



At-Home Science

Experiment: Paper

Helicopters

Images and content courtesy of Exploratorium

Time: 45 minutes

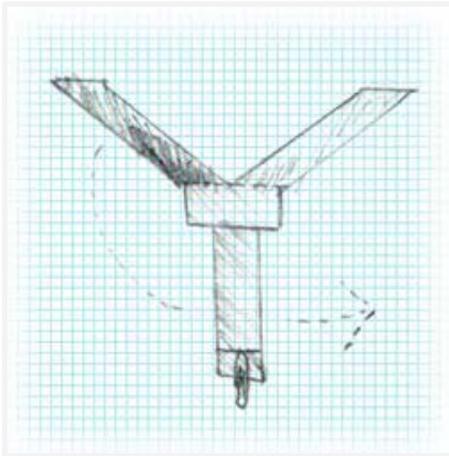
Grouping: Individuals

Vocab:

Gravity- the force that pulls the helicopter toward the earth.

Drag- the air resistance to the downward motion of the helicopter.

Thrust- what is produced if you throw the helicopter downward instead of dropping it. This force counteracts drag.

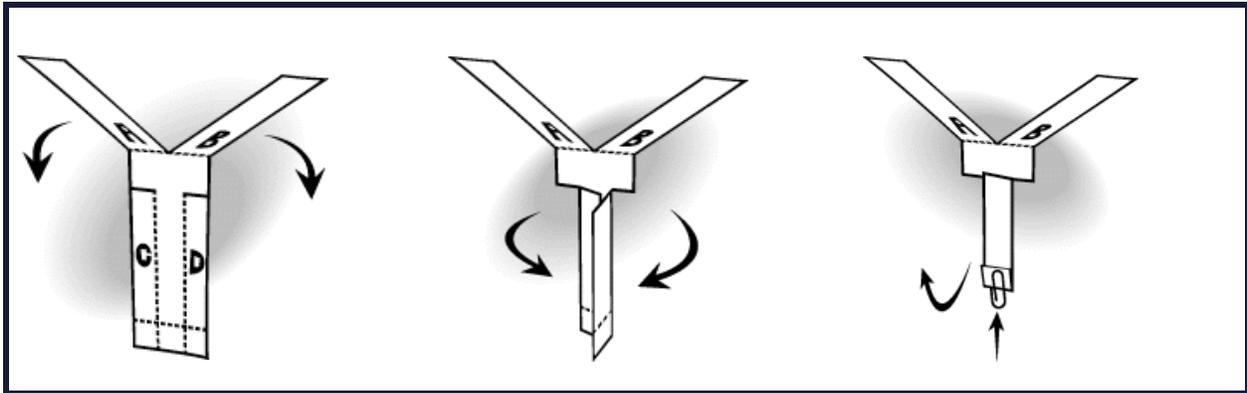


Materials:

- Helicopter sheet w/patterns
- Paper clips
- Scissors

Procedure:

1. Cut along all of the solid lines of the helicopter pattern.
2. Fold the lower sections (C & D) toward each other along the dotted lines.
3. Hold the folded sections and place a paper clip at the end. Use a paperclip to fasten the lower sections together.
4. Fold the top blades (A & B) in opposite directions.



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5. Hold the helicopter high above your head, with the blades on top and the folded section with the paper clip pointing down. Release!
6. For further testing and investigating, you can also stand on a stool or take your helicopter to the top of a set of stairs and drop it.
7. **BONUS:** Put a basket down to use as a target. Can you drop your helicopter so that it lands in or near the target?

Other Ideas:

- Use different weights of paper. Some have found that stiff paper, like that of a manila folder, made the best helicopters.
- Try different size helicopters and see if size influences the spinning or rate of drop.
- Try shaping your blades or using different amounts of weight. You can also try uneven blades.

Questions for Expansion:

- Did the helicopter rotate clockwise or counterclockwise?
- How can you make it rotate in the opposite direction?
- Does the height you drop it from affect its flight? (the speed that it falls, speed it spins, or the flight path?)
- How does the weight (paperclips) affect the flight?

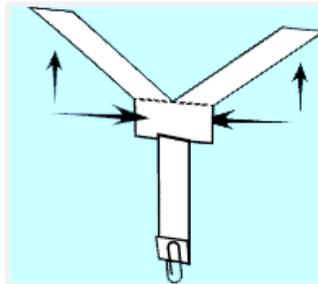
Science in Action:

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.

Q: Why doesn't the copter simply move sideways through the air?

A: Because there are two blades. Each gets the same push but in opposite directions. The two opposing thrusts work together to cause the toy to spin.

Next time you drop your copter, notice which direction it spins as it falls. Is it clockwise or counterclockwise? Now bend the blades in the opposite directions and drop the copter again. Now which way does it spin?



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