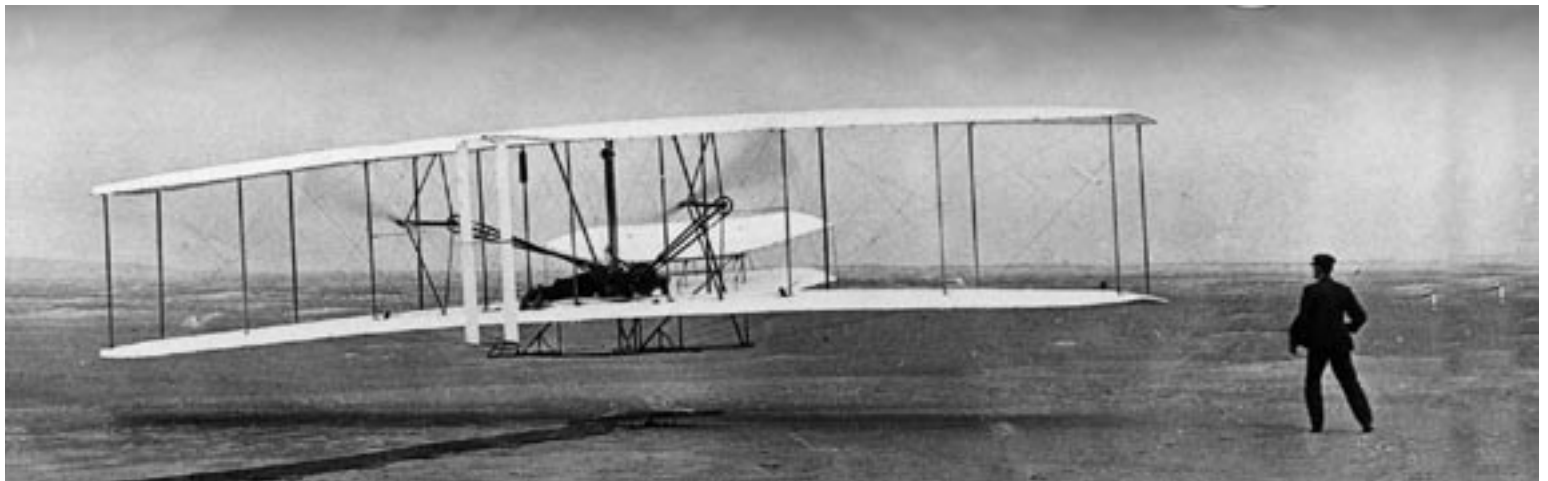


FLY TO THE FUTURE

This activity is from *Fly to the Future* Summer Camp. For more information on how your Challenger Learning Center can obtain a copy of this camp curriculum, contact the Challenger Learning Center of Greater Washington at (703) 837-5640.

To find out how to attend a Challenger Learning Center summer camp, contact your local Learning Center. To find a Learning Center near you, visit www.challenger.org.





Catch Some Air

Grade Level

5 - 7

Activity Type

Hands-on building and testing

Duration

1 hour

30 minutes the following morning

Scheduled Time

Monday, 2:15 - 3:15

Tuesday, 9:15 - 9:45

Content Overview

Two important parts of an airplane that help to control it are ailerons and elevators. Ailerons are located on the outer edge of the airplane's wings. They move in opposite direction, so when one is up, the other is down – this allows the airplane to roll (the side to side motion). Elevators are on the horizontal tail section and control pitch – the up and down motion of the airplane. Adjusting these controls, even a small amount, can increase (or decrease) the stability of the aircraft and allows for better-controlled flight.

Essential Question

How do the parts of an airplane help it to remain in flight?

Objectives

Campers will be able to:

- ◇ Construct a cardboard glider.
- ◇ Manipulate the glider parts for better flight.

Materials

Per camper:

- ◇ A copy of the two glider pages printed on card stock
- ◇ Scissors
- ◇ Glue stick
- ◇ Paper clips or plasticine (optional)

Per class:

- ◇ Several stopwatches

Preparation & Management

1. Ask campers what they know about airplanes. Use the Content Overview and Glossary to give campers even more information about gliders. (Optional: Use a large K-W-L chart to gather this information. See the K-W-L section in the Background Information of this guide.) Ask campers what makes airplanes fly? What helps control an airplane?
2. Copy glider pages (1 set per camper) on to card stock.
3. Make sure that campers do NOT cut the elevators or ailerons until you tell them to do so.
4. Allow the plane to dry completely.
5. Have campers try a test flight. If the plane nosedives, tell the campers to cut ONLY the small black lines on each tail fin. Then have them fold the elevator upwards. If the airplane rolls tell them to cut the lines on each wing and bend the ailerons up or down to control the roll.



6. Paper clips or plasticine can be added to the nose of the plane to help it fly.

Tuesday Morning Fly-In:

1. Designate an area of the room which is long and straight as the fly-in area. Place a tape measure, or mark off the distance, along the length of this space.
2. Tell campers to make adjustments to their gliders.
3. Allow each camper three test flights of their gliders. Tell them that you are looking for gliders that go the furthest and travel in a straight line.
4. Give each camper three test flights. Mark the results of each flight on your Counselor Data Sheet. The column on the right is for recording the test flights.
5. You may also want to add a second component to this activity: Which glider remains airborne the longest?
6. After completion of the activity, finish the K-W-L chart. Make sure the following topic(s) have been discussed:
 - ◇ Ailerons help to control roll.
 - ◇ Elevators help to control pitch.



Catch Some Air

Task Card 1

CUT ONLY ON SOLID BLACK LINES. FOLD ON DOTTED LINES.

1. Use scissors to cut out the glider pieces.
2. Line up the pieces of the fuselage (pieces 1 - 5) in order. Number 1 at the far left, number 2 next, and number 5 at the far right. (See note.)
3. Glue each of the pieces of the fuselage to the piece that is next to it.
4. Bend down the rectangular sections that are found on pieces 1 and 5, as shown in Figure 1. (There are a total of four of these sections.)
5. Glue piece 7 to the bottom of piece 6.
6. Glue the wing to the top of the front rectangular sections of the fuselage. (See note.)
7. Glue the two tail pieces to the back two rectangular sections. (See note.)
8. Allow the glue to dry.

NOTE: The airplane picture on each piece shows the direction that the piece faces. The front of the airplane picture is at the front of that glider piece. Make sure that all of your pieces face the correct direction.



Catch Some Air

Task Card 2

THE NEXT MORNING

9. Test your glider.
10. Camber the wings by using your fingers to give the top of the wings a rounded shape. (See Figure 2.)
11. Cut the lines next to the sections labeled: elevators and ailerons. (See Figure 3.)
12. Bend along the dotted lines to adjust the glider's flight. Elevators help with pitch (nose up or down). Ailerons help control roll.
13. Test the glider again.
14. You will have the opportunity to fly your glider 3 times during the Fly-in. It will be measured for distance. It will also be observed for the straightness of its path.

BONUS: Launch your airplane by placing a rubber band in the notch at the bottom of the fuselage. To do this, cut out the triangle at the bottom of the fuselage. Put one end of the rubber band in this notch. Hold the rubber band with one hand and pull back the airplane with the other. Once the rubber band is taut, release the airplane.



Catch Some Air

Task Card 3



Figure 1

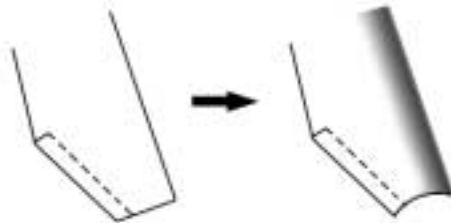


Figure 2

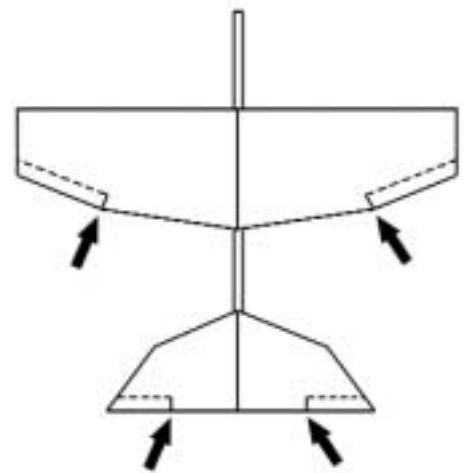


Figure 3

CATCH SOME AIR

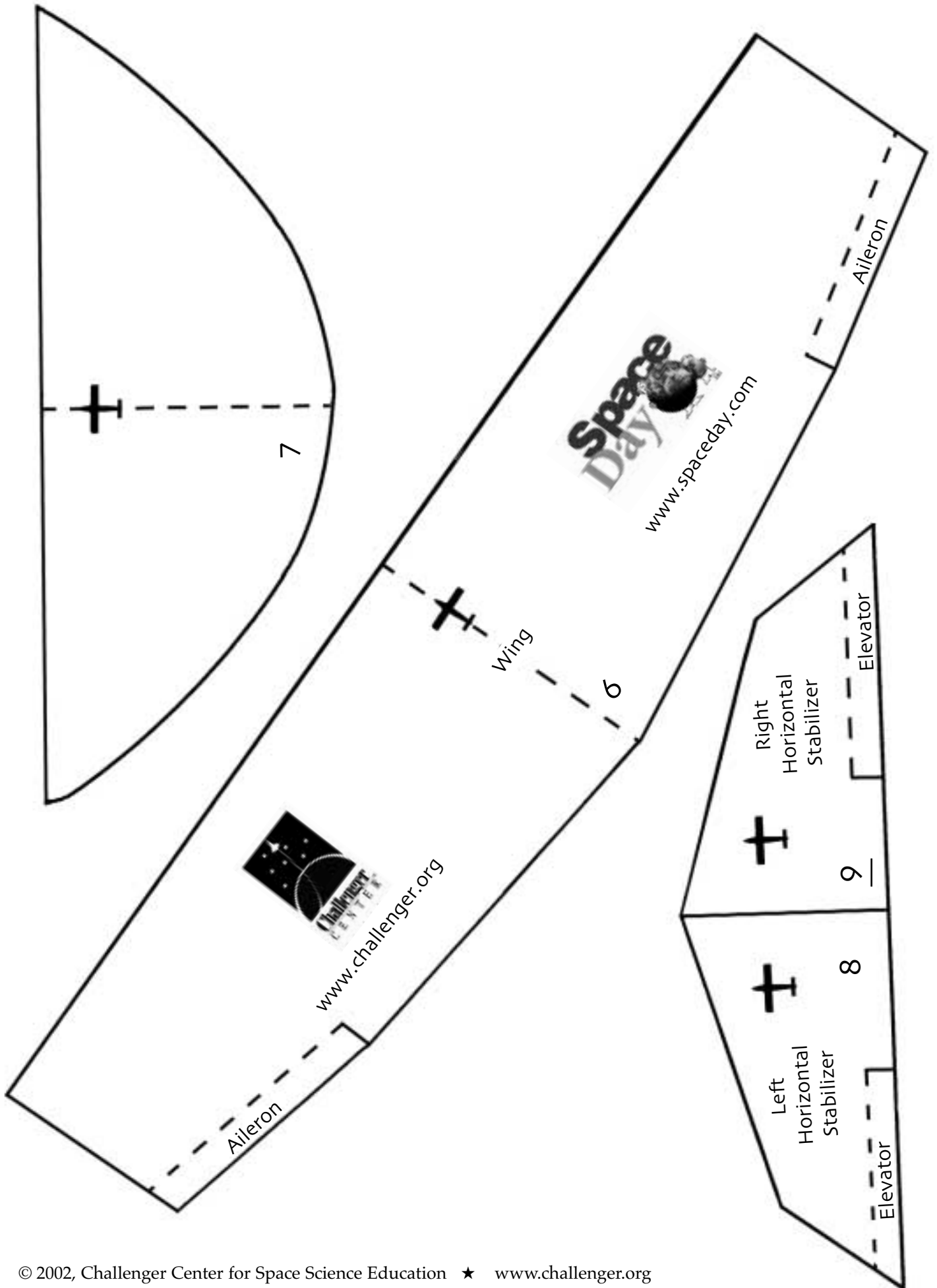
Record your data from your flight test in the spaces below.

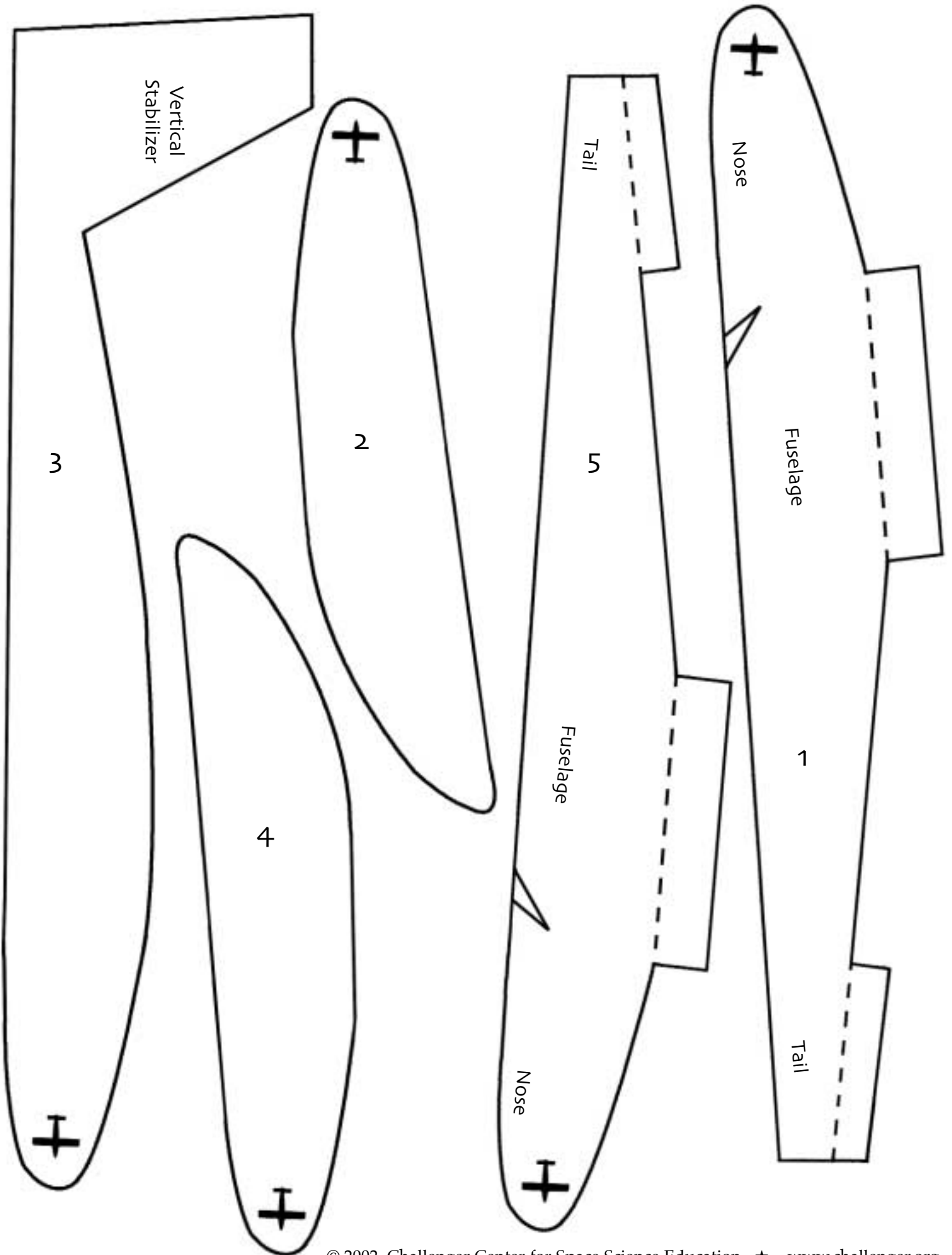
| TEST FLIGHT | DISTANCE TRAVELLED (inches or centimeters) |
|-------------|---|
| 1 | |
| 2 | |
| 3 | |

Record your observations, or changes that you would like to make to your glider, in the space below.

What adjustments to your glider helped the most?

COMPLETED BY: _____ SIGNATURE: _____ DATE: _____





Challenger Center Programs



The internationally acclaimed **Challenger Learning Center** Network currently consists of state-of-the-art, innovative educational simulators located at 49 sites across 29 states, Canada, and the United Kingdom. Staffed by master teachers, the core of each Center is a two-room simulator consisting of a space station, complete with communications, medical, life, and computer science equipment, and a mission control room patterned after NASA's Johnson Space Center. See www.challenger.org for information.

A joint initiative of Challenger Center for Space Science Education, the Smithsonian Institution, and NASA, *Voyage — A Journey through our Solar System* is a space science exhibition project that includes permanent placement of a scale model solar system on the National Mall in Washington, DC, and at locations all over the world. See www.voyageonline.org for information.



Space DaySM launches new *Design Challenges* created by Challenger Center each school year. The inquiry-based challenges are designed to inspire students in grades 4-8 to create innovative solutions that could aid future exploration of our solar system. See www.spaceday.org for information.

Challenger Center's *Journey through the Universe* program provides under-served communities with diverse national resources, including K-12 curriculum materials, teacher workshops, classroom visits by scientists from all over the country, and Family Science Nights. See www.challenger.org/journey for information.



The **MESSENGER** spacecraft (MErcury Surface, Space ENvironment, GEOchemistry and Ranging) is to be launched in 2004 and go into Mercurian orbit in 2009. Challenger Center is one of the partner organizations charged with MESSENGER education and public outreach activities. See www.messenger.jhuapl.edu for information.

Through the Challenger Center **Speakers Bureau, Voyages Across the Universe**, staff members speak to student audiences of 30-1,000, conduct workshops for 100-300 educators, give keynote and featured presentations at conferences, as well as conduct Family Science Nights at the National Air and Space Museum, and other facilities across the nation, for audiences of 300-1,000 parents, students, and teachers. See www.challenger.org/speakers for information.

For information about other Challenger Center programs, or to purchase our classroom resources, visit www.challenger.org/store.