FLIGHT ACTIVITY DESIGN WORKBOOK

Name: ________________________________________________________________

Other group members: ________________________________________________

____________________________________________________________________

____________________________________________________________________

____________________________________________________________________

Group Number: ____________  Class: ________________________________
THINKING SPACE

... drawings, diagrams, observations, notes, reflections ...
ENGINEERING DESIGN MODEL

Model adapted from pbs.org model
THINKING SPACE

… drawings, diagrams, observations, notes, reflections …
AEROPLANE FLIGHT

1. 🎥 Watch the video of a plane taking off, flying and landing.

2. ✍️ Describe the movement/direction of the plane while it’s flying.

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________
THINKING SPACE

… drawings, diagrams, observations, notes, reflections …
3. **Draw** a simple outline of the plane.

**Label** your drawing using the following labels:

- Body
- Wings
- Tail
- Nose
- Wheels
THINKING SPACE

… drawings, diagrams, observations, notes, reflections …
OUR TASK: THE PAPER PLANE CHALLENGE

INSTRUCTIONS AND RULES:

➢ You will be working in groups of 3 to 5.

➢ Your plane is to be made from a single A4 sheet of paper.

➢ Your plane is to be hand launched, and is to travel in a straight line.

➢ Your plane is to be designed to stay in the air for as long as possible, and travel the longest distance.

➢ You will time your flight using a stopwatch, and measure the flight distance using a tape measure.

➢ You will have the chance to redesign your plane and try again to see if you can increase the time it stays in the air and the distance it travels.

➢ After every Group design, you will be given time to answer questions regarding the design and performance of your plane. Questions include:
  
  ▪ How long did your plane stay in the air for each test?
  
  ▪ How far did your plane travel for each test?
  
  ▪ What did you observe about the path of your plane in flight (straight, curved)?
  
  ▪ How was your plane launched (speed when released – fast, medium, slow, gently, etc. and the direction it was pointed)?
  
  ▪ What did you notice about the data you collected for the tests?
IMPORTANT SAFETY INFORMATION

NEVER throw a paper airplane at another person, animal, or object that could be damaged if you hit it. Paper planes can have sharp edges and points that can injure someone if you are not careful. Keep in mind that paper planes can curve or change direction after they are launched, so make sure your flying area is clear. When flying outdoors, never fly your plane near moving cars or run into the street after your plane. Plan ahead and fly in a park, playground, or backyard. Today, wait for instruction from your teacher that it is safe to fly your plane.
THINKING SPACE

… drawings, diagrams, observations, notes, reflections …
INDIVIDUAL DESIGN

1. **Build** your individual paper plane, and **write** your name on your plane.

2. **Remember** the safety warning, do not fly/test your plane until your teacher says it is safe to do so.

3. **Test** your plane, measuring your flight distance with a tape measure.

   Was your plane able to fly straight (circle “Yes” or “No”): **Yes** / **No**

   How far (distance) did your plane travel? ________________________ cm
GROUP: 1ST DESIGN

1. **Discuss** your ideas for your design with your group.
   
   You will only make one plane per group.

2. **Draw** your design below.
   
   **Label** your design (e.g. body, wings, tail, nose).
THINKING SPACE

… drawings, diagrams, observations, notes, reflections …
3. **Build** your group plane and write your group number on your plane.

Now that you have built your plane, **measure** important features such as the length and width of the body, wingspan and tail. **Record** these measurements on your design at Step 2 on page 13.

4. **Remember** the safety warning, do not fly/test your plane until your teacher says it is safe to do so.
THINKING SPACE

… drawings, diagrams, observations, notes, reflections …
5. **Test** your plane, time your flight with a stopwatch, and measure your flight distance with a tape measure.

**Table 1:** Record your measurements for each test inside the table below

<table>
<thead>
<tr>
<th>Flight Time (seconds)</th>
<th>Distance travelled (cm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group Attempt 1</td>
<td></td>
</tr>
<tr>
<td>Group Attempt 2</td>
<td></td>
</tr>
<tr>
<td>Group Attempt 3</td>
<td></td>
</tr>
</tbody>
</table>

6. **Record** your observations below by answering each question.

a) What did you observe about the path of your plane in flight (straight, curved etc)?

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________

b) Referring to your results in **Table 1**, what did you notice about the data you collected for the three tests

(i) How did the times vary (or change)?

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
(ii) How did the distances travelled vary (or change)?

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

(iii) Is there anything else you noticed? For example, did the longest distance travelled also take the longest time in each test?

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

c) How was your plane launched (speed when released – fast, medium, slow, gently, and the direction it was pointed)?

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________
THINKING SPACE

… drawings, diagrams, observations, notes, reflections …
FOUR FORCES OF FLIGHT

Lift, thrust, drag and weight

1. **Label** the plane with each force

![Diagram of an airplane](image)

2. Draw an arrow to **show the direction** of each force.
THINKING SPACE

… drawings, diagrams, observations, notes, reflections …
GROUP: 2ND DESIGN

1. Now that you’ve learnt about lift, thrust, drag and weight, discuss your ideas for your 2nd design with your group. How could you improve your plane or launch technique?

You will only make one plane per group.

2. Draw your group’s 2nd design below.

Label your design (e.g. body, wings, tail, nose).
THINKING SPACE
… drawings, diagrams, observations, notes, reflections …
3. **Record** how you changed your design, and why.

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________

4. **Build** your group plane, and write your group number on your plane.

Now that you have built your plane, **measure** important features such as the length and width of the body, wingspan and tail. **Record** these measurements on your design at Step 2 on page 22.

5. **Remember** the safety warning, do not fly/test your plane until your teacher says it is safe to do so.
THINKING SPACE

… drawings, diagrams, observations, notes, reflections …
6. **Test** your plane, time your flight with a stopwatch, and measure your flight distance with a tape measure.

**Table 2:** Record your measurements for each test inside the table below

<table>
<thead>
<tr>
<th></th>
<th>Flight Time (seconds)</th>
<th>Distance travelled (cm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group Attempt 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Group Attempt 2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Group Attempt 3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

7. **Record** your observations below by answering each question.

a) What **did** you change about the way you launched your plane, and why?
b) What did you observe about the path of your plane in flight (straight, curved)?

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

c) Referring to your results in Table 2, what did you notice about the data you collected for the three tests

(i) How did the times vary (or change)?

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

(ii) How did the distances travelled vary (or change)?

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________
(iii) Is there anything else you noticed? For example, did the longest distance travelled also take the longest time in each test?

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

d) If you were to do another design, would you change, and why?

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________
THINKING SPACE

… drawings, diagrams, observations, notes, reflections …
OUR FACT SHEET

Dear QANTAS Education Centre.

Today we acted as aerospace engineers and our Group built some paper planes.

Our best plane for the “time in the air” category was the (circle one): 1st Design / 2nd Design.

This plane stayed in the air for ___________ seconds, and was the best design because ________________

____________________________________________________________

____________________________________________________________

____________________________________________________________

____________________________________________________________
Our best plane for the “distance travelled” category was the (circle one): 1st Design / 2nd Design.

This plane travelled ___________ centimetres, and was the best design because ________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________