

Lesson Plan for CAP Paper Airplane

Objective: To teach the four forces of flight and airplane control surfaces through the use of a paper airplane.

National Standards:(National Science Standards – Source: National Research Council)

Content Standard A: Science as Inquiry

- Abilities necessary to do scientific inquiry
- Understanding about scientific inquiry

Content Standard B: Physical Science

- Motions and Forces

Content Standard E: Science and Technology

- Abilities of technological design
- Unifying Concepts and Processes
- Evidence, models, and explanation
- Form and function

Materials:

CAP paper airplane pattern, scissors (optional)

Estimated Time: 20 minutes

Background Information: What forces act on an airplane?

There are four forces acting on an airplane in flight: lift, weight, thrust and drag.

We already know that lift comes from the wings. What about the other forces?

Weight is a force caused by gravity. You've felt gravity every time you jump. Gravity is what pulls you and everything else back down to the ground. This "pulling down" by gravity is what causes you to have a "weight" that you measure when you step on a bathroom scale. An airplane's weight also pulls downward on it - directly opposite to the lift force that is pulling the airplane up. It's like the lift and weight forces are playing a game of tug-of-war. One pulls in one direction and the other pulls in the opposite direction. For level flight, lift and weight must balance each other out. Thrust, caused by the airplane's

engines, is the force that moves the airplane forward. If an airplane did not keep moving, air would stop moving over and under the wings. Without this movement of air, the wings could not create lift, and the airplane would start to fall back to the ground!

Drag is the force that tries to slow down a moving object. To lessen the drag that an airplane feels, most airplanes are made more aerodynamic, or streamlined, to reduce the amount of drag they feel. A streamlined airplane has smooth surfaces and no bumpy sections, causing as little resistance to the air as possible. Just like lift and weight are opposite forces, thrust and drag are opposites to each other too. For an airplane to keep flying, its thrust must be bigger than its drag.

7. The adjustable flaps –

- Cut on sides
- Fold up to make the plane rise...fold down to make the plane drop

8. The stick-up tail

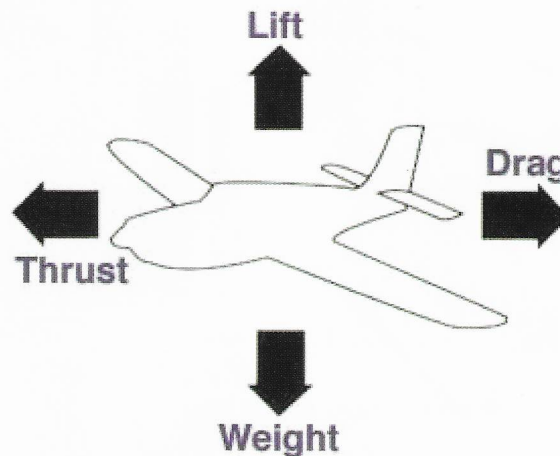
- Bring the two angled fold lines together

- Crease along the top

9. Throw briskly and slightly angled up.

Rationale: This lesson will teach students how an airplane moves through air using control surfaces and forces of flight.

Assessment: Have students identify the forces of flight and the surfaces that cause the airplane to change direction.



Procedure:

1. Flip the paper over so that the printed fold lines are facing down.
2. Fold the corners up along the outside fold lines and crease down. Repeat for the next set of folds.
3. Fold the nose back (for safety reasons).
4. Fold up along the center line so the lines and graphics are on the outside.
5. Finally fold down each wing and fold up the corner flaps.
6. Tape together nose, wing and aft fuselage for optimum performance.

