

Flight! gliders to jets

Context (InTASC 1,2,3)

Lesson Plan Created By: Alyssa Horpedahl

Created:

Lesson Topic: Flight

Grade Level: 3-4th Grade

Duration: 4 - 50 minute sessions

Kit Contents: http://odin-primo.hosted.exlibrisgroup.com/nmy:nmy_all:ODIN_ALEPH007372786

Desired Results (InTASC 4)

Purpose: Students will understand the Engineering Design Process. They will be able to apply it to the design of a paper airplane. They will understand the forces that act on flying objects.

North Dakota Science Content Standards:

- Science Standards: Forces and Motion
 - PS.2.2 (Kindergarten) Analyze data to determine if a design solution works as intended to change the speed or direction of an object with a push or a pull.

North Dakota Engineering Design Content Standards

- Engineering Design standards: Defining Engineering problems
 - ETS.1a (Kindergarten-Grade 2) A situation that people want to change or create can be approached as a problem to be solved through engineering. Such problems may have many acceptable solutions.

North Dakota Writing Content Standards:

- Writing Standards: Research to build and present knowledge
 - W.8 (Grade 3) Recall information from experiences or gather information from print and digital sources; take brief notes on sources and sort evidence into provided categories.

Objectives:

1. Students will be able to identify the forces acting on an airplane and use that knowledge to design a paper airplane that stays in the air the longest.

Assessment Evidence (InTASC 6)

Evidence of meeting desired results: Pilot's license quiz and successful paper airplane design.

Learning Plan (InTASC 4,5,7,8)

Instructional Strategy: (Check all that apply)

Direct Indirect Independent Experiential Interactive

Technology Use(s): (Check all that apply)

Student Interaction Align Goals Differentiate Instruction Enhance Lesson

Collect Data N/A

Hook and Hold:

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- **Day 1:**

Have the lights off when the students come into the classroom. Explain to them they will become flight experts today and will be earning their paper airplane pilots license. In order to earn this license they will need to be able to explain the four forces acting on an airplane when it is in flight.

Show the students the BrainPop video:
<https://www.brainpop.com/technology/transportation/flight/>
- **Day 2:**

Show Bill Nye the Science Guy about Flight found at the following link:
<https://vimeo.com/83625163>
(22 minutes long).
- **Day 3:**

Hand out pilots' licenses to students. Explain how they are now going to use their new knowledge to become aeronautical engineers. Show video below to explain what an engineer is:
<https://www.youtube.com/watch?v=owHF9iLyxic>

Materials:

- ActiveBoard/SmartBoard with internet access & sound
- Pilot's License Certificate (attached at the bottom of this lesson)
- EDP Paper Airplane Engineer Badge (attached)
- Engineering Design Process Worksheet (attached)
- "Flight! Gliders to Jets" Science Kit w/Activity Guide Pages (attached)
- Other materials needed are listed in the activity guide but are all easily found in the science kit.

Procedures:

Day 1:

1. Demonstrate Activity 1 "Falling and Floating" to remind students how gravity and air resistance works (attached at the bottom of this lesson).
2. Show students on large airplane printout (attached at the bottom of this lesson) where and how gravity and drag (air resistance) acts on the airplane.
3. Demonstrate Activity 5 in the Activity Guide found in the science kit, "Flight! Gliders to Jets." This activity teaches students about air pressure and how it can be used to move and lift objects. (Activity Guide copies attached at the bottom of this lesson).
4. Show students where lift acts on the airplane on the large airplane printout.
5. Use the rubber band powered propeller in the kit to demonstrate the idea of thrust. Label thrust on the large airplane printout.
6. Introduce Activity 8 "Flight Control" to the students and explain how the procedure will go first thing in class tomorrow. They will each get their own glider and will be experimenting with elevators and rudders on the glider.
7. Take down the large airplane printout and give students the quiz at the bottom. Tell them

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that this is their practice test for their pilot's license and that the actual test will be tomorrow.

Day 2:

1. Hand out gliders. Go through Activity 8 "Flight Control" in the activity guide together as a class.
2. Review forces acting on an airplane.
3. Give airplane quiz (attached below).

Day 3:

1. Hand out Engineering Design Process worksheet for the students.
2. Go through each step of the worksheet together. They will each be creating their own paper airplane so they should be doing their work independently.
3. Give students a deadline of tomorrow for flight testing/competition.

Day 4:

1. Flight test day!
2. For the "Communication" step in the EDP have the students create a quick presentation to give to the class explaining their design. Use the rubric below to grade their presentation (presentation must include the four forces acting on an airplane).
3. Hand out "Paper Airplane Engineer" Badges to the kids for their accomplishment once the EDP has been completed.

Summary: (Included in Engineering Design Process Above)

Reflection (InTASC 9)

Reflect On:

- *Preparation*
- *Planning*
- *Teaching*
- *Student Engagement and Participation*

Evidence of Student Learning

Standards

Council of Chief School Officers. (2011, April) *Interstate Teacher Assessment and Support Consortium (InTASC) model core teaching standards: a resource for state dialogue*. Washington DC. Retrieved from

http://www.ccsso.org/documents/2011/intasc_model_core_teaching_standards_2011.pdf

North Dakota Department of Public Instruction. (2011) *North Dakota English language arts & literacy content standards*. Bismarck, ND. Retrieved from https://www.nd.gov/dpi/uploads/87/ELA_JUN0811.pdf

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