

# February STEM

## LOW PREP Valentine's challenges

**HOUSE OF  
CARDS**



**AIR  
MAIL**



**CANDY  
BOX**

CREATED BY BROOKE BROWN

# 3 LOW PREP STEM CHALLENGES + BONUS BRAINBUILDER ACTIVITY

## HOUSE OF CARDS



## CANDY BOX



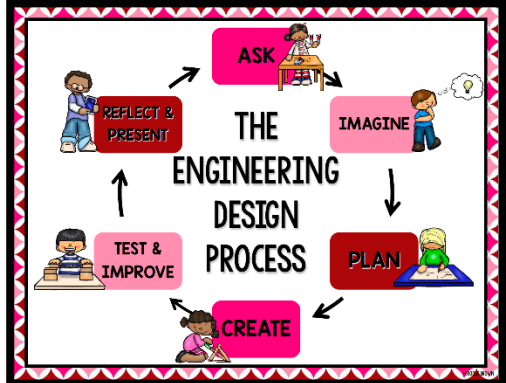
## AIR MAIL



## CANDY DISPENSER

BONUS  
BRAINBUILDER


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



### House of cards

You want to create a special house for your toys to live in.

Construct the tallest possible structure out of cards and tape.




**MATERIALS:**

- Playing cards or index cards
- Masking tape
- Ruler

### candy Box

You need to carry enough candy to school for your whole class to share.

Construct a box that will hold the most pieces of candy possible.



**MATERIALS:**

- Candy such as conversation hearts or chocolate kisses
- Options for box construction: construction paper (2 sheets per group), playdough, or building bricks

### 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



### BRAINBUILDER candy Dispenser

Work with your team to create a handheld device that dispenses candy.



You may create your candy dispenser using 2 toilet paper rolls, 1 ft. of aluminum foil, tape, scissors, and markers.





### WORDS TO KNOW

<b>triangular prism</b> a three-dimensional solid with two triangular bases and three rectangular faces 	<b>rectangular prism</b> a three-dimensional solid with six rectangular faces 
<b>truss</b>	<b>foundation</b>

### WORDS TO KNOW



<b>container</b> an object used to hold or transport something 	<b>solid</b> firm or stable in shape 
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### WORDS TO KNOW

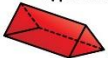

<b>thrust</b> the force of flight that pushes an object forward 	<b>drag</b> force on an object in the air that reduces forward motion 
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### House of cards

REAL WORLD EXAMPLES

Types of Prisms




What is similar? What is different?

Structures with Trusses

Card House Tips

### candy Box

REAL WORLD EXAMPLES

Types of Containers

What is similar? What is different?

Things That are Measured using Capacity

Calculating Volume

### Air Mail

REAL WORLD EXAMPLES













Main Parts of an Airplane







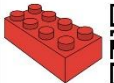

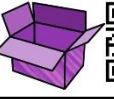

Forces of Flight

Other Things That Use Forces of Flight









### EXPLORE HOUSES

<b>RECORD-BREAKING CARD HOUSE</b>  	<b>TRUSSES</b>  
<b>3D SOLIDS AND NETS</b>  	<b>SHAPES IN ARCHITECTURE</b>  

### EXPLORE VOLUME & CAPACITY

<b>CAPACITY</b>  	<b>VOLUME</b>  
<b>BUILDING BRICK BOX</b>  	<b>ORIGAMI BOX</b>  

### EXPLORE FLIGHT

<b>FORCES OF FLIGHT</b>  	<b>THE WRIGHT BROTHERS</b>  
<b>FOLD N FLY</b>  	<b>MAKE A PAPER AIRPLANE</b>  

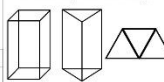
# DIFFERENTIATED RECORDING SHEETS FOR K-5<sup>TH</sup> GRADE

**House of cards** Name: \_\_\_\_\_

**MY BLUEPRINT**

COLOR the shapes that you used in your design.  
CIRCLE the shapes that were strongest!

Draw a picture of your house.



Measure the height of your house.

**candy BOX** Name: \_\_\_\_\_

**MY BLUEPRINT**

What material did you use?

Draw a picture of your box.

How many pieces of candy fill in your box?

**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: \_\_\_\_\_

**candy Dispenser** Name: \_\_\_\_\_

**BLUEPRINT**

Explain how your candy dispenser works.

**House of cards** Name: \_\_\_\_\_

**BLUEPRINT**

Measure the height of your house.

TEST 1  
(5 min.)

TEST 2  
(10 min.)

TEST 3  
(15 min.)

Show or write the two-dimensional and three-dimensional shapes that you used in your house design.

**candy BOX** Name: \_\_\_\_\_

**BLUEPRINT**

Which building material did you choose and why?

MEASUREMENTS		
LENGTH	WIDTH	HEIGHT
VOLUME: _____		
= _____ x _____ x _____		

How many pieces of candy fill in \_\_\_\_\_

What improvements can be made to your box?

**Air Mail** Name: \_\_\_\_\_

**BLUEPRINT**

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 did you think so?

How far did your airplane fly?

TEST 1  
TEST 2  
TEST 3

What improvements did you make to your design?

**LET'S REFLECT!**

- What was most difficult about this challenge?
- Which three dimensional shapes did you use in your structure?
- Which shapes were strongest and why do you think so?
- How is your house similar to and different from real houses?
- What could your house be used for?
- If we completed this challenge again, what would you do differently next time?

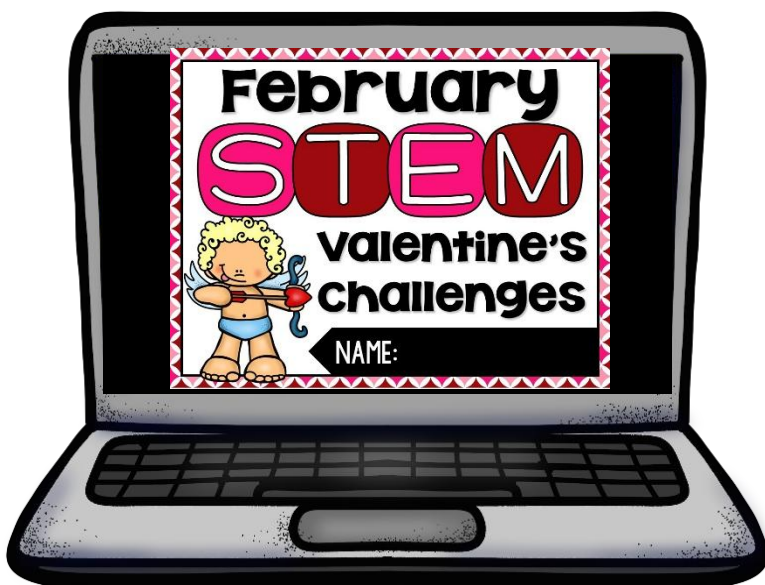
**LET'S REFLECT!**

- What was most difficult about this challenge?
- Which material was easiest to use to build a box and why?
- Which style of box held the most pieces of candy?
- How do you calculate the volume of your box?
- How do the length, width, and height affect the capacity of the container?
- If we completed this challenge again, what would you do differently next time?

**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?
- How are your paper airplane designs similar to real airplanes?
- How are your paper airplane designs different from real airplanes?
- If we completed this challenge again, what would you do differently next time?

## DIGITAL GOOGLE SLIDES NOTEBOOK



**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 recording 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, and 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: \_\_\_\_\_

**My February STEM Journal**

NAME: \_\_\_\_\_



**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 Challenges, 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, \_\_\_\_\_

*If you are able to donate, please detach and return the form below.*

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

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

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

# SAY Hello TO STRESS-FREE STEM!

## SUPPLIES CHECKLIST

FEBRUARY SUPPLIES CHECKLIST	STEM CHALLENGE	ITEM	NUMBER PER GROUP	I HAVE IT
	House of Cards	playing cards or index cards	40	
		masking tape	6 Ft.	
		ruler	1	
	Candy Box	building bricks	1 small tub	
		construction paper	2 sheets	
		playdough	1 cup	
	Air Mail	candy conversation hearts (or other small candies)	30	
		ruler	1	
		copy paper	3-4 sheets	
BONUS BRAINBUILDER: Candy Dispenser	Air Mail	secret code template	1	
		yardstick or measuring tape	1	
	BONUS BRAINBUILDER: Candy Dispenser	toilet paper rolls	2	
		scissors and markers	1	
		aluminum foil	1 Ft.	
	BONUS BRAINBUILDER: Candy Dispenser	scotch tape	1 roll	
		small candy pieces	20	

## STANDARDS ALIGNMENT

FEBRUARY STANDARDS ALIGNMENT			
CHALLENGE	ENGINEERING	SCIENCE	MATH
House of Cards	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	2-Structure and Properties of Matter •Action/Reaction Forces, tension and compression Forces, weight, balance, stability	1-1 Make sense of problems and persevere in solving them 1-2-Reason abstractly and quantitatively 1-3-Use appropriate tools strategically 1-6-Attend to precision 1-7-Look for and make use of structure
Candy Box	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	2-Structure and Properties of Matter •Volume and Capacity	1-1 Make sense of problems and persevere in solving them 1-2-Reason abstractly and quantitatively 1-3-Use appropriate tools strategically 1-6-Attend to precision 1-7-Look for and make use of structure
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	1-1 Make sense of problems and persevere in solving them 1-2-Reason abstractly and quantitatively 1-3-Use appropriate tools strategically 1-6-Attend to precision 1-7-Look for and make use of structure
BONUS BRAINBUILDER: Candy Dispenser	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	4-PS3 Energy 5-PS2 Motion and Stability: Forces and Interactions	1-1 Make sense of problems and persevere in solving them 1-2-Reason abstractly and quantitatively 1-3-Use appropriate tools strategically

### CHALLENGE OVERVIEW

### 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

### KEY SKILLS

### MATERIALS

### 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.

### SUGGESTED READ ALOUDS

### STEP BY STEP INSTRUCTIONS