



The material used to build a plane is very important. If the material is too flimsy, the wings will fold and the plane will fall. If the material is too heavy, the wings will not be able to hold the weight of the plane. If the material is not flexible, the body of the plane will bend and crumple. Using the materials listed here, make a plane that will fly for long distances and land without too much damage.

Materials

Typing paper
Tissue paper
Card stock
Paper towel
Aluminum foil
Metric ruler
Blunt-end scissors
Masking tape
Marker
Meter (or yard) stick
Tape measure (optional)

NOTE: This activity should be done outside, in a gymnasium, or in a large empty hallway where there are no breakable objects. You will need a flight path that is about 5 meters (about 5½ yards) long.

SAFETY! SAFETY: Be sure to follow Milli's Safety Tips and do this activity only with adult supervision! Eye protection should be worn by everyone doing this activity.

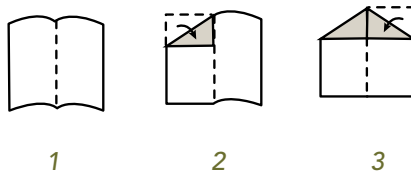
Procedure

Make the Planes

1. Use your ruler and scissors to trim the sheets of typing paper, tissue paper, card stock, paper towel, and aluminum foil so that they measure 216 X 280 mm (8½ X 11 inches). It is important that the different pieces of material be the same size.
2. Fold each piece of material into a plane by following the diagram "Folding an Airplane". Be sure to make each one the same way.

Folding an Airplane

1. Fold the sheet in half vertically, and then reopen it.
2. Fold the top left corner of the page down until it meets the middle fold.
3. Fold the top right corner of the page down until it meets the middle fold.
4. Fold the left corner of the page down until it meets the middle fold to form a wing flap.
5. Repeat with the right corner.
6. Fold the tip down so that it meets the point made by the wing flaps.



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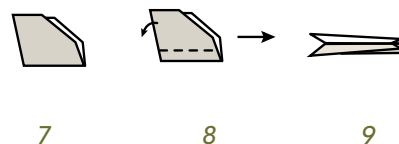


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7. Fold the plane in half along the center crease.
8. Fold each side down to form two wings. You should make your fold approximately 1 cm from the bottom of the plane (see dashed line below).



7

8

9

Test the Planes

1. Ask your adult partner to help you find an area outside, a large room like a gymnasium, or a hallway that you can use as a flight path for your planes. You will need a straight path that is about 5 meters (about 5½ yards) long.
2. Mark one end of your flight path with a piece of masking tape. Using the marker, write "Start" on the tape. This is where you will stand to test your planes.
3. Use your meter stick to measure 1 meter from the start. Mark this spot with masking tape and write "1 meter" on the tape.
4. Repeat step 3 measuring 2, 3, 4, and 5 meters. Use the masking tape and marker to label each position. Alternatively, you can use a long measuring tape to mark the flight path.



- Put your toes on the piece of tape marked "Start", and throw the plane made out of typing paper as straight down the flight path as you can. Measure how far the plane went and record the results in the "What Did You Observe?" section. Did the plane crumple when it landed, or does it still look the same? Write your answer in the space provided in the "What Did You Observe?" section.
- Repeat step 5 with each of the other planes, and write down your answers in the "What Did You Observe?" section. Try to launch each plane the same way. For safety reasons, never fly a plane with a pointed tip.

Where's the Chemistry?

Each of the materials that you used to make your planes behaves differently. Some of the materials that you used to build your planes are very light. These materials would be good for planes that need to fly a long way on little fuel. However, they might not be rugged enough for rough weather or violent winds. Some of the materials that you used were very heavy and strong. Planes made of these materials would be strong but would need a lot of fuel to stay in flight. They probably could not go as high as the lighter planes. The plane that you made out of aluminum foil probably crumpled when it landed, so it might not be

good for repeated flights without reinforcement. Commercial airliners are made from aluminum but have an inner skeleton to make them stronger. Can you think of any other materials that you could use to make an airplane?



What Did You Observe?

Plane (material used)	Distance traveled	Appearance after flight
Typing paper	_____ meters	
Tissue paper	_____ meters	
Card stock	_____ meters	
Paper towel	_____ meters	
Aluminum foil	_____ meters	

Which plane flew the farthest?

Which plane crumpled when it landed?

Which plane flew the straightest?



The American Chemical Society develops materials for elementary school age children to spark their interest in science and teach developmentally appropriate chemistry concepts. The *Activities for Children* collection includes hands-on activities, articles, puzzles, and games on topics related to children's everyday experiences.

The collection can be used to supplement the science curriculum, celebrate National Chemistry Week, develop Chemists Celebrate Earth Day events, invite children to give science a try at a large event, or to explore just for fun at home.

Find more activities, articles, puzzles and games at www.acs.org/kids.

Safety Tips

This activity is intended for elementary school children under the direct supervision of an adult. The American Chemical Society cannot be responsible for any accidents or injuries that may result from conducting the activities without proper supervision, from not specifically following directions, or from ignoring the cautions contained in the text.

Always:

- Work with an adult.
- Read and follow all directions for the activity.
- Read all warning labels on all materials being used.
- Wear eye protection.
- Follow safety warnings or precautions, such as wearing gloves or tying back long hair.
- Use all materials carefully, following the directions given.
- Be sure to clean up and dispose of materials properly when you are finished with an activity.
- Wash your hands well after every activity.

Never eat or drink while conducting an experiment, and be careful to keep all of the materials used away from your mouth, nose, and eyes!

Never experiment on your own!

For more detailed information on safety go to www.acs.org/education and click on "Safety Guidelines".

