Paper Airplane Lab Assignment

Activity Summary
In this activity, students will:
- Create a name and design for three (3) paper airplanes
- Present their paper airplane(s) to the class
- Complete a Self-Evaluation

Prior Knowledge
- **Essential Skills**
  - Making paper airplanes
  - Use of stopwatches

Teaching Planning Notes
- Sign out books on paper airplane designs to share with the class
- Book access to computers in school (Option 1). Students could also do internet searches on paper airplane designs.
- Download designs and copy them as a class set. (Option 2)
  * [http://bestpaperairplanes.com](http://bestpaperairplanes.com)
  * [www.wannalearn.com/Just_for_Fun/Making_Paper_Airplanes](http://www.wannalearn.com/Just_for_Fun/Making_Paper_Airplanes)
- Provide blank paper for students to draw their designs and names of the paper airplanes
- Provide a clutter-free area (you may have to use the hallway or gymnasium)
- Provide a variety of types and sizes of paper
- Provide students with masking tape, stopwatches, and metre sticks

Assessment of Student Achievement

<table>
<thead>
<tr>
<th>Task</th>
<th>Tool / Type</th>
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<tr>
<td>Brainstorming Lab</td>
<td>Fly Like an Eagle: Graphic Organizer (Formative)</td>
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<td>Fly Like an Eagle Observations and Calculations Worksheet (Formative)</td>
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<td>Fly Like an Eagle Analysis Worksheet (Formative)</td>
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<td>Fly Like an Eagle Student Lab Performance Rubric (Summative)</td>
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<td>Presentation</td>
<td>Fly Like An Eagle Lab Performance Rubric (Summative)</td>
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<td>Voting Ballot</td>
<td>Fly Like An Eagle: Voting Ballot (Formative)</td>
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<tr>
<td>Ranking <strong>Essential Skills</strong></td>
<td>Rank Your <strong>Essential Skills</strong> Worksheet (Formative)</td>
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Activity and Assessment Materials
- Paper Airplane Lab Assignment Sheet
- Graphic Organizer for Airplane Design
- Observations and Calculations Worksheet
- Student Lab Performance Rubric
- Rank Your **Essential Skills** Worksheet
- Graphic Organizer Answer Key
- Analysis Worksheet
- Voting Ballot
- Lab Performance Rubric
You will soon find out that this is not a crash course! You and your partner(s) have been hired by FunLife, (a fictitious toy manufacturing company) to design and create three paper airplanes that can either cover the greatest distance or have the greatest speed.

Your team must include a design and a creative fun name for each plane. Once your team has completed the investigation, you will demonstrate your fastest airplane and the one that covered the greatest distance to the class. Your teacher may request an employee of FunLife to attend the demonstration. At the end of this activity, you could earn valuable Air Mile prizes for the most creative name, the plane traveling the greatest distance and speed. By completing a ballot, your name could be drawn for a prize. All prizes have been sponsored by FunLife.

**Materials:**

- Paper
- Stopwatches
- Ruler
- Clutter free area
“Working with Others”, is an **Essential Skill** that is important to practice to be successful in the world of work. Brainstorming and being supportive of thoughts, opinions and contributions of others in a group are part of “Working with Others”. Practice this **Essential Skill** while you and your partner(s), develop a graphic organizer similar to the one shown in Figure 1.

1. Brainstorm and identify as many factors that may affect the results of your paper airplane designs. In other words, what could you do to the paper airplane to make it go further or faster. Example, the type of paper. In each of the surrounding circles, name this factor.

2. Draw straight lines off the circles representing how the factor can be changed. For example, the type of paper could be cardstock.

3. Add as many circles and branches as necessary.

4. Once the graphic organizer is complete, start creating three designs of paper airplanes and proceed with the experiment.

5. Provide a sketch of your three designs on a piece of paper.

6. Create a name for each plane.

**Graphic Organizer**

(Factors that Influence Paper Airplane Design)

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*Figure 1:*
Fly Like An Eagle
Paper Airplane Test

Pilot

Throw in this direction

Masking tape

Target Area

Figure 2

Working with Others, Oral Communication, Reading Text, Document Use and Numeracy are five of the Essential Skills you will encounter during the next phase of this activity.

1. Remember safety is extremely important. Make sure the area you are working in is free of any obstructions and people. Never throw a plane directly at another person, especially if the plane has a sharp, pointed nose. You will need to use the length of the classroom for this activity.

2. Place a line of masking tape on the floor away from the target area (at least 6 m). Refer to Figure 2.

3. The Air Traffic Controller should get a stopwatch and a metre stick from the teacher.

4. The Pilot should stand at the line of masking tape with his/her paper airplane.

5. The Air Traffic Controller gets the stopwatch ready to go and tells the Pilot when to throw the plane (start timing once the plane has left the Pilot’s hand). Note: The Pilot should be aiming the plane towards the target area.

6. When the plane lands on the ground, the Air Traffic Controller should stop the stopwatch and record the time in seconds in the table of observations.

7. After the plane has landed, measure the distance between the line of the masking tape and the plane in the table of observations. [Note: we are only measuring the horizontal distance the plane travelled, it does not matter how high the plane flew]

8. Repeat the experiment two more times and record the data each time in the observation chart.

9. Repeat these steps for the remaining two planes. Be sure to switch roles of Pilot and Air Traffic Controller. Sign your name beside the appropriate role.

10. Remember to keep your planes because your team will be presenting the winner of each category to the class.
# Fly Like An Eagle

## Observations and Calculations Worksheet

Name of Pilot: ________________________________________________________________

Name of Air Traffic Controller: ________________________________________________

<table>
<thead>
<tr>
<th>1st Plane</th>
<th>Time the Plane was in the Air (s)</th>
<th>The Distance the Plane Travelled (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trial 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Trial 2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Trial 3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Average Value</td>
<td>(Trial 1 + Trial 2 + Trial 3) ÷ 3 =</td>
<td>(Trial 1 + Trial 2 + Trial 3) ÷ 3 =</td>
</tr>
</tbody>
</table>

Average Speed = \( \frac{\text{average distance (m)}}{\text{average time (s)}} \)

Name of Pilot: ________________________________________________________________

Name of Air Traffic Controller: ________________________________________________

<table>
<thead>
<tr>
<th>2nd Plane</th>
<th>Time the Plane was in the Air (s)</th>
<th>The Distance the Plane Travelled (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trial 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Trial 2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Trial 3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Average Value</td>
<td>(Trial 1 + Trial 2 + Trial 3) ÷ 3 =</td>
<td>(Trial 1 + Trial 2 + Trial 3) ÷ 3 =</td>
</tr>
</tbody>
</table>

Average Speed = \( \frac{\text{average distance (m)}}{\text{average time (s)}} \)
**Fly Like An Eagle**

Name of Pilot: ________________________________________________________________

Name of Air Traffic Controller: ________________________________________________

<table>
<thead>
<tr>
<th>3rd Plane</th>
<th>Time the Plane was in the Air (s)</th>
<th>The Distance the Plane Travelled (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trial 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Trial 2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Trial 3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Average Value</td>
<td>(Trial 1 + Trial 2 + Trial 3) ÷ 3 =</td>
<td>(Trial 1 + Trial 2 + Trial 3) ÷ 3 =</td>
</tr>
</tbody>
</table>

Average Speed = average distance (m) / average time (s)

**Analysis Worksheet**

The **Essential Skills** are embedded throughout this activity. Your skills in Reading Text, Writing and Thinking Skills will be enhanced in this phase.

1. a) Which design travelled the greatest distance? ____________________________
   
   b) What qualities of your design helped in achieving the greatest distance?
   
   ________________________________________________________________________

2. a) Which design had the greatest speed? _________________________________
   
   b) What qualities of your design helped in achieving the greatest speed?
   
   ________________________________________________________________________

3. a) Did the same airplane travel the greatest distance and speed? _____________
   
   b) If no, explain. _________________________________________________________

__________________________________________________________________________
4. Did your team have any problems in making measurements? Was there any variation in the times and/or distances within your trial runs?

__________________________________________________________________________

__________________________________________________________________________

5. Why do you think it is necessary to do three trials?

__________________________________________________________________________

__________________________________________________________________________

Presenting Your Airplane(s)

Oral Communication and Working with Others are important **Essential Skills** to develop for this part of the activity. Your team will present the winning plane(s) to the class. Everyone in your group must participate in the presentation so decide on how you will equally divide up the task. During the presentation:

- Record the name of your plane on the blackboard and announce it to the class
- State the category of plane (e.g. travels the greatest speed or the greatest distance)
- Show the plane to the class and outline its performance features
- Demonstrate the flight of the plane in a safe and controlled manner
- Identify one of the above **Essential Skills** where your group excelled in and describe the situation.
- Identify one of the above **Essential Skills** where your group faced some challenges and describe the situation.
## Fly Like An Eagle

### Lab Performance Rubric

<table>
<thead>
<tr>
<th>Categories/Criteria</th>
<th>Level 1 (50-59%)</th>
<th>Level 2 (60-69%)</th>
<th>Level 3 (70-79%)</th>
<th>Level 4 (80-100%)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Thinking</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Analyzed data to make conclusions and to answer questions.</td>
<td>Limited Effectiveness</td>
<td>Some Effectiveness</td>
<td>Considerable Effectiveness</td>
<td>High Degree of Effectiveness</td>
</tr>
<tr>
<td><strong>Communication</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Effectively expressed and organized the name, category, design features of the planes.</td>
<td>Limited Effectiveness</td>
<td>Some Effectiveness</td>
<td>Considerable Effectiveness</td>
<td>High Degree of Effectiveness</td>
</tr>
<tr>
<td>Recorded observations in data tables using SI units with accuracy.</td>
<td>Limited Effectiveness</td>
<td>Some Effectiveness</td>
<td>Considerable Effectiveness</td>
<td>High Degree of Effectiveness</td>
</tr>
<tr>
<td><strong>Application</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Followed procedure using the necessary safety precautions.</td>
<td>Limited Effectiveness</td>
<td>Some Effectiveness</td>
<td>Considerable Effectiveness</td>
<td>High Degree of Effectiveness</td>
</tr>
</tbody>
</table>

**Note:** A student whose achievement is below Level 1 (50%) has not met the expectations for this assignment.

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### Fly Like An Eagle: Voting Ballot

You could earn some valuable Air Mile prizes by completing the ballot below. When all the ballots are submitted, the teacher will determine the most popular creative name for an airplane. All of the ballots will then be put into a container and a draw will be made. The winner of the draw for most creative name, and the group with the most successful planes for distance and speed will win prizes. Prizes have been sponsored by FunLife.

Student Name: ________________________________________________________________

Favourite creative name of paper airplane: ________________________________________
Fly Like An Eagle

Rank Your Essential Skills Worksheet

Throughout the Fly Like An Eagle activity, you used several of the **Essential Skills**. Consider the **Essential Skills** you personally used and complete the chart below.

Here is a summary of the tasks you performed during this activity.

- Brainstorming
- Creating designs
- Building paper airplanes
- Role of Air Traffic Controller
- Role of Pilot
- Analysis of data
- Oral presentation

(1=none or little usage, 2=some usage, 3=moderate usage, 4=high usage, 5=very high usage)

<table>
<thead>
<tr>
<th>Essential Skills</th>
<th>FLY LIKE AN EAGLE ACTIVITY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reading Text</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>Document Use</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>Writing</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>Numeracy</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>Oral Communication</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>Thinking Skills</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>Working with Others</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>Computer Use</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>Continuous Learning</td>
<td>1 2 3 4 5</td>
</tr>
</tbody>
</table>

Which **Essential Skill(s)** had the highest ranking? ________________________________

Which **Essential Skill(s)** had the lowest ranking? ________________________________
Fly Like An Eagle
Graphic Organizer
Answer Key

**Length of the body**
- Short
- Long

**The way it is Released**
- Quick snap of the wrist
- No snap of the wrist

**Paper**
- Type (cardstock, binder, etc.)
- Size

**Nose**
- Sharp
- Rounded
- Flat

**Wingspan**
- Long
- Short