

# Air Mail STEM



**LOW PREP  
VALENTINE'S DAY  
STEM CHALLENGE**

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K-5<sup>TH</sup> GRADE

CREATED BY BROOKE BROWN

- ✓ SIMPLE SUPPLIES
- ✓ INTERACTIVE ANCHOR CHARTS
- ✓ VISUAL VOCABULARY
- ✓ QR CODE RESEARCH
- ✓ REFLECTION QUESTIONS

# Air Mail

You want to deliver a secret message to your friend across the classroom.

Construct a paper airplane that will fly the farthest distance.




**MATERIALS:**

- Copy paper
- Secret Code (optional)
- Yardstick or measuring tape

## Air Mail

### REAL WORLD EXAMPLES




What is similar? What is different?

Forces of Flight

### Main Parts of an Airplane




Other Things That Use Forces of Flight




## WORDS TO KNOW

### thrust




the force of flight that pushes an object forward

### drag




force on an object in the air that reduces forward motion

### lift



force that pushes an object upward



### gravity





force of attraction of objects to the center of the Earth

## EXPLORE FLIGHT



### FORCES OF FLIGHT



### THE WRIGHT BROTHERS

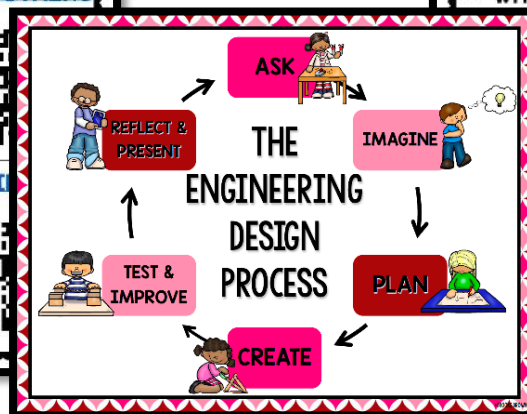



### FOLD N FLY

### MAKE A PAPER AIRPLANE



## LET'S REFLECT!

- What was most difficult about this challenge?
- Which airplane designs flew the farthest and why?
- Which design had the most lift and why?
- Which design had the least drag and why?
- Are your paper airplane designs similar to real airplanes?
- Are your paper airplane designs different from real airplanes?
- If you completed this challenge again, what would you do differently next time?

# DIFFERENTIATED RECORDING SHEETS FOR K-5<sup>TH</sup> GRADE

## LOWER GRADES

## Air Mail

Name: \_\_\_\_\_

### MY BLUEPRINT

Draw a picture of your airplane.

Force used to **THROW** the airplane:

Force that holds the airplane **UP**:

Force that **SLOWS** the airplane down:

How far did your plane fly?

TEST 1	
TEST 2	
TEST 3	

## UPPER GRADES

## Air Mail

Name: \_\_\_\_\_

### BLUEPRINT

How far did your airplane fly?

TEST 1	
TEST 2	
TEST 3	

Force used to **THROW** the airplane:

Force that holds the airplane **UP**:

Force that **SLOWS** the airplane down:

Force that **PULLS** the airplane to the ground:

Which design flew the farthest and why do you think so?

What improvements did you make to your design?

## DIGITAL GOOGLE SLIDES NOTEBOOK

# Air Mail

You want to deliver a secret message to your friend across the classroom.

Construct a paper airplane that will fly the farthest distance.

### MATERIALS:

- Copy paper
- Secret Code (optional)
- Yardstick or measuring tape

### STEM Challenge Assessment Rubric

Challenge: \_\_\_\_\_

Date: \_\_\_\_\_

Student Name: \_\_\_\_\_

3	2	1
Student followed all instructions for challenge.	Student followed some instructions for challenge.	Student did not follow instructions for challenge.
Student used best effort and perseverance on challenge.	Student used some effort and perseverance on challenge.	Student did not show effort or perseverance on challenge.
Student completed assigned blueprint and reflection sheet.	Student partially completed assigned blueprint and reflection sheet.	Student did not complete assigned blueprint and reflection sheet.
Student showed accuracy in testing, calculating, and measuring.	Student showed some accuracy in testing, calculating, and measuring.	Student did not show accuracy in testing, calculating, or measuring.
Student fully cooperated with group members and contributed fairly.	Student partially cooperated with group members and contributed fairly.	Student struggled to cooperate with group members and/or failed to contribute.
Student fully participated in class discussions.	Student somewhat participated in class discussions.	Student did not participate in class discussions.

TOTAL POINTS: \_\_\_\_\_ /18

Comments: \_\_\_\_\_

## We Need STEM Supplies!

Dear Families, We are learning all about Science, Technology, Engineering, and Math through STEM lessons, and we need your help! If you are able to donate any of the following supplies for our STEM Challenge, please detach and return the form below and send back to school with your child. We greatly appreciate your support and generosity!

We are in need of the following items by \_\_\_\_\_:

Thank you so much for helping to make our STEM lessons possible! Please contact me at \_\_\_\_\_ with any questions.

Sincerely, \_\_\_\_\_

All you are able to donate, please detach and return the form below:

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Parent Name(s): \_\_\_\_\_

Child's Name: \_\_\_\_\_

I am able to donate: \_\_\_\_\_



# SAY Hello TO STRESS-FREE STEM!

SUPPLIES CHECKLIST			
STEM CHALLENGE	ITEM	NUMBER PER GROUP	I HAVE IT
Air Mail	copy paper	3-4 sheets	
	copy of secret code template	1	
	yardstick or measuring tape	1	
STANDARDS ALIGNMENT			
CHALLENGE	ENGINEERING	SCIENCE	MATH
Air Mail	K-2-ETS1 Engineering Design K-2-ETS1-1, 3-5-ETS1-2, 3-5-ETS1-3 3-5-ETS1 Engineering Design 3-5-ETS1-1, 3-5-ETS1-2, 3-5-ETS1-3	K-PS2 Motion and Stability: Forces and Interactions 3-PS2 Motion and Stability: Forces and Interactions 4-PS3 Energy 5-PS2 Motion and Stability: Forces and Interactions	MP1: Make sense of problems and persevere in solving them. MP2: Reason abstractly and quantitatively. MP4: Model with mathematics. MP6: Attend to precision. MP7: Use appropriate tools strategically.

## SUPPLIES CHECKLIST & STANDARDS ALIGNMENT

### CHALLENGE OVERVIEW

### MATERIALS

### STEP BY STEP INSTRUCTIONS

## STEM CHALLENGE: Air Mail

**OVERVIEW:** This challenge is always a favorite! Students experiment with different designs of paper airplanes, test them to see which designs fly the farthest, and measure the distances for each flight. You may choose to have students follow some of the tutorials provided on "Explore Flight" or let them come up with unique designs. As an added extension, students may use the provided "Secret Code" template to write coded Valentine's messages to classmates on their airplanes.

**KEY SKILLS:** Forces of Flight (gravity, thrust, drag, lift), Measurement

**SUGGESTED READ ALOUDS:** [Flight by Robert Burleigh](#), [Violet the Pilot by Steve Breen](#), [After the Fall by Dan Santat](#)

**MATERIALS PER GROUP:** 3-4 sheets of copy paper, copy of secret code template, yardstick or measuring tape

## LESSON PLAN

1. Activate students' prior knowledge by asking them to share what they already know about forces of flight and how airplanes work.
2. Share and discuss the videos on "Explore Flight."
3. Hold a class discussion, using the teacher chart and real world examples to guide student thinking. (You can project the chart on an interactive whiteboard or document camera.) Record their ideas on the teacher chart.
4. Introduce the STEM challenge and permitted materials.
5. Introduce and discuss key vocabulary cards related to the challenge.
6. Have students sketch blueprints of their designs on their recording sheets.
7. Distribute materials and allow students 45-60 minutes with partners or small groups to construct their paper airplanes, write secret codes, test their airplanes, and measure the distances they travel.
8. Hold a whole class closing discussion and reflection, allowing students to share their paper airplane designs. Use the "Let's Reflect" poster to guide the discussion.

### KEY SKILLS

### SUGGESTED READ ALOUDS