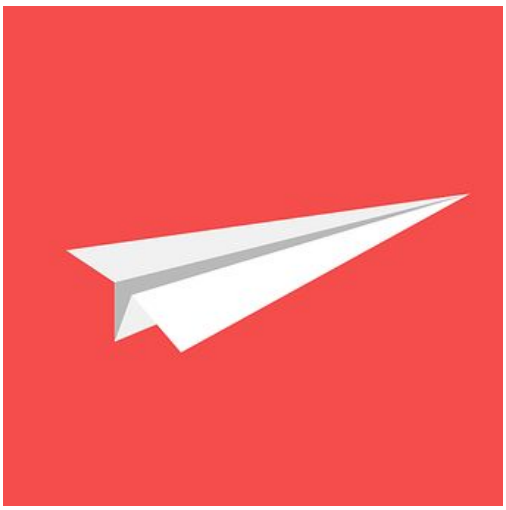
Air: Design a Paper Airplane

Grades: K-2 Timeframe: 1 Week



The Purpose of This Resource:

This STEM challenge can be used during an air unit. Students are able to find ways to best minimize air resistance. The students are trying to develop a paper airplane that will go the farthest in the class competition.

Stage 1 - Desired Results

Big Idea(s)
We can create an airplane that minimizes the air resistance so it will travel a greater distance.

PA Core Standards / Next Generation Science Standards

T & E Education	Science Education	Mathematics Education	Computer Science	CEW
3.2.4.D. Inquiry and Design: Recognize and use the technological design process to solve problems. • Recognize and explain basic problems. • Identify possible solutions and their course of action. • Try a solution. • Describe the solution, identify its impacts and modify if necessary. • Show the steps taken and the results.	**3.2.4.C. Inquiry and Design:** Recognize and use the elements of scientific inquiry to solve problems. • Generate questions about objects, organisms and/or events that can be answered through scientific investigations. • Design an investigation. • Conduct an experiment. • State a conclusion that is consistent with the information.	**CC.2.4.2.A.1 Measurement, Data, and Probability** Measure and estimate lengths in standard units using appropriate tools.	**CSTA.1B06 Collaboration, Visualization, and Computation.** Organize and present collected data visually to highlight relationships and support a claim.	**13.1.3. Career Awareness and Preparation** E. Describe the work done by school personnel and other individuals in the community.

Essential Questions
• How can I minimize the air resistance of an airplane?

Students Will Know	Students Will Be Doing

• Content specific vocab
  ○ Air Resistance
  ○ Parachute
  ○ Gravity
  ○ Aerodynamics
  ○ Drag
  ○ Lift
  ○ Thrust
• Steps of Design Process
	• Students will understand the ideas and vocabulary words about air.
	• Students will plan and create a paper airplane.
	• Students will test and re-design their airplanes.
	• Students will go back and re-test their planes.

Stage 2 - Evidence of Understanding

Assessments (Formative and Summative):	Performance Task(s)
● If the teacher is using an Air Unit then the students should complete the end of unit of assessment.	● The teacher can check over the worksheet documenting the Engineering by Design process. ● The teacher can use observations throughout the lesson.

Stage 3 - Lesson Learning Targets

Learning Activities:

I Can Statement:

I can find ways to maximize the air resistance of a parachute.

Lesson 1: Introduction to Need or Problem

Lesson Focus: Students will understand the key concepts and vocabulary about air.

Materials:

- Projector
- Quizlet: https://quizlet.com/_5qwztn
- Video That Includes a Description of Air and Vocab. Words: https://www.youtube.com/watch?v=Zovq8fjnxfQ
- Paper
- Worksheet

Procedure:

- Show the students the video to provide some background information: **https://www.youtube.com/watch?v=Zovq8fjnxfQ**
- Use Quizlet with students to review the different vocabulary words.
- Students should sketch a picture of a plan that they think would be able to travel the farthest.

Lesson 2: Create a Prototype

Lesson Focus: Students will design a prototype.

Materials:

- Paper

Procedure:
- The students need to design a prototype.

Lesson 3: Test the Prototype

Lesson Focus: Students test the prototype.

Materials:

- Paper
- Ruler

Procedure:
- Students should test their out their planes.
- The students should measure the distance.

Lesson 4: Re-Design

Lesson Focus: Students re-design the prototype.

Materials:

- Paper

Procedure:
- The students will write about what went well, and students will write about what they will change.
- Students will re-design their airplane.

Lesson 5: Re-Test

Lesson Focus: Students re-test the prototype.

Materials:

- Ruler
- Worksheet

Procedure:

- Re-test the paper airplanes.
- Measure the new distance.
- Record and sketch a picture of the new design.

STEM Challenge: Design a Paper Airplane

Sketch an Idea

Reflections

What Went Well?	What Do You Want to Change?

Re-Design Sketch