



Student Project

Make Your Own Glider

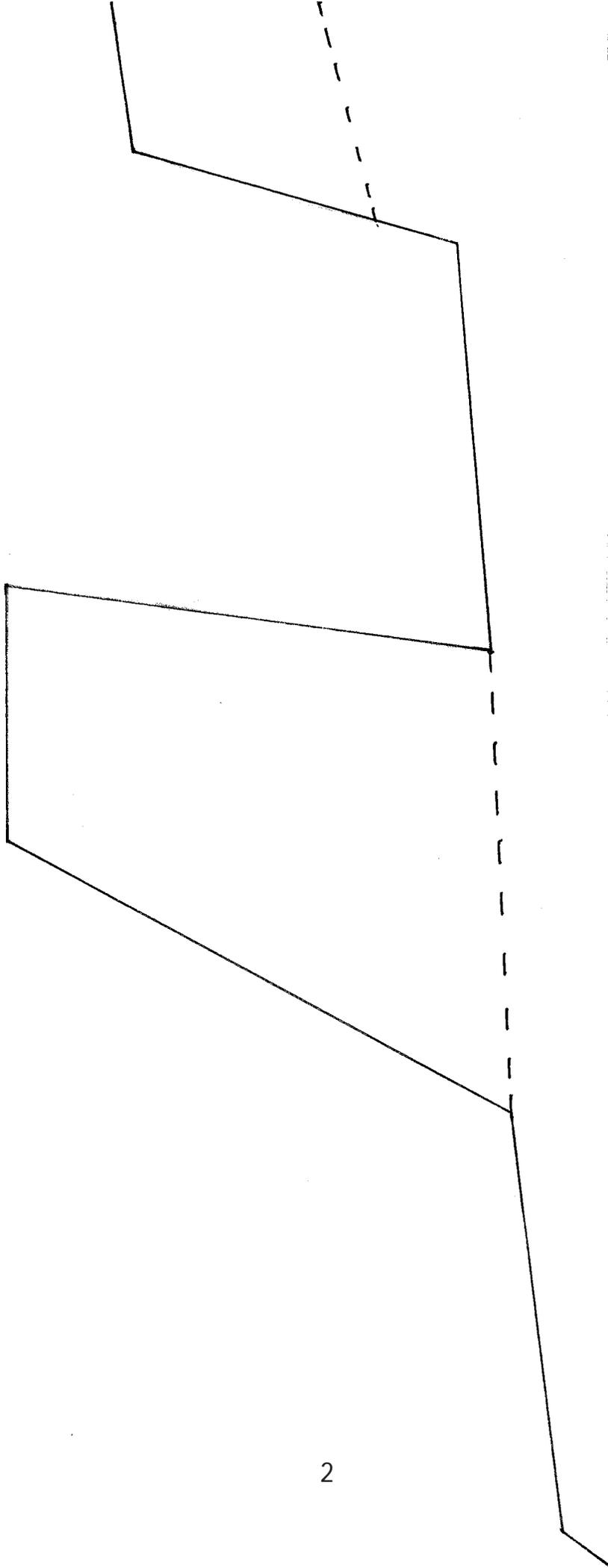
Directions: Using the paper and glider pattern given to you by your teacher, follow the procedure below to make your own glider.

Procedure

1. Use the Glider Template page (next page) and cut out the Glider.
2. Fold a piece of sturdy card stock paper in half lengthwise.
3. Take the pattern of the glider and place it on the folded card stock so that the long straight line is on the folded edge.
4. Trace the pattern onto the folded piece of paper. Mark the dotted lines as shown on the pattern.
5. Use scissors to carefully cut along the traced outline. Be careful to hold the two folded sides of the paper together while cutting. Do not cut along the dotted lines!

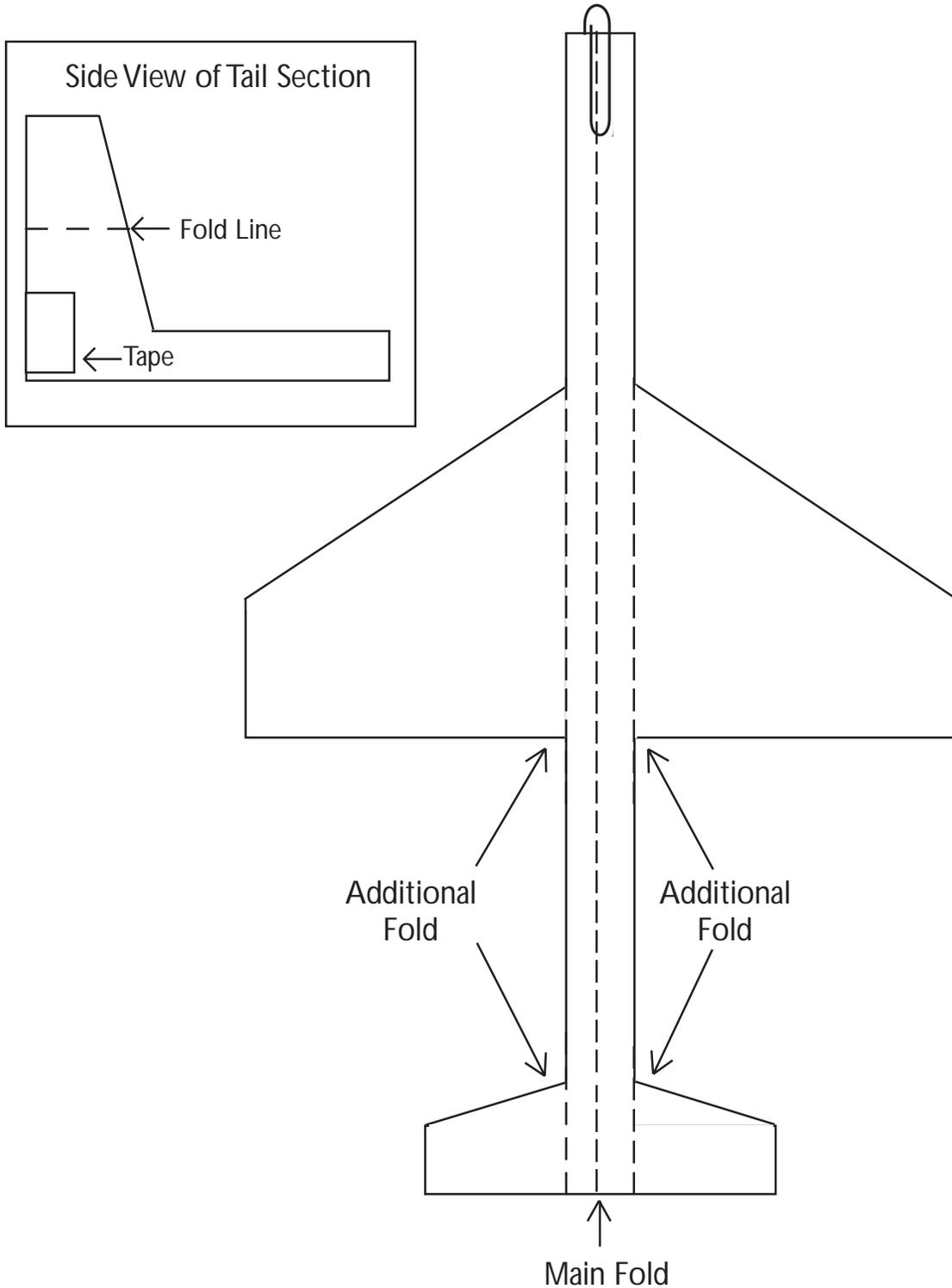
You will use your glider to perform the experiments in this section.

Glider Template



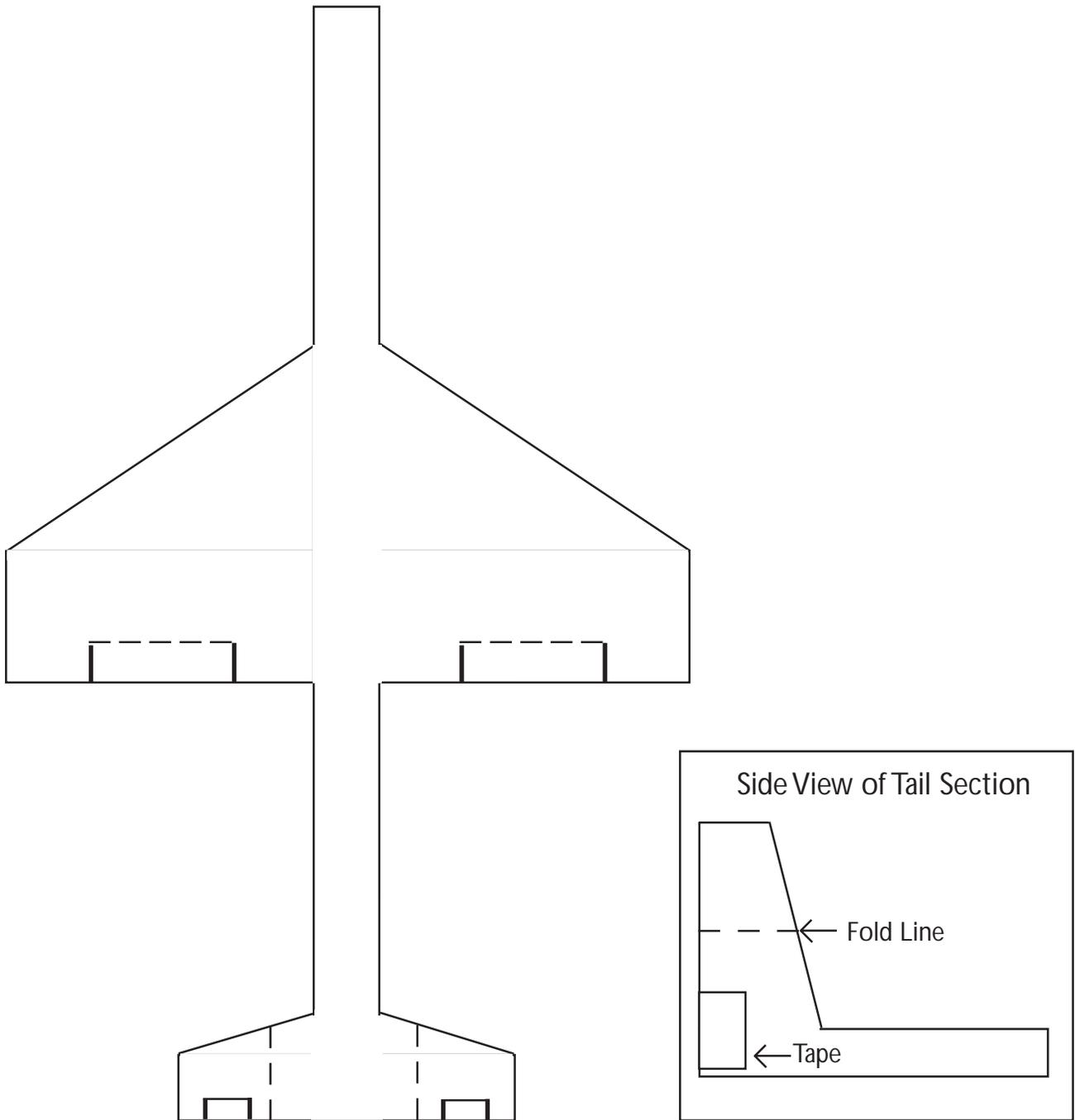


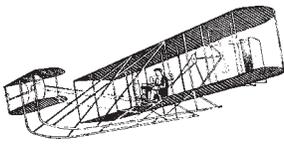
6. Bend the wings and the tail section where shown. Attach a lightweight paper clip to the nose section.
8. Tape together the two edges at the tail of the glider.





9. Mark the wings and the tail section with dotted lines as shown in the diagram below.



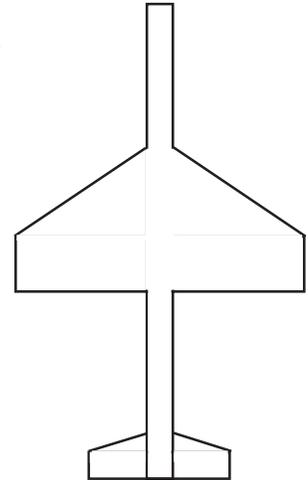


Experiment Data Sheet #1

Control Experiment #1

Directions: Follow the steps from the procedure card for Control Experiment #1. As you test each control surface with your glider, complete this data sheet.

1. On the diagram shade the part of the plane you are testing.
2. Name the control surface you just shaded.
3. Tell what position you moved that control surface to (up, down, left, right, etc.).
4. Briefly describe the glider's flight.
5. Draw the glider's flight path.



6. Circle the type of motion that this control surface controls.

pitch

yaw

roll

7. Circle the axis around which this motion takes place.

longitudinal

lateral

vertical

8. Use this space for any other observations you might have.



Control Experiment #1

Procedure Card

Materials

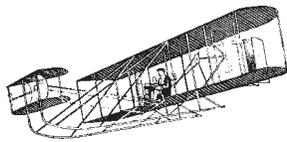
standard size sheet of plain white paper
scissors
paper airplane construction directions
tape
paper clip

Experiment Set Up

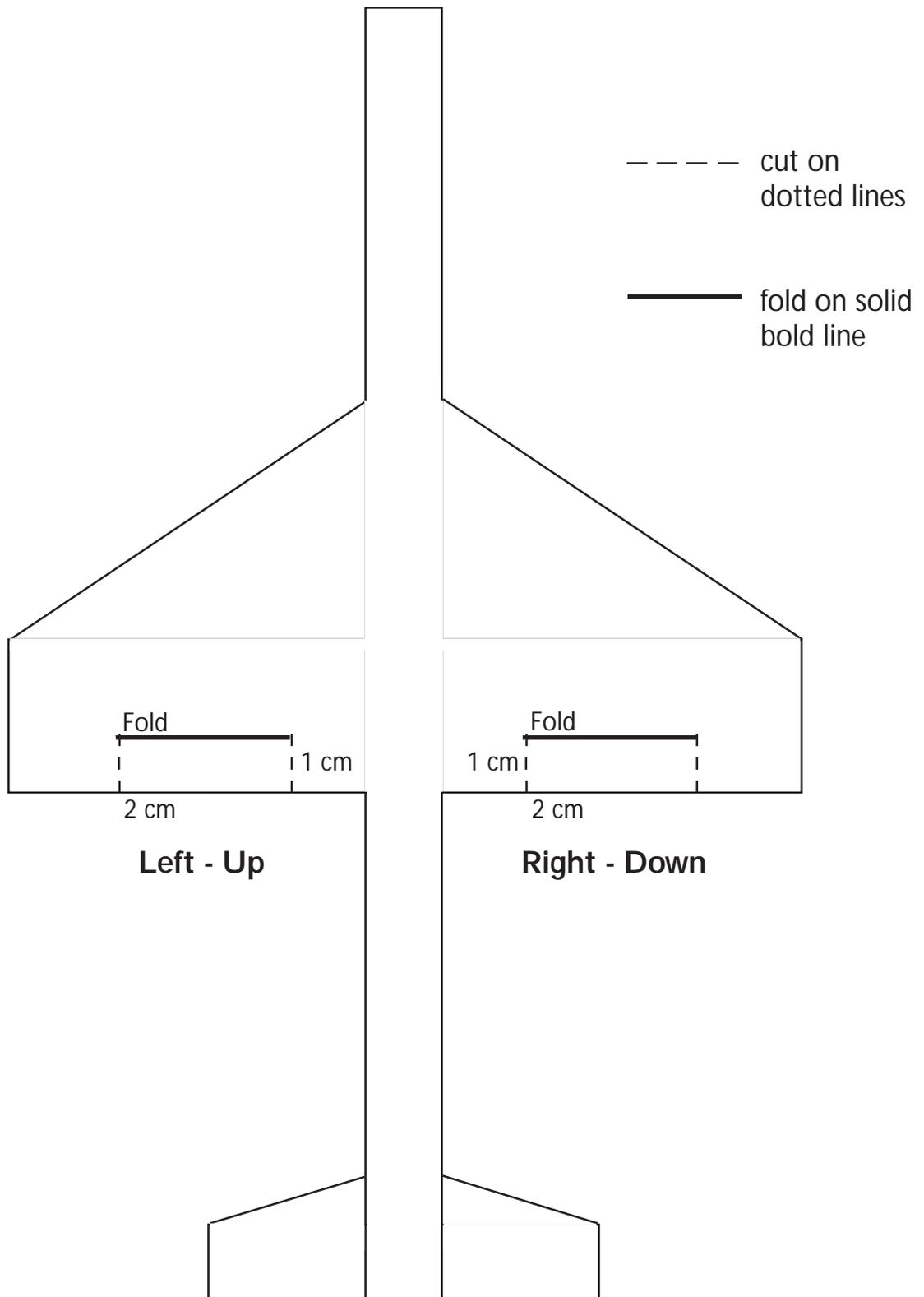
Follow the directions for constructing a paper airplane that your teacher gives you.

Experiment Procedure

1. Make two cuts in the trailing edge of each wing (see diagram on next page).
2. This part of the plane is the aileron and controls movement around the longitudinal axis.
3. Bend the left aileron up and bend the right aileron down.
4. Predict how the plane will fly.
5. Launch the plane by throwing it gently forward.
6. Observe and record.



Top View





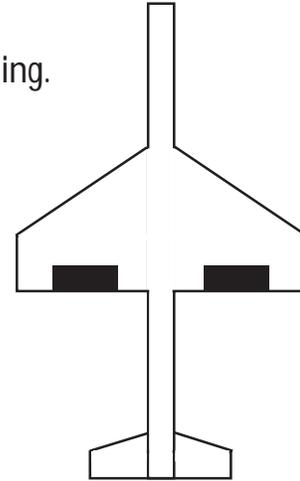
Experiment Data Sheet – Key

Control Experiment #1

Directions: Follow the steps from the procedure cards for Control Experiments #1, #2, and #3. As you test each control surface with your glider, complete this data sheet.

1. On the diagram shade the part of the plane you are testing.
2. Name the control surface you just shaded.

aileron

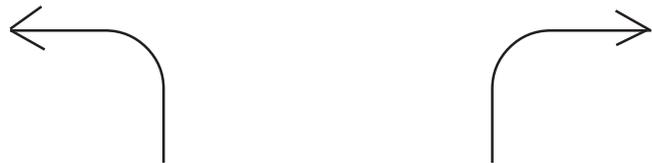


3. Tell what position you moved that control surface to (up, down, left, right, etc.)

*left aileron up, right aileron down
or
left aileron down, right aileron up*

4. Briefly describe the glider's flight.

*the glider rolled left
or
the glider rolled right*



5. Draw the glider's flight path.

6. Circle the type of motion that this control surface controls.

pitch yaw roll

7. Circle the axis around which this motion takes place.

longitudinal lateral vertical

8. Use this space for any other observations you might have.



Experiment Data Sheet #2

Control Experiment #2

Directions: Follow the steps from the procedure card for Control Experiment #2. As you test each control surface with your glider, complete this data sheet.

1. On the diagram shade the part of the plane you are testing.
2. Name the control surface you just shaded.
3. Tell what position you moved that control surface to (up, down, left, right, etc.).
4. Briefly describe the glider's flight.
5. Draw the glider's flight path.
6. Circle the type of motion that this control surface controls.
pitch yaw roll
7. Circle the axis around which this motion takes place.
longitudinal lateral vertical
8. Use this space for any other observations you might have.



Control Experiment #2

Procedure Card

Materials

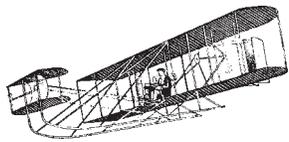
standard size sheet of plain white paper
scissors
paper airplane construction directions
tape
paper clip

Experiment Set Up

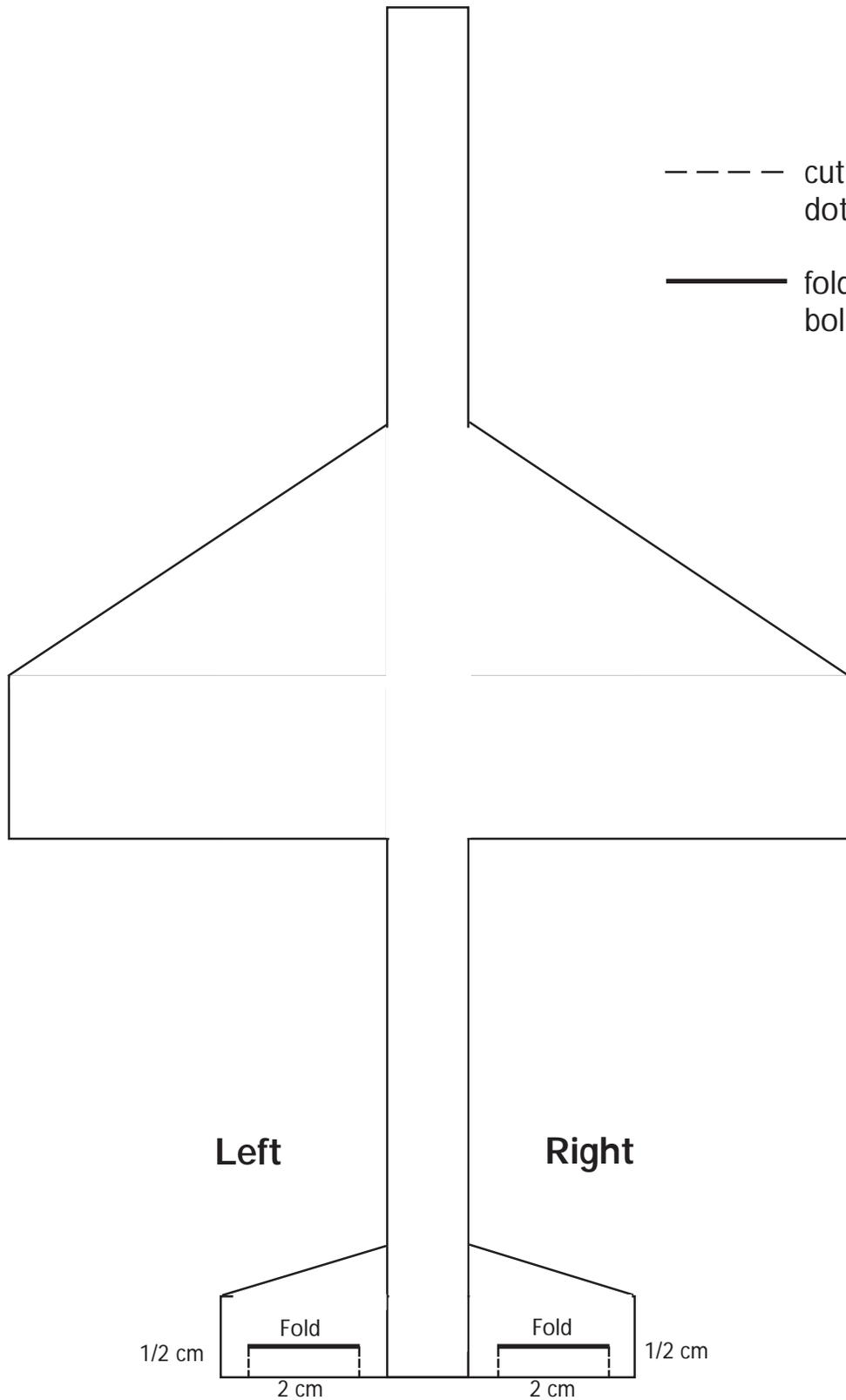
Follow the directions for constructing a paper airplane that your teacher gives you.

Experiment Procedure

1. Make two cuts in the back of the horizontal stabilizer (see diagram on next page).
2. These are the elevators and they control movement around the lateral axis.
3. Bend both elevators up.
4. Predict how the glider will fly.
5. Launch the plane by throwing it gently forward.
6. Observe and record.
7. Bend both elevators down.
8. Repeat steps 5 and 6, launching the airplane at the same speed every time.



Top View



--- cut on
dotted lines

— fold on solid
bold line

Left

Right

1/2 cm

Fold
2 cm

Fold
2 cm

1/2 cm



Experiment Data Sheet – Key

Control Experiment #2

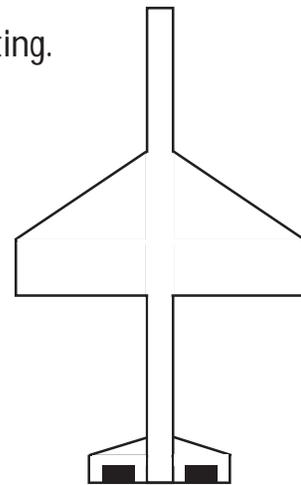
Directions: Follow the steps from the procedure cards for Control Experiments #1, #2, and #3. As you test each control surface with your glider, complete this data sheet.

1. On the diagram shade the part of the plane you are testing.
2. Name the control surface you just shaded.

elevators

3. Tell what position you moved that control surface to (up, down, left, right, etc.)

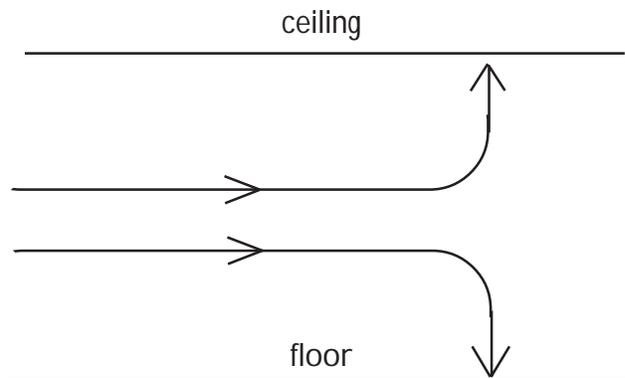
*both elevators bent up
or
both elevators bent down*



4. Briefly describe the glider's flight.

*the glider's nose pitched up
or
the glider's nose pitched down*

5. Draw the glider's flight path.



6. Circle the type of motion that thi

pitch

yaw

roll

7. Circle the axis around which this motion takes place.

longitudinal

lateral

vertical

8. Use this space for any other observations you might have.



Experiment Data Sheet #3

Control Experiment #3

Directions: Follow the steps from the procedure card for Control Experiment #3. As you test each control surface with your glider, complete this data sheet.

1. On the diagram shade the part of the plane you are testing.

2. Name the control surface you just shaded.

3. Tell what position you moved that control surface to (up, down, left, right, etc.).

4. Briefly describe the glider's flight.

5. Draw the glider's flight path.

6. Circle the type of motion that this control surface controls.

pitch

yaw

roll

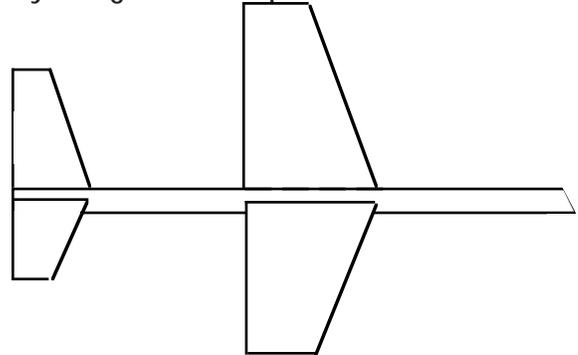
7. Circle the axis around which this motion takes place.

longitudinal

lateral

vertical

8. Use this space for any other observations you might have.





Control Experiment #3

Procedure Card

Materials

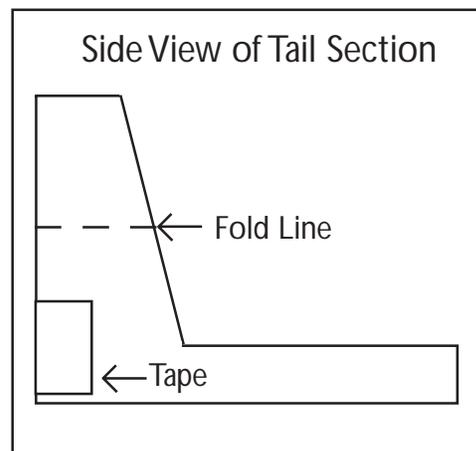
standard size sheet of plain white paper
scissors
paper airplane construction directions
tape
paper clip

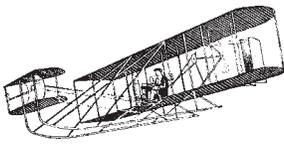
Experiment Set Up

Follow the directions for constructing a paper airplane that your teacher gives you.

Experiment Procedure

1. Make two cuts on the back of the fin (see diagram on next page).
2. This is the rudder and it controls movement around the vertical axis.
3. Bend the rudder to the left.
4. Predict how the plane will fly.
5. Launch the plane by throwing it gently forward.
6. Observe and record.
7. Bend the rudder to the right.
8. Repeat steps 5 and 6.



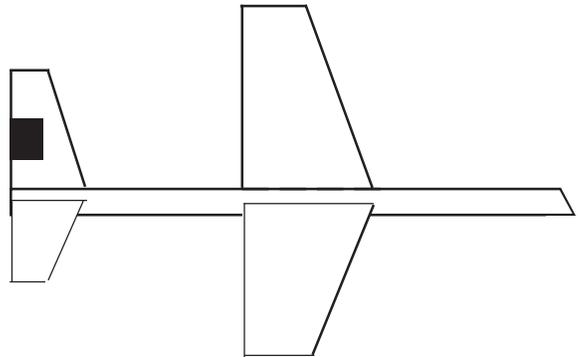


Experiment Data Sheet – Key

Control Experiment #3

Directions: Follow the steps from the procedure cards for Control Experiments #1, #2, and #3. As you test each control surface with your glider, complete this data sheet.

1. On the diagram shade the part of the plane you are testing.
2. Name the control surface you just shaded.



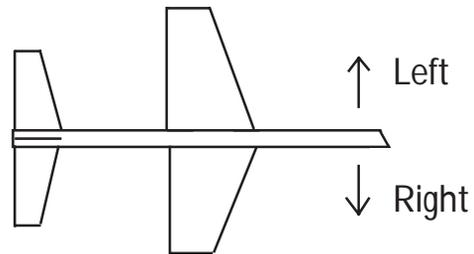
rudder

3. Tell what position you moved that control surface to (up, down, left, right, etc.)

*to the left
or
to the right*

4. Briefly describe the glider's flight.

*the glider's nose yawed left
or
the glider's nose yawed right*



5. Draw the glider's flight path.

6. Circle the type of motion that this control surface controls.

pitch yaw roll

7. Circle the axis around which this motion takes place.

longitudinal lateral vertical

8. Use this space for any other observations you might have.