



Aerodynamics – The Science of Air

PROJECT DESCRIPTION

In this session students will assemble, design, and/or make a paper airplane while learning the fundamentals of aerodynamics, the science of flight.

OBJECTIVES

- Explore the concepts of aerodynamics and aviation
- Discover the fun and fascination of science
- Understand the **four competing forces of flight**: gravity, lift, thrust, and drag
- Design and assemble an airplane that flies far and straight based on their understanding of gravity, lift, thrust, and drag

ENGAGE

Start with a bang! “We are going to make airplanes today. The student that builds the airplane that flies the farthest wins” (give prizes if you have something). Now that you have their attention.

- Talk about airplanes; ask questions about family flights, travel, museums, history, etc. Based your discussion on your student population’s cultural, demographics, and relevancy of what you think surrounds their experience with airplanes.

Next, review the foundation of aerodynamics. Talking points:

- The power of air. Although air is invisible, it’s all around us and weighs quite a bit. Air that fills your bedroom weighs about 100 pounds. This weight of air is what creates air pressure. We don’t feel air pressure because it is the same inside and outside our bodies. Therefore, when a plane flies, it’s a balancing act.

Click here to show [video](https://youtu.be/eSF6ghOxekM): (<https://youtu.be/eSF6ghOxekM>)

MATERIALS

- ✓ KNT Airplane Kit
- ✓ Color markers
- ✓ Rubber bands (optional)

PRE-REQUISITES

- TEACHER: Watch the video before workshop
- Review science notes.
- Make an airplane

TECHNOLOGY SUGGESTED

Computers with high speed internet, smart board or projector to show video.

PROJECT BUILD



INSTRUCTIONAL SEQUENCE

Just before starting the build activity, demonstrate your sample plane in 3-5 quick seconds. The 4 Forces of Flight...

- As you position to throw the plane, describe “thrust” in one word!
- As the plane takes off, describe “lift”!
- As the plane begins to slow down, describe “drag”!
- As the plane ascends and hits the ground, describe “gravity”!

The directions for this item are extremely simplified, as there is no right/wrong way to put this item together. The purpose of this project is to learn through the process of experimentation, and trial and error.

Lay out all materials listed above. Students may decorate the airplane as they chose. Challenge students to create their own version.

Let’s Fly!!!

Once planes are decorated and assembled, move class to outdoor or large indoor area.

Encourage your students to start with a smooth, steady throwing motion, and then gradually increase their throw (or thrust).

ADAPTATIONS

If time allows:

- Flying contest, measure distance; Analyze which airplanes flew the farthest distance and why? Which airplanes flew the fastest and why?
- Use rubber band (optional) to give more thrust by hooking on notch at the bottom of the plane.
- Redesign planes if time permits.
- Start flying again!

KNT DESIGN PROCESS

PROJECT/PROBLEM – Review project, read through instructions.

PREPARE/ PLAN- Lay out all your materials that are required to make your project as listed in each step.

BUILD IT – Follow instructions

TEST IT – Use your project for its intended use. Compare the appearance of your project to the sample. Does it look the same? Similar? Better? Or lacking the same appeal?

TWEAK IT – Change the project in the areas that should be improved

NOTE REMINDER:

End project 15 minutes prior to dismissal. Give each student a W.D.Y.D. today sheet and complete the sheet as a group. Make sure each child has their project (if applicable) and the W.D.Y.D. sheet to take home.

NOTES TO NOTE:

Explain Gravity, Thrust, Lift, and Drag:

Gravity is what causes any object you throw into the air to come back to the ground; Earth has a magnetic force that pulls things to the ground, therefore, gravity works against an object. The lighter your plane, the less it will need to fight against gravity pulling it to the ground.

Thrust is the force that causes an object to move forward through the air. Your arm thrust behind your plane. So, it’s important how you aim and throw.

Drag is the force that slows the airplane down. Drag is produced when air flowing over the plane causes friction. When the plane is flying, it must push oncoming air out of the way. As this air is pushed around the plane, it bumps into other air molecules.

Lift and thrust help to keep a plane flying. Gravity and drag work against it. We can’t do anything to change gravity, but we can try to minimize drag and increase thrust.

Name: _____

W.D.Y.D.

(WHAT DID YOU DO TODAY SHEET)

Aerodynamics – The Science of Air



STEM/STEAM AREA THAT I EXPLORED TODAY

STEM: Aerodynamics

TODAY'S PROJECT?

Design an airplane that will glide

What are the 4 forces of flight?

- | | |
|----|----|
| 1. | 2. |
| 3. | 4. |

Label the plane with the 4 forces of flight.

MATERIALS

- ✓ KNT Airplane Kit
- ✓ Color markers
- ✓ Rubber bands

