FLIGHT OF FANCY · 7TH GRADE · DATA CHALLENGE

Planning Guide

Duration: ~7 Class Periods | Grade 7

Activity Overview and Pacing

Activity	Name	Day	Time	Essential Question
1	Introducing the Flight of Fancy Challenge	Day 1	~50 min	What do engineers need to know before they start designing?
2	How Wings Work	Day 2	~50 min	How does wing shape affect how far a glider flies?
3	Establishing a Testing Procedure	Day 3	~50 min	Why does it matter how we test?
4	Glider Testing	Days 4–5	~100 min	Which wing configuration helps a glider fly the farthest?
5	Data Analysis and Visualization	Days 6–7	~100 min	What story does our data tell?

Activity Descriptions and Materials

Activity 1 — Introducing the Flight of Fancy Challenge | Day 1 | ~50 min

Essential Question: *What do engineers need to know before they start designing?*

Students are introduced to the A+ Airways RFP and their role as engineers. They read about the challenge, identify design criteria and constraints, write a problem statement, and are introduced to the foam glider they will be testing.

Materials:

- Foam gliders — cut from foam trays using the NASA Glider template (1 per group)
- Printed RFP
- Engineering Design Logs

Activity 2 — How Wings Work | Day 2 | ~50 min

Essential Question: *How does wing shape affect how far a glider flies?*

Students learn the basic forces of flight (lift, drag, thrust, weight) and examine six wing configurations. They make predictions about which wing shape will produce the longest flights before any testing begins.

Materials:

- Wing cut-outs — 6 configurations per group, cut from foam trays using the NASA Glider template
- Engineering Design Logs

Activity 3 — Establishing a Testing Procedure | Day 3 | ~50 min

Essential Question: *Why does it matter how we test?*

Students discover that inconsistent testing produces unreliable data. Working as a class, they develop and document a standardized launch procedure that will be used for all glider trials in Activity 4.

Materials:

- Foam gliders
- Cloth measuring tape
- Painters tape to mark the launch point

Activity 4 — Glider Testing | Days 4–5 | ~100 min

Essential Question: *Which wing configuration helps a glider fly the farthest?*

Using the class procedure, each group tests all six wing configurations with multiple trials per configuration, recording flight distances on the student data sheet. Class data is pooled for analysis in Activity 5.

Materials:

- Foam gliders with all 6 wing configurations
- Cloth measuring tape
- Student activity sheets
- Open floor space

Activity 5 — Data Analysis and Visualization | Days 6–7 | ~100 min

Essential Question: *What story does our data tell?*

Students calculate mean flight distances for each wing configuration, create labeled bar graphs comparing the results, and draw evidence-based conclusions about wing performance. Groups share findings in preparation for the Design Challenge.

Materials:

- Completed student data sheets
- Graph paper or charting tools
- Calculators
- Student activity sheets

Standards Alignment

This unit was designed to support the Next Generation Science Standards (NGSS) Engineering Design performance expectations and Science & Engineering Practices, and the Common Core State Standards for Mathematical Practice (SMP). The tables below summarize the strongest alignment points and where they show up in the challenge. The NGSS engineering design performance expectations map cleanly to most state engineering and technology standards. If your state uses different standards (e.g., Georgia Standards of Excellence, TEKS, NYS Next Generation Standards), align using the descriptions in the tables below.

NGSS Engineering Design Performance Expectations

Standard	Description	Where It Shows Up	Classroom Connection
MS-ETS1-1	Define the criteria and constraints of a design problem with sufficient precision.	Activity 1	Students analyze the A+ Airways RFP to identify design criteria (farther flight) and constraints (wing configurations provided, consistent procedure required).

Science and Engineering Practices

Standard	Where It Shows Up	Classroom Connection
Practice 3: Planning and Carrying Out Investigations	Activity 3	Students develop a class-wide standardized testing procedure to reduce variability.
Practice 4: Analyzing and Interpreting Data	Activities 4–5	Students collect flight data, compute averages, and create bar graphs to interpret which wing performs best.
Practice 5: Using Mathematics and Computational Thinking	Activity 5	Students calculate mean flight distances and use data to support conclusions.
Practice 6: Constructing Explanations	Activity 5	Students draw evidence-based conclusions about which wing design performs best and explain why.

Common Core Standards for Mathematical Practice

Standard	Where It Shows Up	Classroom Connection
SMP 1: Make Sense of Problems and Persevere	Throughout	The open-ended RFP requires sustained effort; students return to the problem across multiple sessions.
SMP 2: Reason Abstractly and Quantitatively	Activities 4–5	Students move between raw trial data and calculated averages to make comparisons.
SMP 3: Construct Viable Arguments	Activity 5	Students defend conclusions with data-backed reasoning during class discussion.
SMP 6: Attend to Precision	Activities 3–5	The testing procedure emphasizes consistent measurement and recording to reduce variability.

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