: 2, 3, 4, 5, 6

Duration: 30-45 minutes

Classification: Classroom, STEM Spark

Subject(s): Aerospace Engineering

Categories (STEM): Science, Engineering

Keywords: Flight, Drag, Thrust, Gravity, Lift

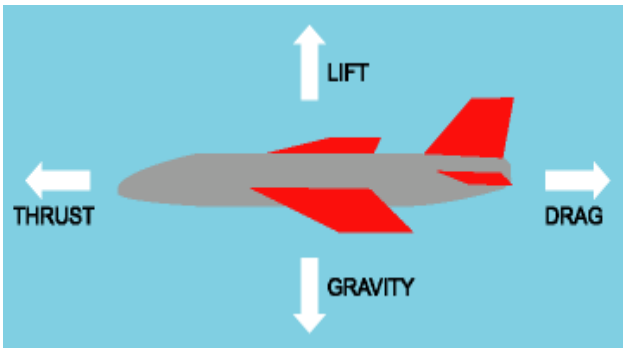
Introduction

- Summary: Learn about basic flight principles that make it possible for planes to fly, then apply them to design a paper airplane.
- Description: Students will learn about how the forces acting on a plane allow it to soar. Then they will work through the engineering design process to create a paper airplane and compete for the furthest distance traveled.

Online Resource:
https://www.teachengineering.org/activities/view/cub_airplanes_lesson06_activity1

Vocabulary

- **Lift**: upward force required to overcome gravity
- **Gravity**: force that pull together matter, downward force of the aircraft
- **Thrust:** forward force required to move an aircraft through the air, overcoming drag
- **Drag:** force that slows down an object



Materials

Materials	Quantity	Reusable?
Paper with Different Weights*	2 Pieces per Student	No
Scissors	1 per 4 Students	Yes
Yardstick	1 per Classroom	Yes
Paper Clips	4 per Student (for extension)	Yes

**ex: notebook paper, copy paper, cardstock; any paper that's 9"x13"*

Paper Airplane Designs handout as a guide

Directions

- Have students get into groups of 4.
- Have each group design and create 4 different paper planes and name each plane so they can differentiate between them.
- Have each group make a data table for each of the 4 planes and have them write down their prediction.
- Throw each airplane 4 times and record each distance and find the average distance travelled.
- Each group should redesign their paper planes so they can travel farther.
- Re-do the experiment with new changes.

Activity Extension

- Test the paper planes to see which ones can be in the air the longest.
- Add paper clips to the airplanes as an additional challenge to design for.

Discussion Questions

- What changes did you make in your second round of airplane design and how did those changes affect the flight distance?
- Did certain designs go farther than others? Why?
- Did certain designs stay in the air longer than others? Why?
- How were the four forces of flight (drag, lift, thrust, and gravity) acting on your airplane?

What is happening?

- Flying is defined as controlled movement through the air and includes sustained, controlled and powered flight.
- Fast moving air equals low air pressure while slow moving air equals high air pressure. The high air pressure underneath the wings will therefore push the aircraft up through the lower air pressure.

Applications:

- Majors
  - Aerospace Engineering
  - Mechanical Engineering
- Jobs
  - Pilot, Aerospace Engineer, Automotive Engineer
- Hobbies
  - Paper Airplanes
  - Model cars and trains
- Real-World applications
  - Hot Air Balloons, Birds
  - Cars, planes, trains, etc try to reduce drag to run more efficiently