

My Brothers' Flying Machine

4-5 Grade STEM Start-Ups



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1. MY BROTHERS' FLYING MACHINE (4-5)

Primary Resource: *My Brothers' Flying Machine* by Jane Yolen

Adapted by: McGraw Hill Education



1.1. INTRODUCTION

Wilbur and Orville Wright were American inventors and pioneers of aviation. In this activity, students will read closely *My Brothers' Flying Machine* by Jane Yolen. This picture book provides a look at the lives of Orville and Wilbur Wright as seen through the eyes of their younger sister, Katharine, as she provides support and inspiration to her brothers. Students will gather details and examples in the text when referring to what the text says and when making inferences. Furthermore, students will write an opinion paragraph using the prompt: How did the Wright brothers change the world?

Finally, students complete an engaging design challenge. Students will design a paper airplane and analyze how weight affects the flight of a paper airplane. The students will engage effectively in a range of collaborative discussions with diverse partners to build on others' ideas and express their own clearly. Students will review ideas expressed and draw conclusions in light of information and knowledge gained from the discussions.

1.2. MATERIALS

- *My Brothers' Flying Machine* by Jane Yolen
- Tutorials / Pamphlets on How to Make a Paper Airplane
- Construction Paper
- Tape
- Handful of Coins
- Ruler

1.3. LANGUAGE ARTS WORK

1.3.1. EXPLORE THE TEXT

Students will read closely and answer the following questions in their reading journal:

- According to the author, the Wright brothers were very close. Can you find evidence on page 1 and 10 to support the author's perspective of their relationship?
- This story is narrated by whom?
- Where did the Wright brothers go to test their first powered aircraft?

- Find a detail from the text that supports the fact that the Wright brothers were clever inventors.
- How did the Wright brothers decide who would pilot their airplane on its first flight?
- When the Wright brothers' first aircraft was not successful, they decided to _____.

1.3.2. PART 2

Students will read closely and respond to the following writing prompt in their reading journal: *How did the Wright brothers change the world? Write a paragraph explaining your answer and support it with details/evidence from the text.*

1.4. DESIGN CHALLENGE

The motor began: Cough, chug a chug, chug a chug. The plane raced forward into a strong wind and into history. The Wright brothers did it! Their first flight lasted 12 seconds! Since then, planes have not only been developed to travel longer and farther distances but to also carry cargo. Your task is to create an airplane that will carry cargo (pennies which will be taped on). The goal is for the airplane to fly at least 10 feet with your cargo attached. You can only use construction paper, ruler, tape, and coins. You may want to complete more than one attempt to observe the best place on your airplane to apply weight. Good luck!

1.5. DESIGN PROCESS

In their journal the students will answer the following questions:

- Ask:
 - What is the problem?
 - What are the materials?
 - What are the constraints?
- Brainstorm:
 - What are some ideas?
- Plan:
 - Draw and label a sketch for your solution
- Test
 - Was your challenge successful? Why or why not?
- Improve/Reflection:
 - If you were to do the challenge over, what would you keep the same and what would you do differently? (Justify/Provide evidence for each answer.)

1.6. RUBRIC

Category	Developing (1)	Good (2)	Excellent (3)	Score
Language Arts Work	Answers are not correct. Evidence/details from the text does not correlate with the writing prompt.	Answers are on track but not fully correct. Evidence/details from the text is attempted to support writing prompt.	Questions are answered correctly. Evidence/details from the text support the writing prompt.	
Design Process	<p>Brainstorming: Ideas are unclear to connect to problem.</p> <p>Plan/Create/Build: The design and model is not aligned with the criteria, constraints, and intent of the problem.</p> <p>Improve/Reflection: Student only explains one concept: either what would be kept the same or what would be changed. Also, does not provide evidence for response.</p>	<p>Brainstorming: Ideas are somewhere aligned to problem but needs explanation to make clear.</p> <p>Plan/Create/Build: The design and model is somewhat aligned with the criteria, constraints, and intent of the problem.</p> <p>Improve/Reflection: Student explains what would be kept the same and what would be changed, but does not provide evidence for response.</p>	<p>Brainstorming: Ideas are aligned to problem.</p> <p>Plan/Create/Build: The design and model is aligned with the criteria, constraints, and intent of the problem.</p> <p>Improve/Reflection: Student explains what would be kept the same and what would be changed. Provides evidence for response.</p>	
Collaboration	<p>Ignores and distracts others.</p> <p>Shows no understanding of project and has a negative attitude during work time.</p> <p>Argues with others and does not ask or answer any questions.</p>	<p>Listens respectfully and follows directions.</p> <p>Shows understanding of project and sometimes argues with others.</p> <p>Asks and answers questions.</p>	<p>Listens respectfully and engages in discussion.</p> <p>Shows understanding of project and has a positive attitude during work time. Never argues with others.</p> <p>Asks and answers questions and provides evidence to support answers.</p>	

1.7. RESOURCES

This 5 Step Engineering Design Process template can help the students answer the questions for the design process during their challenge:

- The Works: The Hands On Museum <http://teachers.egfi-k12.org/wp-content/uploads/2010/05/Post-lesson-Student-Activities-Engineers-and-the-Engineering-Design-Process.pdf>
- How to make a paper airplane: <https://youtu.be/qhuRw88A-8c>