SUMMER AT THE LIBRARY
Join Us on a Journey of Discovery!

Grades 3–5
Journey to Invention
Flying Around

Children will construct a model of a helicopter that is powered by a rubber band to learn and apply the basic knowledge of aeronautics (lift, gravity, thrust, and drag) and operations of a helicopter.

What Will You Learn?
- Importance of energy
- Operations of a helicopter
- Basic aeronautics

Materials:
- Helicopter template
- Propeller
- Craft stick
- Paperclips
- Rubber bands
- Colored cardstock

Instructions:
1. Fit the propeller snugly on the end of the craft stick.
2. Pull the inside bend part of the paperclip away from the rest of the clip.
3. Hold the paperclip flat against the craft stick with the tip of the thumb, then tightly wrap a piece of masking tape around it.
4. Using a template, trace and cut out the helicopter body on cardstock. Take a few minutes to decorate your helicopter body.
5. Attach the cutout with tape to the craft stick on the opposite side of the standing paperclip.
6. Put your fingers inside the rubber band and stretch it. Slip the rubber band onto the propeller hook and then onto the paperclip. Do the same with the second rubber band.
7. Hold the middle of the craft stick with one hand and wind the propeller with the other hand. Keep winding until both rubber bands are tightly coiled.
8. Release the helicopter into the air and watch it fly!

**Reflection Questions:**

- What parts of your helicopter are similar to the real-world version?
- What were some of the challenges you discovered along the way?
- What was your favorite part of this activity?

**Explanation:**

- Energy is stored in the rubber band by winding the propeller. When flown, the rubber band rapidly releases its energy by unwinding, which turns both the propeller blade and the paper cutout. The paper cutout pushes against the surrounding air, which creates horizontal air resistance, or drag. This makes it harder for the cutout to spin. Because the cutout does not spin as easily, more energy from the rubber band is released into the propeller, which is much easier to turn. In this way, the paper acts like the rear rotor of a real helicopter. As the propeller spins rapidly, it begins to create lift by pushing air downward. With enough energy, the helicopter will fly in whatever direction it is pointing.
Further Reading Recommendations:

- [Image of book cover: Astrophysics for Young People in a Hurry by Neil deGrasse Tyson]
- [Image of book cover: Helicopters: First Flight by Neil deGrasse Tyson]

Borrow these books and more: [borrow.nypl.org](http://borrow.nypl.org)
Helicopter Template

Instructions

1. Cut out the helicopter below.
2. Trace that paper cutout on your piece of cardstock.
3. Then, cut out your cardstock helicopter. This is what you will use to make rubber band powered helicopter.
4. If you make a mistake, you can trace a second helicopter on to your cardstock as long as you hang on to your paper template.