


BE A STEM GIANT



A STEM Alliance Program

ENGINEERING: LET'S GO FLY!

Description:

To learn how airplanes fly, we need to look at the effect that moving air has on objects. Let's make a rotocopter to demonstrate the four forces of flight: lift, gravity, thrust and drag.

Materials:

- Rotocopter Template
(See page 2 and print)
- Paperclip
- Scissors

BONUS ACTIVITY:

Build your own [WIND TUBE](#), then construct and test "flying machines" made of recycled materials!

The STEM Alliance is dedicated to growing the next generation of STEM GIANTS.

Learn more:

www.theSTEMalliance.org



Creating a network of STEM learning opportunities!

DIRECTIONS TO MAKE A ROTOCOPTER:

NOTE: Solid lines are for cutting, dotted lines are for folding. We gave you 2 rotocopters just in case you make a mistake. Be careful not to cut more than the exact SOLID lines.

1. Cut out the rectangular rotocopter, cutting only the **SOLID** lines around the edge.
2. Next, cut on the **SOLID** line between Wing A and Wing B.
3. Finally, cut on the small **SOLID** lines over Panel X and Panel Y.
4. Fold Panel X back, then fold Panel Y back so it's covering the "X"
5. Next, fold Panel Z up so it's on the back with Panel Y and put your paperclip over Panel Z to give your rotocopter some weight.
6. Fold Wing A back on the dotted line.
NOTE: This fold will be on a slight angle
7. Next fold Wing B forward on the dotted line. This will be a bit more difficult to see because the dotted line will be on the underside of the paper.
NOTE: This fold will also be on an angle.
8. Hold the rotocopter at the paperclip and give it a light shake to spread the wings.

TESTING YOUR ROTOCOPTER:

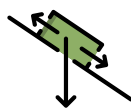
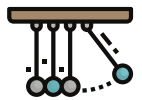
Hold the rotocopter by the paperclip, swing your arm back and toss it high in the air. Watch your rotocopter spin down and try it from different heights (for example, the top of a staircase.) Experiment with different size paperclips to see how different weights affect your rotocopter's flight.

HOW IT WORKS: THE 4 FORCES OF FLIGHT



GRAVITY (weight): What goes up, must come down!

THRUST (a force or a push): By swinging your arm back and then tossing the rotocopter, you create the power to move the object.



DRAG (friction or pressure): An object in motion will be slowed down by friction from air pressure (which is why your rotocopter glides down instead of just falling to earth.


LIFT (an upward-acting force): The bent wings of the rotocopter are lifted by the air flow created by the thrust. This causes the rotocopter to stay in the air longer.



Learn more about the 4 Forces of Flight from Smithsonian Air & Space Museum [HERE](#)

Rotocopter Templates

Wing A Wing B



THE **STEM** ALLIANCE


X

www.theSTEMalliance.org

Y

Z

Wing A Wing B



THE **STEM** ALLIANCE

X

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Y

Z