

## Elementary Engineering Activity Bag 2

# Taking Flight: Student Activity Guide

You have been hired by an airplane company to design and build two new planes. The company wants you to make an airplane that can travel far and do tricks. When designing a new plane, engineers follow the steps of the engineering design process. Engineers design and test many models before building a real airplane. Today, you will follow the engineering steps to design and test a plane that travels far and does tricks.

### Materials From The Bag

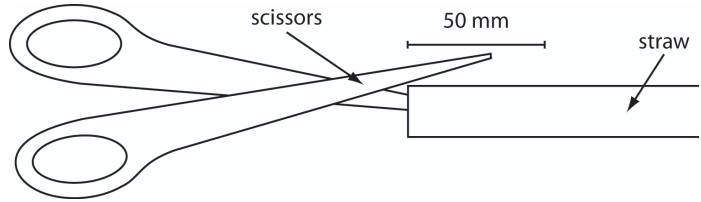
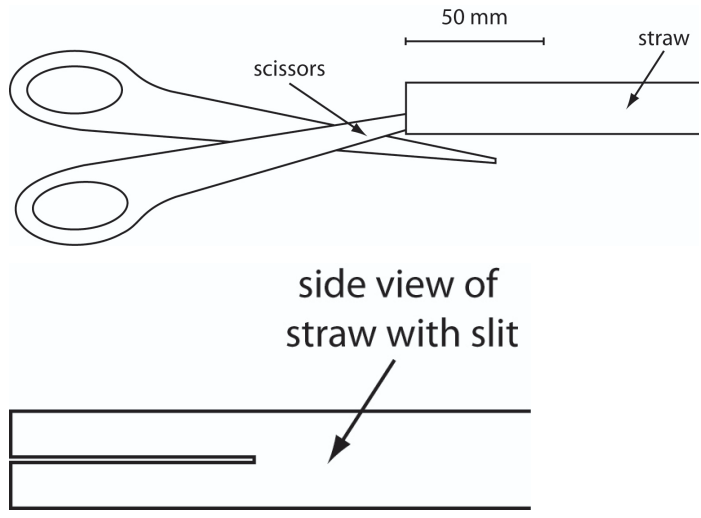
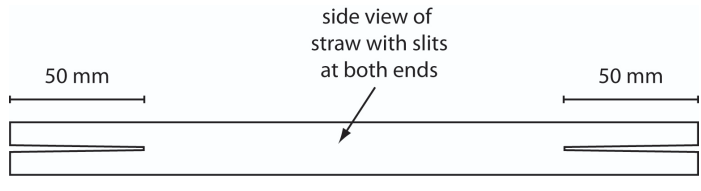
- Measuring Tape
- Large Straw
- Modeling Clay
- Chipboard

### You Will Supply These Materials

- Scissors
- Pencil

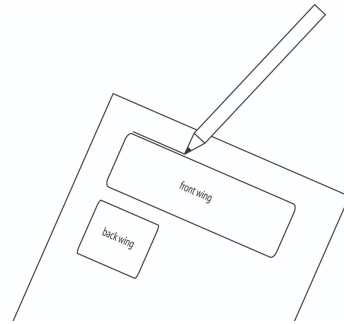
### Part 1: Airplane Prototype

A prototype is a basic design that you can improve.

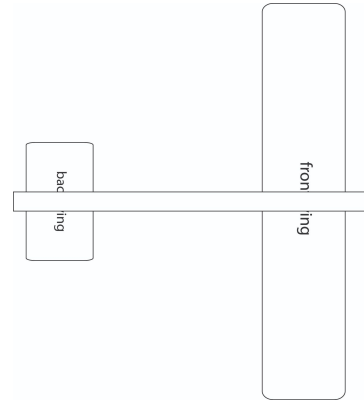
<p>1. Take a large straw, place one of the scissor blades inside one end of the straw, and cut the straw about 50mm (about the length of your thumb).</p>	
<p>2. Place the other blade into the <b>SAME</b> end and cut the straw directly below the first cut. The cut should be about 50mm. The straw can now open up.</p>	
<p>3. Repeat steps 1 and 2 on the <b>OTHER</b> end of the straw. Try to make the two slits line up as if they were both cut along a single straight line.</p>	

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4. Find the front and back wing patterns on page 3. Cut out the wing patterns. Trace both wing patterns onto the chipboard and cut them out.



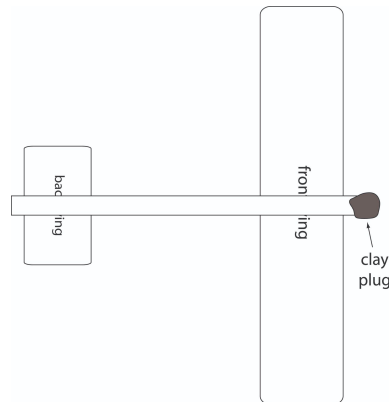
5. Slide the front wing into the slit at one end of the straw. Slide the back wing into the slit at the other end of the straw.



6. Take a ball of clay about the size of a marble and place it on the end of the straw near the front wing. Make sure the clay covers the hole in the straw.

This is your “prototype” plane.

Before you practice flying your plane, check with an adult.



### Part 2: How Far Can Your Plane Travel?

Your first challenge is to fly your plane as far as you can.

1. Fly your prototype plane as far as you can.
2. Use the measuring tape to measure the farthest flight your plane flew. Measure from where you threw it to where it landed.
3. It is ok if this prototype plane doesn't go far. Change your plane to make it fly farther. Be creative. You do not have to use the wing templates. You can make other wing shapes you think will work better. You can place slits for the wings anywhere you want. You can place larger or smaller amounts of clay anywhere you want. *How far did your plane fly?*

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4. Draw your final design. *What is different from the prototype? What did you change in your design that made the plane fly further?*

### **Part 3: Make Your Plane Do Tricks!**

Your next challenge is to see if you can build a plane that does tricks.

1. Try to get the plane to do any of the following tricks:
  - A loop
  - A spiral
  - Turn left or right
  - A trick that you design
2. It is ok if your plane does not do any tricks at first. Some of the tricks are hard. Continue to change your plane and keep trying. *What tricks were you able to get your plane to do? Which trick was the hardest to complete? What did you change in your design that made the plane do a trick?*

**When you are done with your clay, place it in the plastic bag for the other activities. Save your measuring tape for the other activities.**

## **Wing Patterns**

front wing

back wing