

# PAPER AIRPORT

## Concepts Illustrated:

(1) Different flying apparatus designed out of paper.

**Time Requirements:** 60 minutes

**Grade Level of Audience:** These activities are suited for kids of all ages

## **I. Materials and Equipment Utilized**

(Materials needed for a group of 20 students)

1. 5 rolls of scotch tape
2. copy paper
3. 20 scissors
4. various patterns and templates
5. Kleenex
6. string
7. garbage bags
8. clothes pins
9. coins for stabilization purposes.

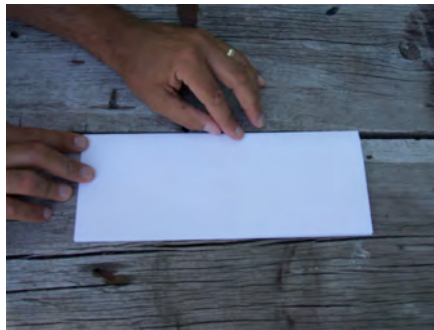
## **II. Description of Set-up and/or Construction of Apparatus**

1. Airplanes: (These are great airplanes with complete instructions and templates)

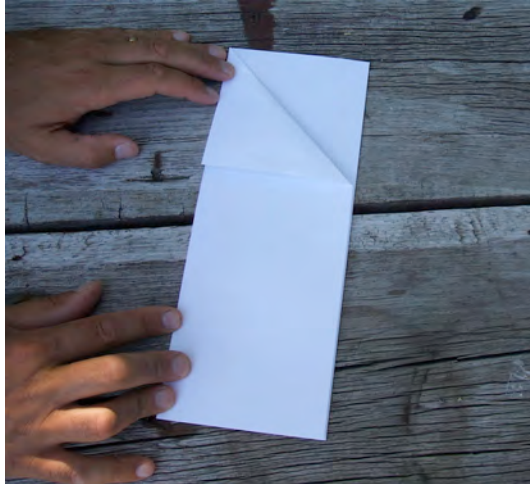
[www.funpaperairplanes.com/Plane%20Downloads.html](http://www.funpaperairplanes.com/Plane%20Downloads.html)

Paper Plane Model #1 (Courtesy Science in Flight...Classic Design)

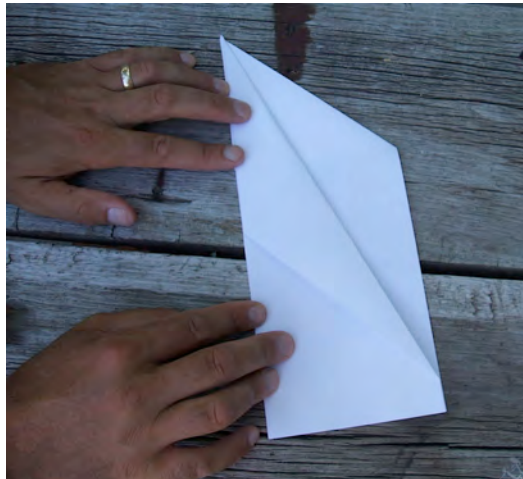
- Take an 8- ½” x 11” sheet of paper, fold it in half lengthwise. Make sure the folds are sharp, crisp, and precise.



- Fold the short edge of one side down to the first fold (producing a 45° angle). Repeat for the other side.



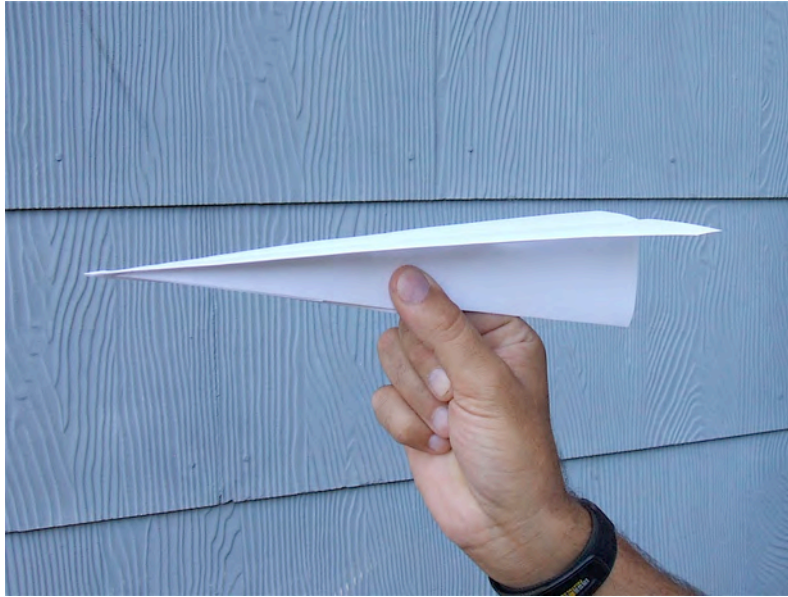
- Fold down the new fold you have created to the original fold down the center. Repeat for the other side.



- Fold down the new fold you have created to the original fold down the center. Repeat for the other side.



- Hold center and open wings out. Now throw!



Paper Plane Model #2 (Courtesy AvKids)

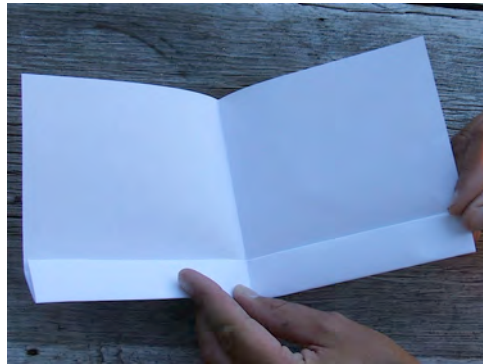
- Take an 8- 1/2" x 11" sheet of paper, fold it in half lengthwise and open it flat again.



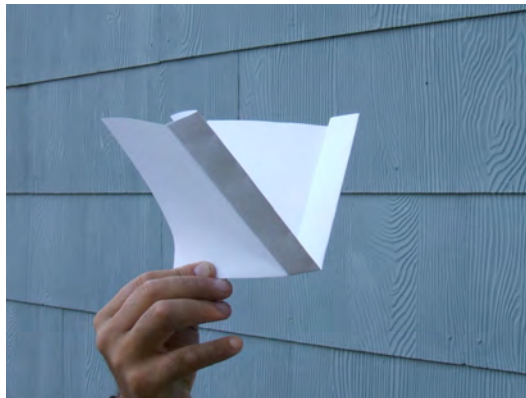
- Fold the bottom edge to the middle crease. Fold it again making four thicknesses.



- Crease the folded part at its midpoint, causing a slight angle in the wing.



- Hold at the back of the wing and launch with a gentle forward thrust.

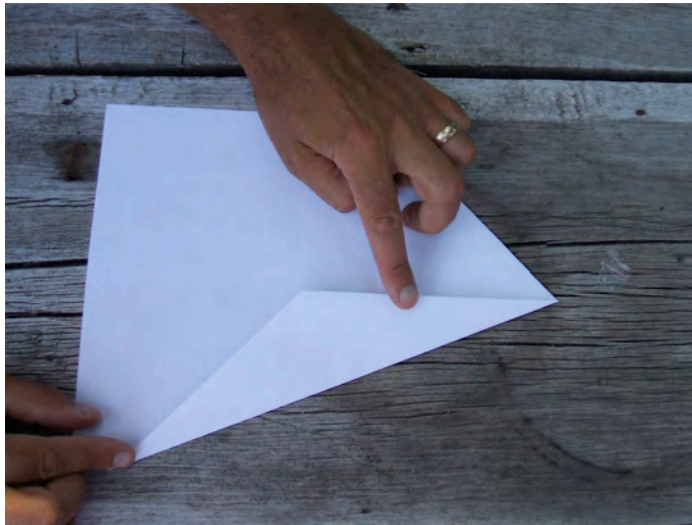


### Paper Plane Model #3

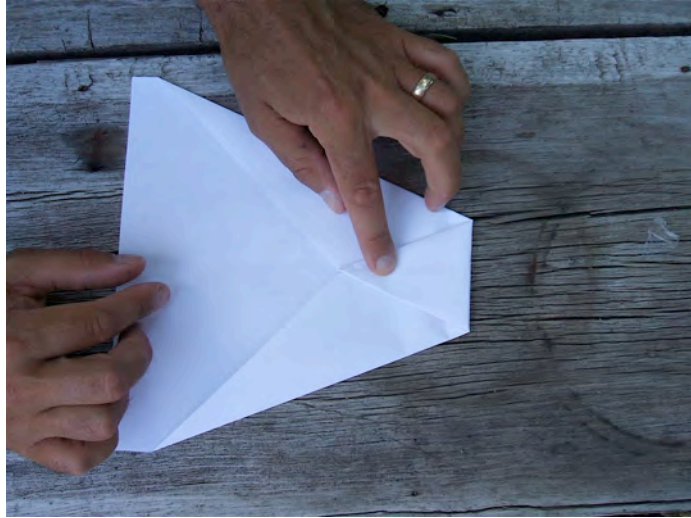
- Fold the top left and top right corners, such that, they meet at the mid-line of the 8-1/2" x 11" sheet of paper.



- Fold the left and right folds over again, such that, they again meet at the mid-line.



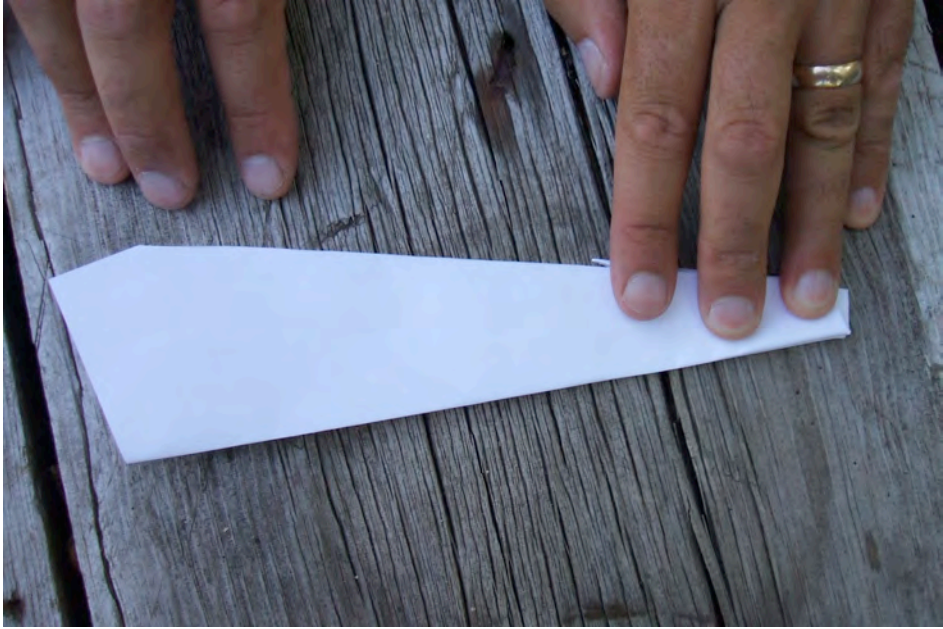
- Fold the tip down, such that, the tip ends up at the vertex of the other two sides.



- Flip the paper over and fold the left side to the right side, such that, the outside edges of the wings line up.



- Fold the wings down, such that, the outer edge of the wing lines up with the base of the center section. Cut two slits, one inch apart, along the back edge of each wing for elevator adjustments. You can add wing dihedral by tilting the wings slightly upward. Now, you are ready to fly.



## 2. Flying Cylinders/Tubes

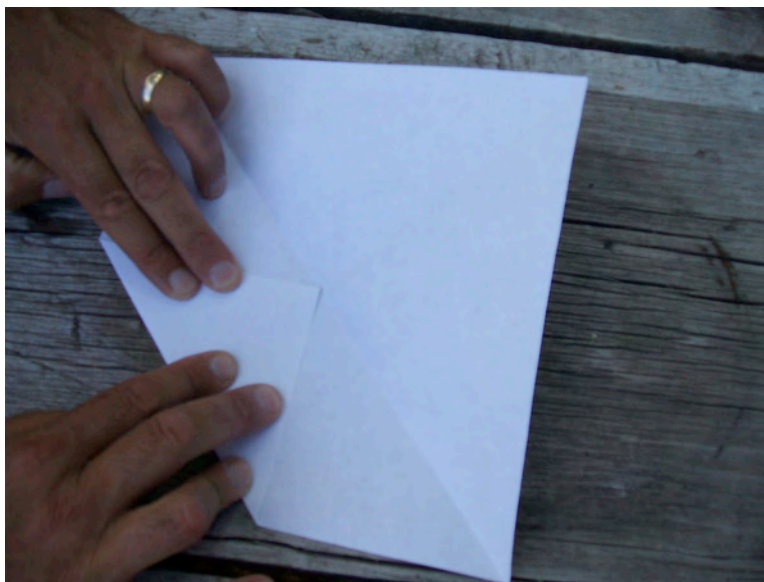
### Tube Plane (Courtesy AvKids)



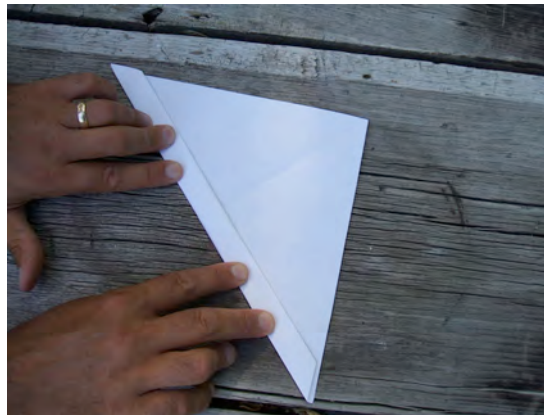
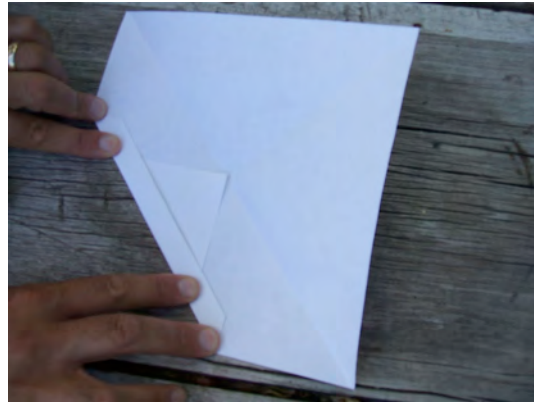
- Fold a piece of 8- 1/2" x 8- 1/2" paper diagonally to find the center point.



- Open the paper and fold one corner to the center point.



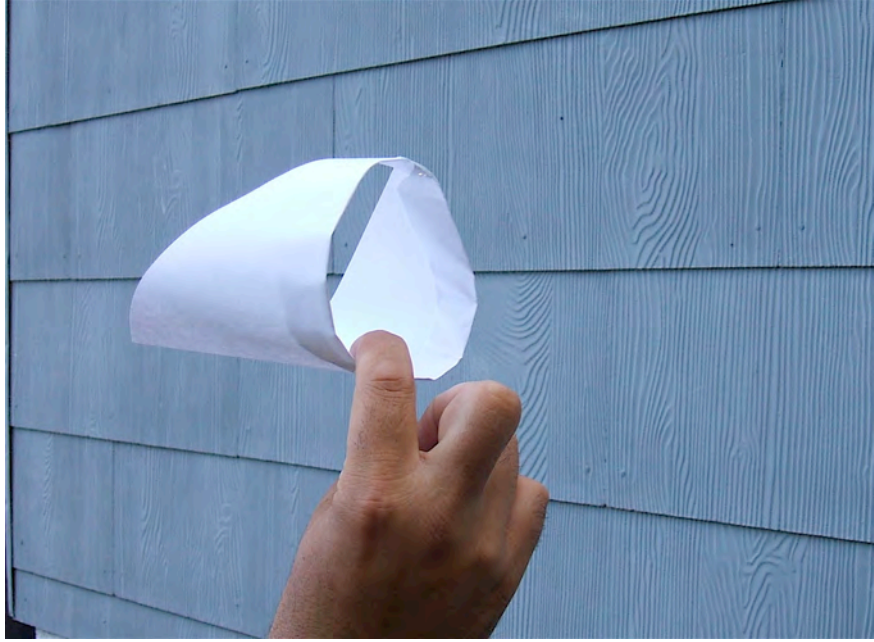
- Continue folding this side to the center using 1.0 cm folds.
- Fold once more past the centerline.



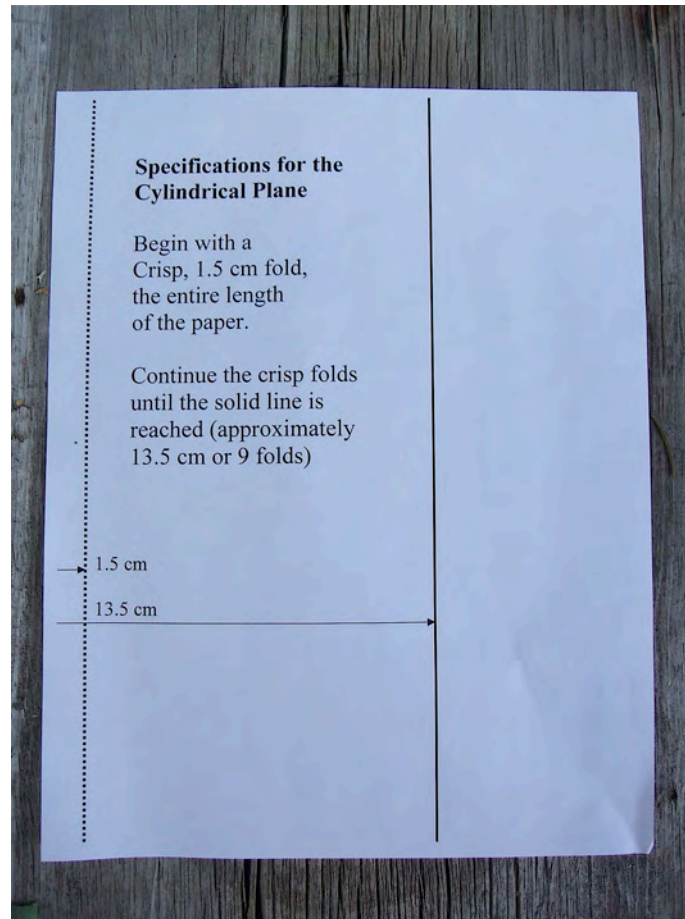
- With the fold up, run the paper over the edge of the table several times to establish a curve. Tape the overlapped ends to form a tubular structure.



- Pinch at the folded end and gently toss.



### 3. Cylindrical Plane



- Fold the long edge of a 8- 1/2" x 11" piece 1.5 cm in from the edge. Firmly crease this fold.



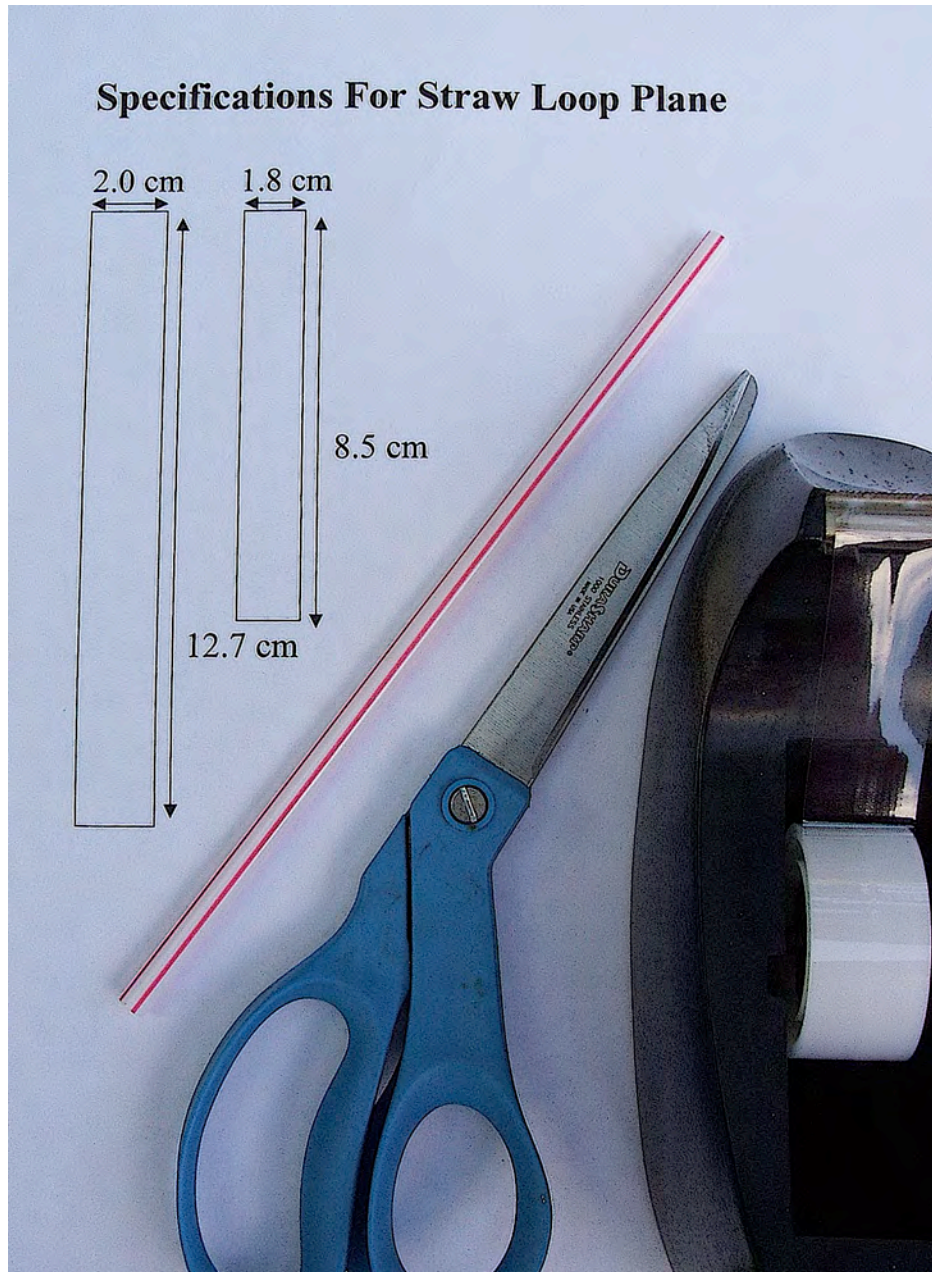
- Take the 1.5 cm fold and continue to fold it over itself until you have made nine – 1.5 cm folds. Make sure you firmly crease each fold.
- With the fold up, run the paper over the edge of the table several times to establish a curve. Tuck one edge of the folded lip into the other edge of the folded lip to form a cylindrical structure. Apply cellophane tape along the seam to hold the cylinder together.



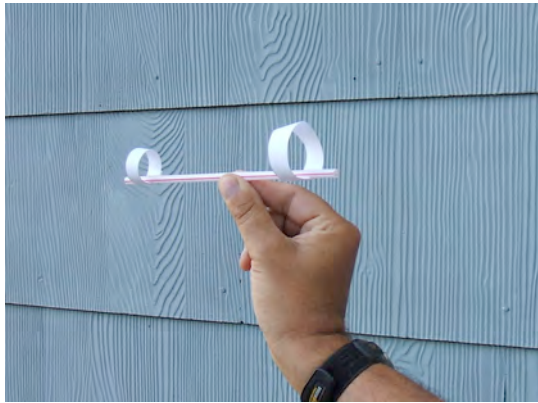
- Grip the cylinder with the thick rim facing forward and throw like a football (giving the cylinder a spin).



### 3. Straw Loop Planes (Courtesy AvKids)

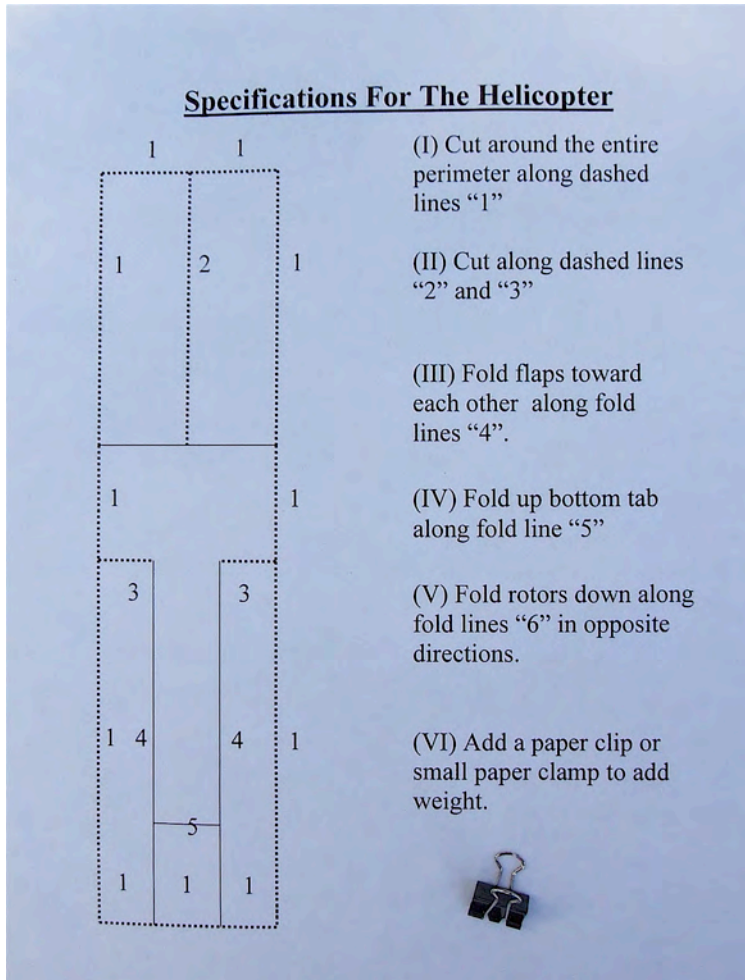


- Cover both ends of a straw with pieces of tape
- Cut out two rectangular pieces of paper (one is 2 cm x 12.5 cm, and the second is 2 cm x 8.5 cm). Loop each piece of paper and secure with cellophane tape.
- Tape the small loop about  $\frac{1}{2}$ " from one end of the straw and the large loop about  $\frac{1}{2}$ " from the other end of the straw.

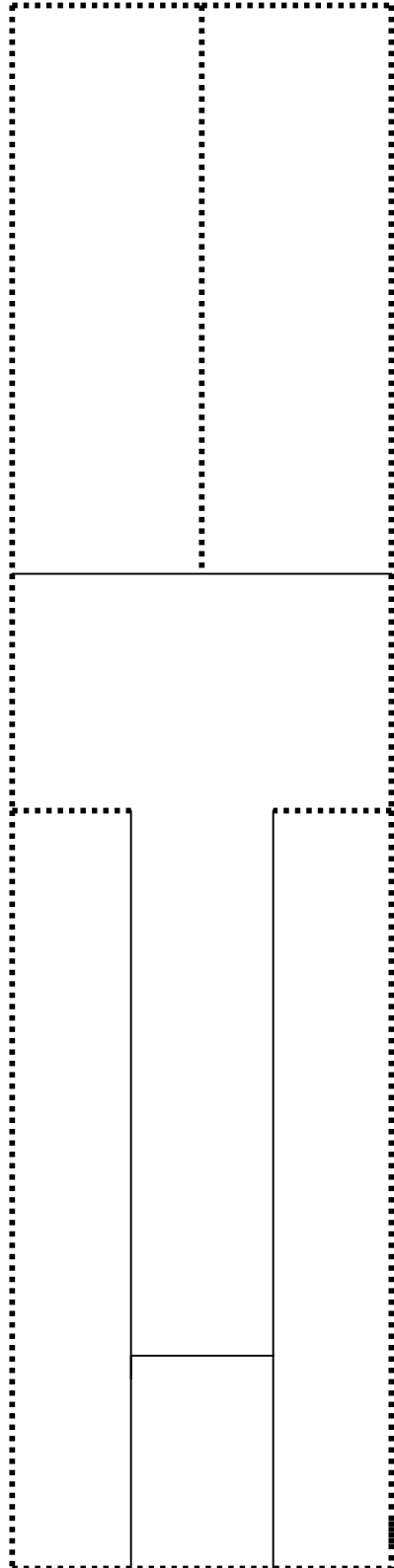


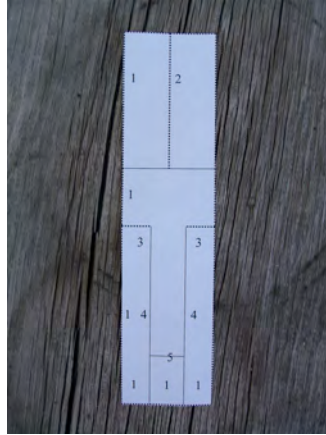
4.

➤ Duplicate or construct the template shown below.

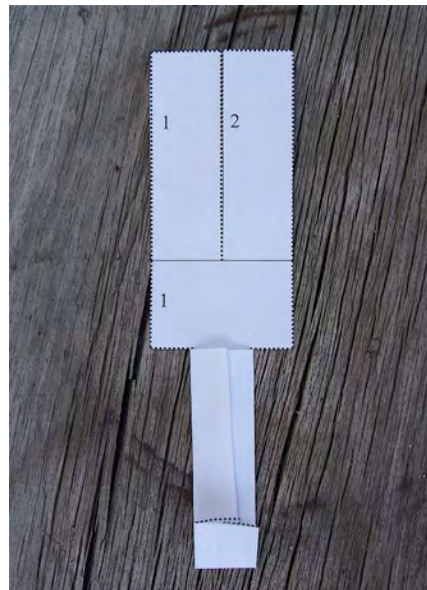


➤ Cut around the entire perimeter along dashed lines "1".

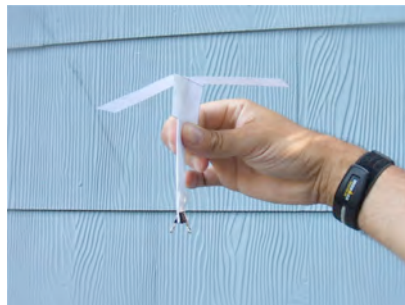




- Fold along dashed lines “2” and “3”. Fold flaps towards each other along fold lines “4”. Fold up bottom tap along fold line “5”.



- Fold Blade 1 back and Blade 2 forward.



- Add paper clips to vary the helicopter behavior.

## 5. Parachutes

### Version #1 (*Courtesy AvKids*)

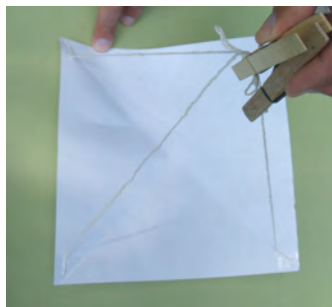
- Bring the handles of a plastic grocery bag together and secure with a clothespin or a large paper clip



- Drop the grocery bag/clothespin combination with the bag first crumpled up. Make sure the clothespin falls first. Observe the descent of the clothespin
- Next, fully open the parachute and observe the descent of the clothespin.

### Version #2 (*Courtesy Einstein Science of Flight Kit*)

- Create parachutes that vary from a full sheet of paper to a half sheet of paper to a quarter of a sheet of paper.
- Tape the ends of one string to the same side of the square, attaching it to each corner on that side. Then, take a second string and attach it to the other side at each corner. See the diagram below.

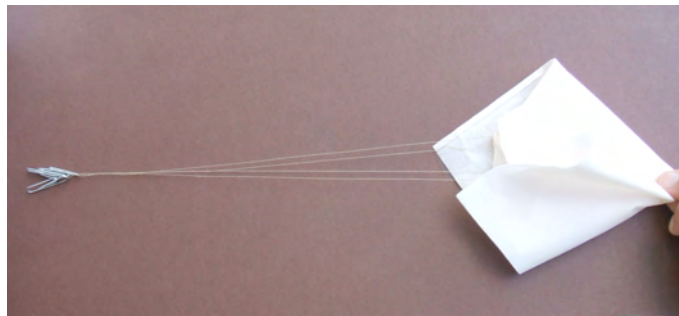




- Gather the middle of the two strings and tie a knot at the bottom. Attach paper clips to the ends of the strings.
- How does a parachute work?

Version #3 (*Courtesy EAA Museum Education*)

- Completely unfold a Kleenex.
- Tape one piece of string to diagonal corners of the unfolded Kleenex. Tape a second piece of thread diagonally between the remaining corners of the unfolded Kleenex.
- Hang a paperclip where the two pieces of thread meet in the middle of the Kleenex.



- Compare the rate of fall for a dropped paperclip to the rate of fall for a paperclip attached to the parachute.

