



# Paper Helicopters

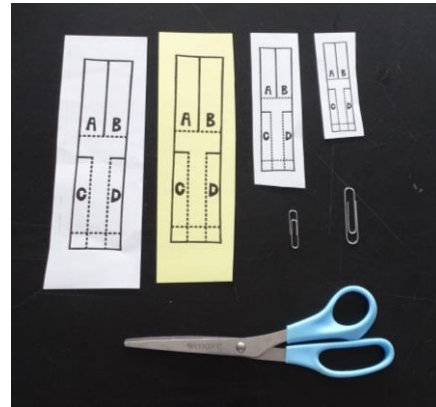


## Materials: Included in Kit:

- 3 Paper Helicopter Templates of Different Sizes (1 large, 2 medium, 2 small)
- 1 Cardstock Paper Helicopter Template (large)
- 1 Large Paper Clip
- 1 Small Paper Clip

## You Will Also Need:

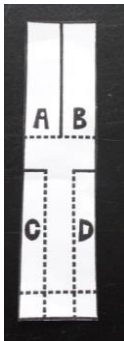
- Scissors



## Making and Using the Paper Helicopter:

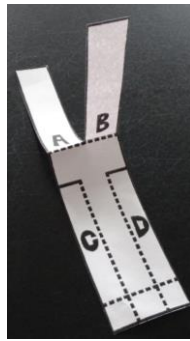
### Step 1:

Take the large paper helicopter and cut it out along the outer solid lines.



### Step 2:

Cut the solid line between A and B.



### Step 3:

Fold back flap A in one direction and flap B in the opposite direction.



### Step 4:

Cut the small solid lines above C and D.

### Step 5:

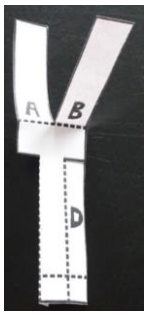
Fold back flap C along the dotted line, then fold flap D along the dotted line.

### Step 6:

Fold the small flap below C and D up along the dotted line and add one of the paper clips.

### Step 7:

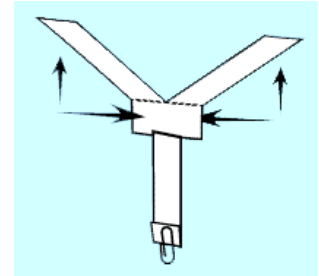
Test your helicopter out by dropping it or throwing it up into the air.



### What's going on?

When the helicopter falls, air pushes up against the blades, bending them up just a little. When air pushes upward on the slanted blade, some of that thrust becomes a sideways, or horizontal, push.

Why doesn't the copter simply move sideways through the air? That's because there are two blades, each getting the same push, but in opposite directions. The two opposing thrusts work together to cause the toy to spin.



“The twirling seeds of maple trees spin like miniature helicopters as they fall to the ground. Because the seeds descend slowly as they swirl, they can be carried aloft by the wind and dispersed over great distances. Just how the seeds manage to fall so slowly, however, has mystified scientists.” You can read more about this here:

“Maple Seeds and Animals Exploit the Same Trick to Fly.” *California Institute of Technology*, <https://www.caltech.edu/about/news/maple-seeds-and-animals-exploit-same-trick-fly-1540>.

### Experiment:

Experiment by making the medium and small helicopters. What happens when the size changes? You can also fold flaps A and B differently to see how it changes the flight. Make the helicopter with the cardstock paper. Does the flight change? Try the larger or smaller paper clip to see how mass affects the helicopter. You can also make your own templates with a ruler and create one that has longer or shorter wings.

### Follow this link to watch a video on how to make your Paper Helicopter:

[https://vod.video.cornell.edu/media/Take+and+Make+-+Paper+Helicopters/1\\_tnenjq7t](https://vod.video.cornell.edu/media/Take+and+Make+-+Paper+Helicopters/1_tnenjq7t)

*Cornell Center for Materials Research (CCMR) works with families to improve the quality of STEM programs. The funding from the National Science Foundation enables CCMR to provide resources for the Take and Make STEAM kit program.*

*You can help out by taking a short, anonymous survey using the link below:*

[https://cornell.ca1.qualtrics.com/jfe/form/SV\\_ehXj6hCQQFNaL2K](https://cornell.ca1.qualtrics.com/jfe/form/SV_ehXj6hCQQFNaL2K)

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*Adapted from the Exploratorium Teacher Institute*

[https://www.exploratorium.edu/science\\_explorer/roto-copter.html](https://www.exploratorium.edu/science_explorer/roto-copter.html)