The Structure of Flight

Theme: Flight **Grade Level:** 4th – 8th grade
Concept: Structure **Time needed for lesson:** (2) 40 minute lessons

Overview: This lesson shows students how artists and scientists have made great discoveries through their powers of observation. It encourages students to extend their own observational capacities through drawing and discussion.

Objectives: Students will compare and contrast characteristics of a feather and will observe how form follows function in flight. Students will learn how to draw a feather from direct observation.

Essential Question: How does form affect function?

Preparation for lesson: Teacher begins discussion with the question: "How did the Wright Brothers' observations of birds lead to the development of the airplane?"

Lesson Activities:

1. Teacher briefly introduces the elements and principles of art, focusing on symmetry, asymmetry, line and value.

2. Students observe and discuss the characteristics of an actual feather: barbs, shaft, and structure. Students will compare these characteristics with Leonardo daVinci's drawing of a flying machine.

3. Teacher asks directed questions about how the form of the feather enhances its function and how that design influenced the Wright Bros. Students demonstrate concept of lift under the wings by imitating a birds' wings in flight.

4. Teacher demonstrates drawing techniques, focusing on linear and tonal elements. Discuss with students how the texture of the paper influences the quality of the line and tone

5. Students draw the feather emphasizing line, value and pattern.

Extension of the lesson: Students discuss the symbolism of birds while viewing art prints from Japanese, African and Native American cultures.
Students can also create and compose a fictional story using some of the elements of this lesson: E.g.: Leonardo daVinci and his flying machine, the Wright Brothers, birds, line, value, pattern, etc.

Materials needed: *The Wright Brothers: How They Invented the Airplane* by Russell Freedman**,** feathers, 3.5 x 8.5" textured drawing paper, ebony pencils, Leonardo's study of flight machines, Japanese, African and Native American bird prints.

Vocabulary: Lift, force, convex, concave, rudders, barb, shaft, design, structure, symmetry, asymmetry, value, texture, Leonardo daVinci

Benchmarks
Science:
Observe and measure.

- Compare and /or contrast characteristics (e.g., color, shape, size, texture, sound, position, change).

Classify – Objects, organisms, and events are classified based on similarities, differences, and interrelationships.

Physical Science:
Position and Motion of Objects – The position of a moving object can be described relative to a stationary object or the background.

- The position and motion of objects can be changed by pushing or pulling. The size of the change is related to the strength of the push or pull.

Visual Art:
Language of Visual Art - Describe and apply knowledge of the principles of design: balance (symmetrical, asymmetrical).

- Describe and use the elements of art: line, value, shape, texture, color and space in works of art.
- Know how works of art are made with respect to the materials, media, techniques and sources of ideas.
- Discuss observations of visual and expressive features seen in the environment (such as colors, textures, shapes).

Visual Art Expression – The students will observe, select and utilize a variety of ideas and subject matter in creating original works of art.

- Make original works of art using a variety of materials (media) and techniques (skills) and sources for ideas.
- Use observation, memory and imagination in making original works of art.
- Apply knowledge of a basic art vocabulary through experience in making original works of art.

- Demonstrate a basic knowledge of media and techniques in drawing.

Visual Art Appreciation – The student will learn to appreciate visual art as a vehicle of human expression.

- Demonstrate respect for their work and the work of others.
- Demonstrate thoughtfulness and care in completion of artworks.

Whole Child

Thinking/Cognition: Students will identify similarities, differences and interrelationships within the structure of the feather.

Feelings/Emotions: Students understand the importance of perseverance in the lives of Leonardo daVinci and the Wright Brothers. Students displayed perseverance in their drawings.

Doing/Physical: Students integrated the concepts of convex and concave by imitating wing movement while flapping their arms. Students alternated pressure during drawing from extremely light to extremely heavy. Students touch textured paper.

Creating/Intuition: Students create original drawing. Students intuit how form follows function.

Teacher Assessment

Using a scale of 0 to 5 (5=very much, 0=not at all)

____ Student understands the concept of lift through physical demonstration during lesson.

____ Student understands the interrelationship between the structure of a birds' feather and the Wright Brothers' invention of an airplane.

____ Student compares and contrasts characteristics of a feather.

____ Student used a range of values in their drawings.

____ Students' drawings reflect the asymmetry of the feather.

____ The concepts of concave and convex were reflected in the students' work.

Student Assessment	**Absolutely not**		**OK**		**Cool**
1. I thought that this lesson was very interesting.	1	2	3	4	5
2. This is the best drawing that I have ever done.	1	2	3	4	5
3. I liked talking about feathers and flight.	1	2	3	4	5
4. I understand how a bird and an airplane are alike.	1	2	3	4	5
5. I liked having a chance to figure things out by looking and guessing.	1	2	3	4	5