



Flight: How Do We Stay Up There?

Grade Levels 3-6

Unit Overview

Materials

- Student Journal's
- Book: First To Fly, by Peter Busby
- Paper, colored pencils, pencils
- Learning To Fly: The Wright Brother's Adventure (NASA Educational Resource)
- Lab sheet-every student
- K-W-L Form (each student has one)
- Poem: Who Has Seen The Wind? Just introduce to students.
- Article: What is air? (included)
- Balloons, water, straws, bubbles
- Hand-out: What makes a plane go up?
- Plane Diagrams A & B (Provided)
- www.ueet.nasa.gov/StudentSite
- Explanation of plane parts and how they help operate the plane. (Included)
- Pattern for the Dart (Included)
- Scissors, tape measure, paper (stiff), stop watch
- Science Lab Observation Form (included)
- Flight Chart: Time/Distance/Variables (Included)
- Article: What do the wings really do? (included)
- United Streaming/Discovery Education – Magic School Bus Taking Flight
- Plane Movement Diagram (Included)
- Pattern for The Blunt Nose (Included)
- Scissors, measure, paper (stiff), stop watch
- Flight Chart/Lab Procedure (Included)
- Dictionary (If needed)
- Creative Writing Rubric (included)
- Technology Lab – computers for students to access “The Plane Game”
- www.ueet.nasa.gov/studentsite/funandgames.html

Standards

Unit Content Standards	Unit Youth Development Standards
<ul style="list-style-type: none"> • LA.3.1.6.1: Use new vocabulary that is introduced and taught directly. • LA.3.1.6.2: Listen to, read, and discuss familiar and conceptually challenging text. • LA.3.2.2.2: Use information from the text to answer questions related to explicitly stated main ideas or relevant details. • LA.4.1.5.1: Demonstrate the ability to read grade level text. • Social Studies: Strand A / Standard 4. • LA.5.3.1.3: Organize ideas using tools, KWL • LA.5.4.1.1: Write a narrative that establishes a situation, plot, with rising action, conflict, and resolution. • Math: Strand B (Measurement). • Math: Strand D (Data Analysis). • Science: Strand A (Matter). • Science: Strand C (Force & Motion). • Social Studies: Strand B / Standard 1. 	<p>External Assets:</p> <ul style="list-style-type: none"> • 3 • 5 • 10 • 12 • 14 • 16 • 18 <p>Internal Assets:</p> <ul style="list-style-type: none"> • 21 • 22 • 34 • 35 • 36 • 37

Extension Ideas

- Community Involvement – Field trip to local airport or school visit from pilot/guest speaker
- Field Trip – NASA Aeronautics and Space Administration
- Field Trip / School Visit / Computer Program – Flight Simulator
- Multitude of resources available through NASA to investigate flight further

ELL Modifications

- Pictorial Representation
- Books (attempting to find multi-lingual references)
- Internet / Video Presentations
- Dictionaries
- Buddy or Partner Tutoring

Pre/Post- Assessment

Name: _____

Date: _____

Thematic Unit Pre-Assessment

How Do We Stay Up There?

1. How do you think a plane gets up in the sky?

2. How do you think a plane stays up in the sky?

3. Who were the first inventors to fly an airplane and where did they fly it?

Name: _____

Date: _____

Thematic Unit Post-Assessment

How Do We Stay Up There?

1. How do you think a plane gets up in the sky?

2. How do you think a plane stays up in the sky?

3. Who were the first inventors to fly an airplane and where did they fly it?

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Lesson 1: Flight from the Start: the History of Flight

Essential Question:

What is flight/aviation?

Content Standards:

- LA.3.1.6.1: Use new vocabulary that is introduced and taught directly.
- LA.3.1.6.2: Listen to, read, and discuss familiar and conceptually challenging text.
- LA.3.2.2.2: Use information from the text to answer questions related to explicitly stated main ideas or relevant details.
- LA.4.1.5.1: Demonstrate the ability to read grade level text.
- Social Studies: Strand A / Standard 4.

Youth Development Standards:

External Assets:

- 3
- 5
- 10
- 12
- 14
- 16
- 18

Internal Assets:

- 21
- 22
- 34
- 35
- 36
- 37

Vocabulary

- Aeronautics
- Timeline
- Aviation
- Aerodynamics

Teacher Background Knowledge:

- www.nasa.gov – This site has information and resources needed for this lesson.
- The student should understand the history and timeline of flight.
- The students will read and discuss the Wright Brothers Adventure/First to Fly.
- The students will respond to questions pertaining to the Wright Brothers Adventure/timeline.

Materials:

- Timeline poster
- www.nasa.gov/StudentSite
- Student Journal
- Learning To Fly: The Wright Brother's Adventure (NASA Educational Resource)
- Book: First To Fly, by Peter Busby

Procedure:

1. Give students pre-assessment.
2. Introduce students to topic and vocabulary.
3. View & discuss the history of flight timeline.
4. Whole group: Read The Wright Brother's Adventure.
5. Small group: Respond to questions in student journal regarding to the Wright Brother's Adventure.

Formative Assessment:

- Pre-Assessment – This is the assessment given at the beginning and the end of the unit.
- Observation – Teacher should observe listening, writing, reading, discussions, timeline and art work.
- Discussion – What is flight? How do you think flight began? Who were the first to fly?
- Student Journal – Respond to questions from Wright Brother's Adventure and/or timeline.

Questions:

1. In what century did the tower jumpers try to fly?
2. When was the first around-the-world flight performed?
3. How many years has it been since kites were flown in China?
4. How many months passed between the flights of the first man and the first woman to fly across the Atlantic Ocean?
5. How many years passed between the Wright Brothers success and the first space shuttle flight?
6. How long after the invention of the hot-air balloon did it take to actually make it controllable?
7. Who made the first practical helicopter? In which state is his business/manufacturing company?

Lesson 2: Is Air Something? Does Air Take Up Space?

Essential Question:

What is flight/aviation?

Content Standards:

- LA.3.1.6.1: Use new vocabulary that is introduced and taught directly.
- LA.4.1.5.1: Demonstrate the ability to read grade level text.
- LA.3.1.6.2: Listen to, read, and discuss familiar and conceptually challenging text.
- LA.5.3.1.3: Organize ideas using tools, KWL.
- Science Strands – A & C.

Youth Development Standards:

External Assets:

- 3
- 5
- 10
- 12
- 14
- 16
- 18

Internal Assets:

- 21
- 22
- 34
- 35
- 36
- 37

Vocabulary

- Air
- Predict
- Observe
- Evaluate
- Matter

Procedure:

1. Review lesson #1.
2. Introduce vocabulary & lesson.
3. Read the poem to students to introduce wind/air.
4. Read: What is air?
5. K-W-L Questions: “What do we know about matter?” “What do we want to know?” “What have we learned?”
6. “Is Air Something?” Experiment-Follow Lab Sheet.

Formative Assessment:

- K-W-L Chart – through discussion, observation, participation and completion.
- Lab Sheet – students will show comprehension through completion.
- Student Journal – Write definition of matter in journal, along with vocabulary words.

What is Air?

- Air is a physical substance which has weight. It has molecules which are constantly moving. Air pressure is created by the molecules moving around. Moving air has a force that will lift kites and balloons up and down. Air is a mixture of different gases: oxygen, carbon dioxide and nitrogen. All things that fly need air. Air has power to push and pull birds, balloons, kites and planes.
- In 1640, Evangelista Torricelli discovered that air has weight. When experimenting with measuring mercury, he discovered that air put pressure on the mercury.
- Francesco Lana used the discovery to begin to plan for an airship in the late 1600s. He drew an airship on paper that used the idea that air has weight. The ship was a hollow sphere which would have the air taken out of it. Once the air was removed, the sphere would have less weight and would be able to float up into the air. Each of four spheres would be attached to a boat-like structure and then the whole machine would float. The actual design was never tried.
- Hot air expands and spreads out and it becomes lighter than cool air. When a balloon is full of hot air it rises up because the hot air expands inside the balloon. When the hot air cools and is let out of the balloon, the balloon comes back down.

Lesson 3: Does Air Matter when it Comes to Flight? What Makes a Plane Go Up?

Essential Question:

What is flight/aviation?

Content Standards:

- LA.3.1.6.1: Use new vocabulary that is introduced and taught directly.
- LA.4.1.5.1: Demonstrate the ability to read grade level text.
- LA.3.1.6.2: Listen to, read, and discuss familiar and conceptually challenging text.
- LA.5.3.1.3: Organize ideas using tools, KWL, diagrams.

Youth Development Standards:

External Assets:

- 3
- 5
- 10
- 12
- 14
- 16
- 18

Internal Assets:

- 21
- 22
- 34
- 35
- 36
- 37

Vocabulary

- Air
- Matter
- Drag
- Lift
- Thrust
- Aerodynamics
- Gravity
- (Elements of force)

Teacher Background Knowledge:

- Hand-out: What makes a plane go up? (provided) Diagrams A & B (provided)
- Understand the elements of force and how to label diagrams

Materials:

- Poem: Who Has Seen The Wind? Continue
- K-W-L Chart / Continue

- Hand-put: What makes a plane go up?
- Plane Diagrams A & B (provided)

Procedure:

1. Review lesson #2.
2. Introduce vocabulary & lesson.
3. Read the poem, “Who Has Seen the Wind?” Discuss and answer questions.
4. Read: What makes a plane go up?
5. Students label Diagram A / Use Diagram B to correct answers.

Formative Assessment:

- Student Journal – Vocabulary, Questions pertaining to poem.
- Labeled diagrams of airplane with the elements of force.

Who Has Seen The Wind?

By: Christina Rossetti

Who has seen the wind?
Neither I nor you;
But when the leaves hang trembling
The wind is passing thro'
Who has seen the wind?
Neither you nor I;
But when the trees bow down their heads
The wind is passing by.

Questions:

1. What is the poem about?
2. Is wind air?
3. Does the wind move?
4. How do you know wind moves?
5. Why do the trees bow their heads?

What Makes A Plane Go Up?

What makes a plane go up? Air! A plane flies through the air by continually pushing and pulling the surrounding air downward. In response to the force of moving the air down, the air pushes the airplane upward. Newton's 3rd Law of Motion states that for every action there is an equal and opposite re-action. An airplane wing is shaped so that the air is deflected downward as the wing passes. Because air is a fluid (a gas), both the top and the bottom surface of the wing deflect the air. This is very different than dealing with solid pellets for which only the bottom surface would deflect. The faster an airplane travels the more lift is generated. Inclining the wing to the wind also produces more deflection and more lift. The wings of an airplane have adjustable flaps that can be extended or retracted. When extended, the flaps increase the deflection of the air and provide greater lift for takeoff and landing.

As it flies, a plane is in the center of four forces, lift (upward force) and thrust (forward push, provided by a propeller) get a plane into the air. Gravity and drag (air resistance, which is friction caused by air rubbing against the plane) try pulling the plane down and slow its speed. A plane must be built so that lift and thrust are stronger than the pull of gravity and drag by just the right amount. Lift from the wings is used to overcome the force of gravity. Shape is important in overcoming drag. For example, the nose of a plane is rounded so it can push through the air more easily. The front edge of each wing is rounded, too. An airplane built like a railroad boxcar just wouldn't fly very well.

Lesson 4: What Part Is That?

Essential Question:

What is flight/aviation?

Content Standards:

- LA.3.1.6.1: Use new vocabulary that is introduced and taught directly.
- LA.3.1.6.2: Listen to, read, and discuss familiar and conceptually challenging text.
- LA.4.1.5.1: Demonstrate the ability to read grade level text.
- LA.5.3.1.3: Organize ideas using tools: diagram.

Youth Development Standards:

- Support: 5
- Empowerment: 8, 9, 10
- Boundaries and Expectations: 12, 14, 16
- Constrictive Use of Time: 17, 18
- Commitment to Learning: 21, 22, 24
- Positive Identity: 37, 38, 39, 34

Teacher Background Knowledge:

- www.nasa.gov – This site has information and resources that can be used for all lessons
- Ability to label a diagram of a plane (diagram included)
- Written explanation of how plane parts assist with the flying of the airplane (included)

Materials:

- www.nasa.gov/StudentSite
- www.ueet.nasa.gov/StudentSite
- Diagram of plane / labeled
- Explanation of plane parts and how they help operate the plane (included)

Procedure:

1. Review lesson #3.
2. Introduce students to topic and vocabulary.
3. Whole group, read explanation of how the parts of an airplane assist with flight of airplane.
4. Students can work with partner/group to label their diagrams of airplane.

Vocabulary

- Airfoils
- Ailerons
- Elevators
- Fins
- Flaps
- Fuselage
- Gas turbine
- Landing gear
- Rudders
- Slates
- Spoilers
- Tails
- Wings

Formative Assessment:

- Student Journal – vocabulary is written in journal daily.
- Plane Diagram – labeled by student.

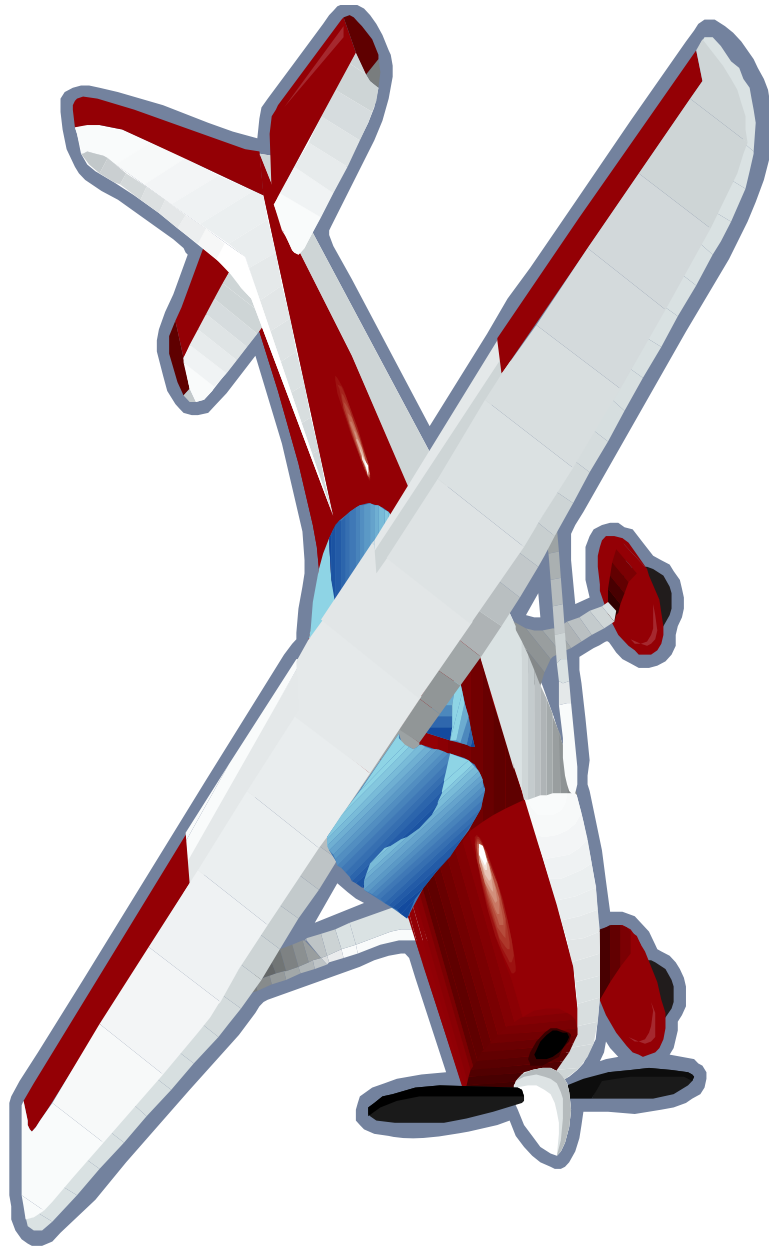
Parts of a Plane

The body of a plane is called the **fuselage**. It is generally a long tube shape. The wheels are called the **landing gear**. There are two main wheels on either side of the plane's fuselage. Then there is one more wheel near the front of the plane. The brakes for the wheels are like the brakes for cars. They are operated by pedals, one for each wheel. Most landing gear can be folded into the fuselage during the flight and opened for landing.

All planes have **wings**. The wings are shaped with smooth surfaces. There is a curve to the wings which helps push the air over the top more quickly than it goes under the wing. As the wing moves, the air flowing over the top has farther to go and it moves faster than the air underneath the wing. So the air pressure above the wing is less than below it. This produces the upward lift. The shape of the wings determines how fast and high the plane can fly. Wings are called **airfoils**.

The hinged control surfaces are used to steer and control the airplane. The flaps and ailerons are connected to the backside of the wings. The **flaps** slide back and down to increase the surface of the wing area. They also tilt down to increase the curve of the wing. The **slats** move out from the front of the wings to make the wing space larger. This helps to increase the lifting force of the wing at slower speeds like takeoff and landing. The **ailerons** are hinged on the wings and move downward to push the air down and make the wing tilt up. This moves the plane to the side and helps it turn during flight. After landing, the **spoilers** are used like air brakes to reduce any remaining lift and slow down the airplane.

The **tail** at the rear of the plane provides stability. The **fin** is the vertical part of the tail. The **rudder** at the back of the plane moves left and right to control the left or right movement of the plane. The **elevators** are found at the rear of the plane. They can be raised or lowered to change the direction of the plane's nose. The plane will go up or down depending on the direction that the elevators are moved.





Lesson 5: Let's Try to Fly! Flight Demonstration with "The Dart"

Essential Question:

How do planes stay in the sky?

Content Standards: 3rd, 4th, 5th, & 6th

- LA.3.1.6.1: Use new vocabulary that is introduced and taught directly.
- LA.3.1.6.2: Listen to, read, and discuss familiar and conceptually challenging text.
- LA.4.1.5.1: Demonstrate the ability to read grade level text.
- LA.5.3.1.3: Organize ideas using tools: diagram, follow pictorial directions, chart.
- Math: Strand B (Measurement).
- Science: Strand C (Force & Motion).

Youth Development Standards:

External Assets:

- 3
- 5
- 10
- 12
- 14
- 16
- 18

Internal Assets:

- 21
- 22
- 34
- 35
- 36
- 37

Teacher Background Knowledge:

- www.nasa.gov – This site has information and resources that can be used for all lessons.
- Procedure to complete Dart Plane and experiment. (included)
- Newton's Laws of Motion (vocabulary sheet)

Materials:

- www.nasa.gov/StudentSite

Vocabulary

- Predict
- Observe
- Gravity
- Weight
- Aerodynamics
- Evaluate

- Pattern for the Dart, Scissors, Tape Measure, Paper (Stiff), stop watch
- Science Lab Observation Form (included)
- Flight Chart: Time/Distance/Variables (Incl)

Procedure:

1. Review lesson #4.
2. Introduce students to topic and vocabulary.
3. Discuss: Laws of Motion
4. Perform the Dart Lab – make Dart plane, students then complete SLOF with the distance and time of flights.
5. Closure: Discuss data from experiment.
- 6.

Formative Assessment:

- Student Journal – vocabulary is written in journal daily / Laws of Motion
- Science Lab Observation Form (SLOF) – completed by students when experiment has concluded.
- Dart Plane Chart – experiment chart filled in with distances and times.

Procedure: Dart Plane

1. Fold a sheet of paper lengthwise, exactly down the middle. Unfold it and smooth the paper flat.
2. Fold one of the corners over as far as the center fold. Then fold the other corner over in the same way.
3. Fold the corners over again so that they meet at the center fold.
4. Fold the two sides together along the center fold. Then, to make wings, fold the top portion of each side down toward the center fold.
5. Use a small piece of tape to fasten the wings together. If you wish, you can snip off about 1 cm for the plane's nose. Tape together the keel (paper under the wings) at both ends.
6. Predict what will happen when you launch The Dart. Use the Science Lab Observation Form (SLOF).
7. Launch the Dart by holding it at the back of the keel and throwing. How long does the Dart stay in the air? How far can you throw it?
8. Observe and record observations on the SLOF.
9. Teacher will elicit discussion as to how planes can be altered. What effect will each variable have on the flight of the plane? (Add a paper clip to the nose, fold elevators down.)
10. Allow flight time with variables and have students record their new observations. Put data in a table.
11. Closure: Discuss what changes were made and what effect they had on the flight time and distance.

Flight Chart

The Dart Plane

Launch	Time in Flight (seconds)	Distance (inches)	Changes made to plane
1			None
2			Added paper clip to nose
3			Elevators down
4			Added paper clip and elevators down

Science Lab Observation Form (SLOF)

Scientist: _____ Date: _____

Subject/Topic: _____

Procedure – This is what I will do.

Prediction – This is what I think will happen.

Observation – This is what I saw happen.

Evaluation – This is why I think it happened, and this is what I learned.

Lesson 6: What Do the Wings Really Do?

Essential Question:

How do planes stay in the sky?

Content Standards:

- LA.3.1.6.1: Use new vocabulary that is introduced and taught directly.
- LA.3.1.6.2: Listen to, read, and discuss familiar and conceptually challenging text.
- LA.4.1.5.1: Demonstrate the ability to read grade level text.
- LA.5.3.1.3: Organize ideas using tools: diagram, follow pictorial directions, chart.
- Science: Strand C (Force & Motion).

Youth Development Standards:

External Assets:

- 3
- 5
- 10
- 12
- 14
- 16
- 18

Internal Assets:

- 21
- 22
- 34
- 35
- 36
- 37

Vocabulary

- Pitch
- Roll
- Yaw
- Laws of motion

Teacher Background Knowledge

- www.nasa.gov – This site has information and resources that can be used for all lessons
- Newton’s Laws of Motion (vocabulary sheet)
- Article: What do wings really do? (included)
- Discovery Education – (Online) Magic School Bus Taking Flight: A Story About Flight
- Use previous lessons for resources

Materials:

- www.nasa.gov/StudentSite

- Science Lab Observation Form (included)
- Article: What do the wings really do? (included)
- United Streaming/Discovery Education – Magic School Bus Taking Flight
- Plane Movement Diagram (Included)

Procedure:

1. Review lesson #5.
2. Introduce students to topic and vocabulary.
3. Read article: What do wings really do? Discuss article.
4. Give students plane diagram and have them label the plane’s movements according to arrows.
5. View – Magic School Bus Taking Flight (United Streaming/Discovery Education)

Formative Assessment:

- Student Journal – vocabulary is written in journal daily / Laws of Motion
- Plane Diagram – Label planes movements.

What Do the Wings Really Do?

Airplane wings are curved on the top which make air move faster over the top of the wing. The air moves faster over the top of the wing. It moves slower underneath the wing. The slow air pushes up from below while the faster air pushes down from the top. This forces the wing to lift up into the air.

Let’s pretend that our arms are wings. If we place one wing down and one wing up we can use the **roll** to change the direction of the plane. We are helping to turn the plane by **yawing** toward one side. If we raise our nose, like a pilot can raise the nose of the plane, we are raising the **pitch** of the plane. All these dimensions together combine to control the flight of the plane. A pilot of a plane has special controls that can be used to fly the plane. These are levers and buttons that the pilot can push to change the yaw, pitch and roll of the plane.

To **roll** the plane to the right or left, the ailerons are raised on one wing and lowered on the other. The wing with the lowered aileron rises while the wing with the raised aileron drops.

Pitch is to make a plane descend or climb. The pilot adjusts the elevators on the tail to make a plane descend or climb. Lowering the elevators caused the airplane’s nose to drop, sending the plane downward. Raising the elevators cause the airplane to climb.

Yaw is the turning of a plane. When the rudder is turned to one side, the airplane moves left or right. The airplane’s nose is pointed in the same direction as the direction of the rudder. The rudder and the ailerons are used together to make a turn.

Lesson 7: Flight Demonstration with “The Blunt Nose”

Essential Question:

How do planes stay in the sky?

Content Standards:

- LA.3.1.6.1: Use new vocabulary that is introduced and taught directly.
- LA.3.1.6.2: Listen to, read, and discuss familiar and conceptually challenging text.
- LA.4.1.5.1: Demonstrate the ability to read grade level text.
- LA.5.3.1.3: Organize ideas using tools: diagram, follow pictorial directions, chart.
- Math: Strand B (Measurement).
- Science: Strand C (Force & Motion).

Youth Development Standards:

External Assets:

- 3
- 5
- 10
- 12
- 14
- 16
- 18

Internal Assets:

- 21
- 22
- 34
- 35
- 36
- 37

Teacher Background Knowledge:

- www.nasa.gov – This site has information and resources that can be used for all lessons
- Procedure to complete The Blunt Nose and experiment (included)
- Use information from prior lessons to assist with lesson and discussion

Materials:

- www.nasa.gov/StudentSite

Vocabulary

- Aerodynamics
- Predict
- Observe
- Gravity
- Weight
- Evaluate
- Compare
- Contrast

- Pattern for The Blunt Nose, scissors, measure, paper (stiff), stop watch
- Science Lab Observation Form (included)
- Flight Chart: Time/Distance/Variables (Included)

Procedure:

1. Review lesson #6.
2. Introduce students to topic and vocabulary.
3. Perform The Blunt Nose Lab – make Blunt Nose plane, students then complete SLOF with the distance and time of flights. Compare information from the Dart experiment.
4. Closure: Discuss data from experiment.

Formative Assessment:

- Student Journal – vocabulary is written in journal daily
- Science Lab Observation Form (SLOF) – completed by students when experiment has concluded.
- Blunt Nose Plane Chart – experiment chart filled in with distances & times.

Procedure: The Blunt Nose Plane

1. Fold up one corner of a sheet of paper to the opposite side. Unfold the paper.
2. Fold up the other corner of the paper. Unfold it.
3. Fold up the bottom edge of the paper so that the crease goes through the spot where the first two creases cross. Unfold the paper.
4. Fold the paper along the creases like an accordion.
5. Fold down both corners of the pleat toward the center tip.
6. Fold up the two bottom points of the first layer of paper.
7. Fold up the bottom tip of the second layer of paper so that it covers the other points.
8. Now comes the tricky part. Look for the two pockets. Underneath these pockets are two, triangular flaps. Tuck these flaps into the pockets to hold them securely in place.
9. Turn the paper over. Fold both wing tips toward the center.
10. Fold out the edge of each wing.
11. Crease the center front of the plane to give it a gentle, upward curve. You're ready to launch.
12. Predict what will happen when you launch the Blunt Nose. Use SLOF.
13. Launch the Blunt Nose. How long does it stay in the air? How far can you throw it?
14. Observe and record observations on the SLOF.
15. Discussion time. What effect will each variable have on the flight of the plane?
16. Allow flight time with variables and record new observations.
17. Closure: Discuss what changes were made and what effect they had on the flight time and distance. Compare and contrast the Blunt Nose with The Dart.

Flight Chart

The Blunt Nose

Launch	Time in Flight (seconds)	Distance (inches)	Changes made to plane
1			None
2			Added paper clip to nose
3			Elevators down
4			Added paper clip & elevators down

Science Lab Observation Form (SLOF)

Scientist: _____ Date: _____

Subject/Topic: _____

Procedure – This is what I will do.

Prediction – This is what I think will happen.

Observation – This is what I saw happen.

Evaluation – This is why I think it happened, and this is what I learned.

Lesson 8: Create Your Own Plane!

Essential Question:

How do planes stay in the sky?

What is aviation?

Content Standards:

- LA.3.1.6.1: Use new vocabulary that is introduced and taught directly.
- LA.3.1.6.2: Listen to, read, and discuss familiar and conceptually challenging text.
- LA.4.1.5.1: Demonstrate the ability to read grade level text.
- LA.5.3.1.3: Organize ideas using tools: diagram, follow pictorial directions, chart.
- Math: Strand B (Measurement).
- Math: Strand D (Data Analysis).
- Science: Strand C (Force & Motion).

Youth Development Standards:

External Assets:

- 3
- 5
- 10
- 12
- 14
- 16
- 18

Internal Assets:

- 21
- 22
- 34
- 35
- 36
- 37

Teacher Background Knowledge:

- www.nasa.gov – This site has information and resources that can be used for all lessons
- Use information from prior lessons to assist with lesson and discussion
- Paper Airplane Procedure/Construction

Materials:

- www.nasa.gov/StudentSite

Vocabulary

- Predict
- Observe
- Gravity
- Weight
- Evaluate

- Scissors, measuring tape, paper (stiff), stop watch
- Science Lab Observation Form (included)
- Flight Chart/Lab Procedure (Included)

Procedure:

1. Review lesson #7.
2. Introduce students to topic and vocabulary.
3. Discuss lab with students and assist where needed.
4. Closure: Discuss results of lab/compare student's results. If time permits, form a graph of class information.

Formative Assessment:

- Student Journal – vocabulary is written in journal daily.
- Science Lab Observation Form (SLOF) – completed by students when experiment has concluded.
- Flight Chart – completed during lab by each student.

Flight Chart

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Launch	Time in Flight (seconds)	Distance (inches)	Changes made to plane
1			None
2			Added paper clip to nose
3			Elevators down
4			Added paper clip and elevators down

Science Lab Observation Form (SLOF)

Scientist: _____ Date: _____

Subject/Topic: _____

Procedure – This is what I will do.

Prediction – This is what I think will happen.

Observation – This is what I saw happen.

Evaluation – This is why I think it happened, and this is what I learned.

Procedure

1. Students will create and name their own plane for the longest duration and/or flight distance.
2. Students will record the flight and distance of each plane.
3. Students will repeat this activity for four flights.
4. Students will find the average of their four flights.
5. If time permits, the teacher will make a graph of the overall distances.

Extension: Students will decorate their planes and display them for a contest.

Lesson 9: Let's Go On A Journey!

Essential Question:

What is aviation?

How do planes stay in the sky?

Content Standards:

- LA.3.1.6.2: Listen to, read, and discuss familiar and conceptually challenging text.
- LA.4.1.5.1: Demonstrate the ability to read grade level text.
- LA.5.4.1.1: Write a narrative that establishes a situation, plot, with rising action, conflict, and resolution.

Youth Development Standards:

External Assets:

- 3
- 5
- 10
- 12
- 14
- 16
- 18

Vocabulary

- Review words from previous lessons

Internal Assets:

- 21
- 22
- 34
- 35
- 36
- 37

Teacher Background Knowledge:

- www.nasa.gov – This site has information and resources that can be used for all lessons
- Use information from prior lessons to assist with lesson and discussion
- Discuss the procedure the students will have to follow for their creative writing assignment (included)
- Completion of creative writing activity

Materials:

- Paper, pencil, journal, dictionary (if needed), previous notes/materials from lessons, Creative Writing Rubric (included)

Procedure:

1. Review lesson #8.
2. Introduce students to topic and review any needed vocabulary terms.
3. Discuss the Creative Writing Procedure.
4. As students complete creative writing, they will have a rubric completed to assess their assignment.

Formative Assessment:

- Creative Writing Rubric – each student will have a rubric completed to assess the assignment.

Procedure

1. Students will begin brainstorming, utilizing the complete writing process, according to their grade level, to initiate and complete this activity.
2. Students will:
 - Create a fictional essay about a plane trip over a place they have seen or have been.
 - Describe the view from their plane.
 - Map the course of travel (ex: city to city / place to place)
 - List sights of interest such as, important buildings, tourist attractions, theme parks.
 - Include weather conditions.
 - Write a detailed description of your plane.
 - Determine duration of your trip, how long did it last.
 - Include character sketches/descriptions of passengers on the trip.

Remember, make it exciting and fun!

Creative Writing Rubric Score: _____

Name: _____ Date: _____

Topic: Write a fictional essay about a plane trip over a place you've seen or have been.

Content:

- Does the essay have a title? _____
- Does the writing follow the topic? _____
- Does it have a beginning, middle, and end? _____
- Does it describe the view as seen from the plane? _____
- Does it include a map of the course of travel? _____
- Does it list sights of interest in your city? _____
- Does it include weather conditions? _____
- Does it tell how long the trip will take? _____
- Does it include a detailed description of your plane? _____
- Does it include character sketches/details of passengers aboard? _____
- Mechanics: (Punctuation, Grammar, Spelling)

_____ 10 Possible Points

Teacher:

Comments: _____

Lesson 10: “The Plane Game”

Essential Question:

What is aviation?

How do planes stay in the sky?

Content Standards:

- LA.3.1.6.2: Listen to, read, and discuss familiar and conceptually challenging text.
- LA.4.1.5.1: Demonstrate the ability to read grade level text.
- LA.5.4.1.1: Write a narrative that establishes a situation, plot, with rising action, conflict, and resolution.
- LA.5.6.4.1: Use appropriate technology to achieve a purpose.
- Social Studies: Strand B / Standard 1.

Youth Development Standards:

External Assets:

- 3
- 5
- 10
- 12
- 14
- 16
- 18

Vocabulary

- Review words from previous lessons

Internal Assets:

- 21
- 22
- 34
- 35
- 36
- 37

Teacher Background Knowledge:

- www.nasa.gov – This site has information and resources that can be used for all lessons.
- Use information from prior lessons to assist with lesson and discussion.
- Completion of creative writing activity.
- Access computer lab so students can perform “The Plane Game” on the NASA Site.

Materials:

- Paper, pencil, journal
- Technology Lab – computers for students to access “The Plane Game”
- www.ueet.nasa.gov/studentsite/funandgames.html
- Measuring cups, note cards (2 per student)

Procedure:

1. Review lesson #9.
2. Introduce students to topic and review any needed vocabulary terms.
3. Review the Creative Writing Procedure.
4. As students complete creative writing, they can get on computer for “The Plane Game”.

Formative Assessment:

- Creative Writing Rubric – each student will have a rubric completed to assess the assignment.
- “The Plane Game” – through observation and technology, the teacher can see how much the student has learned about flight and airplanes. This will test their knowledge of aeronautics.
- Thematic Unit Post-Assessment

Appendix

Supplemental Lesson Information