Week 6: Take Flight

Get blown away this week with the physics of flight. Flight is a balance of four forces: lift (up), weight (down), thrust (forward) and drag (backward). An airplane moves through the air based on the strength and direction of these four forces. These activities explore the different ways to fly parachutes, helicopters and planes.

experiment

FLY AWAY

Materials

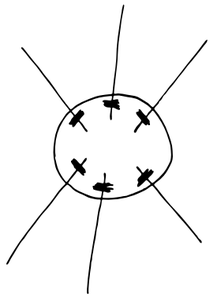
Parachute materials (coffee filters, fabric, tin foil, napkins, string, yarn, lightweight toys)

Tape

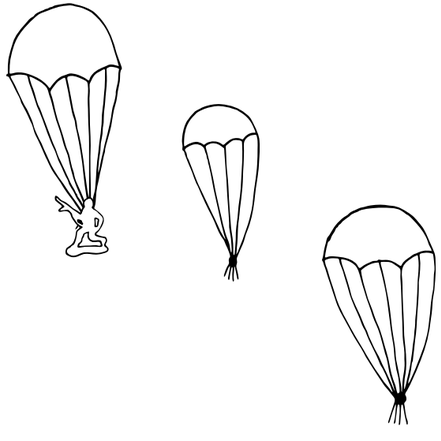
Paper clips

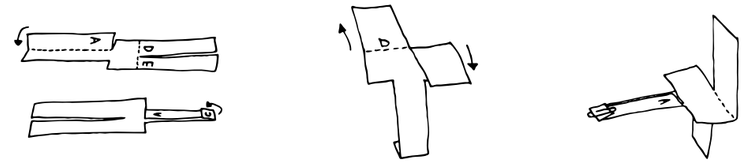
Scissors

Templates for paper airplane and helicopter (at msichicago.org/summerbrain)

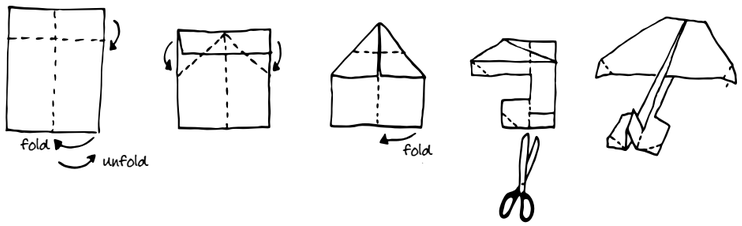


Part 1: Parachute – Have a variety of materials on hand so there's a lot of options to test. Try lightweight materials (like napkins, coffee filters or garbage bags) and tape four to six pieces of string or yarn to the underside of the parachute. Try securing a lightweight toy as a passenger. Drop the parachute from up high and see how long it takes to land. Experiment with materials, number and length of string, parachute sizes and other variables.





Part 2: Helicopter – Print the helicopter template and cut on the solid lines. Fold flaps A and B toward each other so they overlap. Fold flap C up. Fold flaps D and E in opposite directions to form the blades. Drop the helicopter and see how it flies. Experiment by adding paper clips to the stem, changing the shape or size of the blades or making the stem shorter.



Part 3: Plane – Print the plane template and decorate and personalize it. Fold in half lengthwise and unfold. Fold the top down and fold the corners in to the center. Fold the point down to meet the edge made by the folded corners. Fold the plane in half (image on the outside) and cut on all solid lines. Fold wings and horizontal stabilizers down so they're perpendicular to the plane body. To make loops, bend the ailerons down and elevators up and launch straight up. For rolls, bend both ailerons and elevators up on one side and down on the other and launch straight ahead.

What's happening?

Air has mass and takes up space. When you drop a parachute or helicopter, or launch a plane, they push the air around them out of the way in order to move. By experimenting with the weight, shape and size of your aircraft you change how fast and how much air is pushed out of the way, which affects how they move.

Tips

Make sharp creases when folding planes and helicopters.

More ways to play with flight

Go fly a kite! A kite flies when all forces—lift, weight, thrust and drag—are balanced.

Challenge what you know about flight by trying to launch an airplane from a conveyor belt in *MythBusters: The Explosive Exhibition* at MSI.

Learn more with NASA's beginners guide to aerodynamics at grc.nasa.gov. WWW/K-12/airplane.

Game on!

Make a helipad (or download our template at msichicago.org/summerbrain) and try to get your parachute to land on it. Give your parachute some extra oomph and launch it with a hair dryer set on cool (make sure the parachute doesn't touch the hair dryer).

Helicopter Template

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Helipad

Paper Airplane

fold on dotted lines

aileron (roll)

aileron (roll)

cut on solid lines

fuselage

horizontal stabilizer

horizontal stabilizer

vertical stabilizer

elevator (pitch)

elevator (pitch)

rudder (yaw)

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Design based on the "Mockingbird" found in "Best Ever Paper Airplanes" by Norman Schmidt (Sterling Publishing)

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