



Title: Stop Motion Animation

Program: Aviation Adventures - Extension Lesson

Grade: 1-2

Duration: 45 minutes

Objective: Students will use the glider designed in the previous workshop to create a stop motion animation movie that explains the forces of flight and how their ailerons function.

Materials per student:

- 1 smart phone or tablet (Apple or Android)
- 1 glider
- 1 sheet of poster board
- 10 sheets of construction paper (assorted colors)
- 1 pair of scissors
- 10 Pom-poms or cotton balls
- 5-10 Craft sticks
- 5-10 Pipe cleaners
- 5-10 Paper clips
- 2 Binder clips
- 10-20 Index cards
- 1 roll of tape (Scotch or masking tape)
- 1 set of coloring material (markers, color pencils or crayons)
- 3 feet of string or yarn

Background:

Stop motion animation is a film making technique that makes inanimate objects appear to move on their own. To make it work, you place an object in front of a camera and snap a photo. Then, you move the object a tiny bit and snap another photo. Repeat this process twenty to ten thousand times, play back the sequence in rapid progression, and the object appears to move fluidly across the screen.

A **glider** is a [fixed-wing aircraft](#) that is supported in flight by the force of air against its lifting surfaces, and whose [free flight](#) does not depend upon an engine.

Many **forces** act on aircraft in flight, but we're only going to focus on four today:





1. **Lift:** an upward force that is created by the effect of airflow over and under the wing. The difference in air pressure above and below the wing causes a net upward force on the aircraft.
2. **Weight:** the force of gravity attracting an object to Earth.
3. **Thrust:** a forward force that propels that aircraft through the air. Usually this is provided by an engine system.
4. **Drag:** the resistance of the atmosphere relative to the motion of the aircraft. It opposes thrust and limits airspeed. This is a form of friction.

Airplanes have streamlined shapes. This means that they fly through the air with minimal drag, which means that it takes less energy to fly through the air.

Ailerons are horizontal flaps in the middle of either wing. If they are moved in opposite directions, they can cause the glider to bank or roll to its side. If they are moved in the same direction, they can cause the glider to climb or descend at a steeper angle than it would otherwise.

The **rudder** is a vertical flap in the tail that can move from side to side. If the rudder is turned, air will push on it and steer the glider to the side.

Prep

1. Charge tech. (iPads, tablets or smart phones)
2. Download Stikbot Studio 2.0 to the mobile devices.
3. Create a materials table or make one bag of materials for each student.

Engage (10 min)

Today, we are going to use stop motion animation technology to recreate a simulation. You'll be utilizing your glider from the previous workshop.

Ask the students:

- Do you know what stop motion animation is?
- How stop motion animation works?

Explain: Stop motion animation is a film making technique that makes inanimate objects appear to move on their own.

- Images are captured in a sequence and then played back in quick succession to create the illusion of movement over time.
- Stop motion makes use of a still-image camera to capture a single image at a time.
- The character movement is then made before the next photograph in the series is taken. The movement itself is never actually captured — just the result of it.





- Then, when the image sequence is viewed at a high enough frame rate, the experience of movement is achieved.
- Reference: <https://blog.pond5.com/12735-stop-motion-animation-101-how-to-create-the-illusion-of-movement/>
- Play the example.

Ask students to explain how it works in their own words to make sure they understood. Then explain:

- To make it work, you place an object in front of a camera and snap a photo. You then move the object a tiny bit and snap another photo. Repeat this process twenty to ten thousand times, play back the sequence in rapid progression, and the object appears to move fluidly across the screen.

For this project, we will be using the Stikbot Studio 2.0 App in the iPads or your mobile devices to create the animation.

- You'll be working in pairs (or individually) and you'll be able to use one or both of the gliders you designed previously.
- You will discuss with your partner the story line for your animation. Remember, it needs to explain the forces of flight and how the ailerons work. You'll need to combine your ideas to have one design.
- After you have agreed to the scenario and the materials needed, each group can raise their hand, show the plan to the teaching team and get the materials to start working.

Let's talk about how to use the Stikbot Studio 2.0 app (demonstrate):

- Unblock the mobile device you will be using.
- Open the Stikbot Studio 2.0 app.
- Click on "Create Movie".
- The camera will come up. On the top, you'll see that for each second you will need 12 pictures.
- The camera will work the best if it's stable on a secure position, instead of moving it around every time you take a picture. The objects are the ones being moved.
- You can see the progress of your movie by clicking on the arrow to your right.
- **Step by step to create a stop motion animation:**
 - **Step 1:** Choose your characters. For this animation, your main character is your glider.
 - **Step 2:** Set your camera and light your scene. Your camera will be the one from the iPad. It's a good idea to set your camera in a fixed position to minimize the movement.
 - The goal is to have the camera angle remain consistent in each shot, while the character's position changes from one frame to the next.
 - **Step 3:** Capture an image, reposition your characters, and repeat.





- In order to achieve a smooth motion from one point to another, your character(s) should be repositioned by a consistent distance from frame to frame.
- The further a character is moved between increments, the faster it will appear to move when played back. Likewise, if it travels a shorter distance between increments, it will appear to slow down.
- In animation, the process of speeding up or slowing down is called ramping or cushioning.

Step 4: Play back the image sequence.

- Clarify all the student's questions before starting the activity.

Activity (20 min)

1. Talk with your partner about your ideas for the scenario for the simulation. Then, make a design (your story) for the animation. Remember that the main characters are your gliders.
 - a. Add the list of materials to your plan.
2. When your plan is approved by the teaching team, you can get the materials you need.
 - a. Having your plan approved means this means that you can explain the scenario, what materials you will use and how you'll create each movement.
 - b. Remember to be considerate with the materials, every group will use them.Share!
3. Find a spot in the classroom to start working on your project. Please use your communication and collaboration skills to solve any issue that you encounter.
4. Let's the students work for 20 minutes. The teaching team should walk around asking questions and helping with the tech.
5. Give times warnings.
6. When it's 5 minutes to the end of the session, ask students to clean. Ask them to put all their materials together and name them. Please check the floor and tables.

Wrap-up (5-10 min)

Have a brief discussion with the students where they can share their experience while creating the stop motion animation. Use the following guided questions:

- Were you able to follow your story line or did you make changes in the process?
- What was easy about creating a stop motion animation? What was hard?
- If you had more time, what would you change about your animation?
- Would you use stop motion animation to explain other STEM topics?





Storyboard

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Storyboard

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