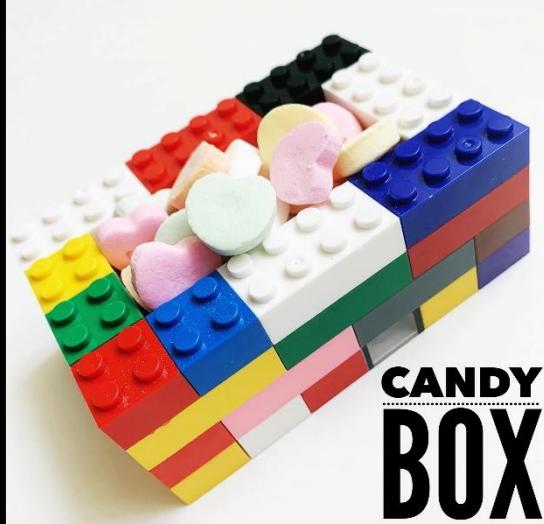


February STEM LOW PREP valentine's challenges

HOUSE OF
CARDS



CREATED BY BROOKE BROWN

3 LOW PREP STEM CHALLENGES + BONUS BRAINBUILDER ACTIVITY

HOUSE OF CARDS



CANDY BOX



AIR MAIL

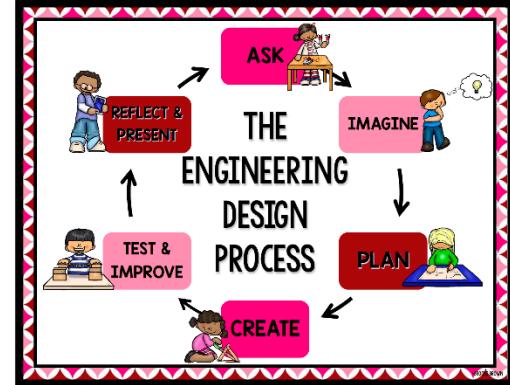


BONUS
BRAINBUILDER

CANDY DISPENSER



- ✓ 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

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.

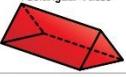


You may create your candy dispenser using 2 toilet paper rolls, 1 ft. of aluminum foil, tape, scissors, and markers.

WORDS TO KNOW

triangular prism

a three-dimensional solid with two triangular bases and three rectangular faces



rectangular prism

a three-dimensional solid with six rectangular faces



truss

foundation

HOUSE OF CARDS

REAL WORLD EXAMPLES

Types of Prisms

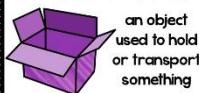
What is similar? What is different?

Structures with Trusses

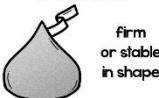
Card House Tips

WORDS TO KNOW

container



solid



firm or stable in shape

volume

capacity

Candy Box

REAL WORLD EXAMPLES



Types of Containers



What is similar? What is different?

Things That are Measured using

Calculating Volume

EXPLORE HOUSES

RECORD-BREAKING CARD HOUSE

TRUSSES

3D SOLIDS AND NETS

SHAPES IN ARCHITECTURE

CAPACITY

VOLUME

BUILDING BRICK BOX

ORIGAMI BOX

WORDS TO KNOW

thrust



the force of flight that pushes an object forward

drag



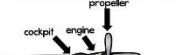
Force on an object in the air that reduces forward motion

Air Mail

REAL WORLD EXAMPLES



Main Parts of an Airplane



Forces of Flight

What is similar? What is different?

Other Things That Use Forces of Flight

EXPLORE FLIGHT

FORCES OF FLIGHT

THE WRIGHT BROTHERS

FOLD N FLY

MAKE A PAPER AIRPLANE

EXPLORE HOUSES

RECORD-BREAKING CARD HOUSE

TRUSSES

3D SOLIDS AND NETS

SHAPES IN ARCHITECTURE

CAPACITY

VOLUME

BUILDING BRICK BOX

ORIGAMI BOX

DIFFERENTIATED RECORDING SHEETS FOR K-5TH GRADE

House of cards

MY BLUEPRINT

Draw a picture of your house.

Measure the height of your house.

Color the shapes that you used in your design. Circle the shapes that were strongest.

candy Box

MY BLUEPRINT

Draw a picture of your box.

How many pieces of candy fit in your box?

What material did you use?

Air Mail

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

BLUEPRINT

Explain how your candy dispenser works.

House of cards

BLUEPRINT

Measure the height of your house.

TEST 1 (0 min.)
TEST 2 (10 min.)
TEST 3 (20 min.)

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

Color the shapes that were strongest.

candy Box

BLUEPRINT

Which building material did you choose and why?

MEASUREMENTS

LENGTH	WDTN	HEIGHT
x	x	x
=		

VOLUME:

How many pieces of candy fit in

What improvements can be made to your box?

Air Mail

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:

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?

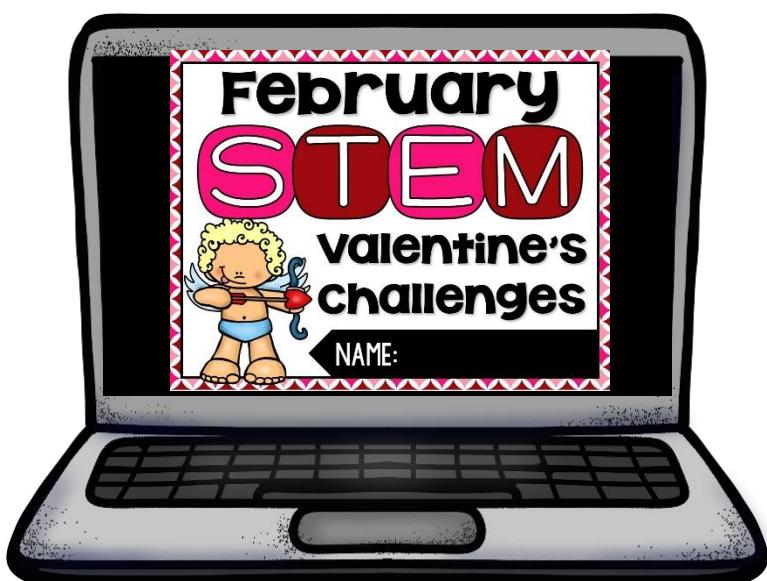
LET'S REFLECT!

- 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



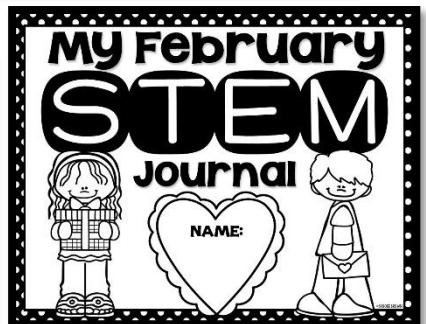
STEM Challenge Assessment Rubric

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, 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 lessons, please fill out 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.

If you are able to donate, please attach and return the form below:

Parent Name(s): _____
Child's Name: _____
I am able to donate: _____

SAY Hello TO STRESS-FREE STEM!

SUPPLIES CHECKLIST

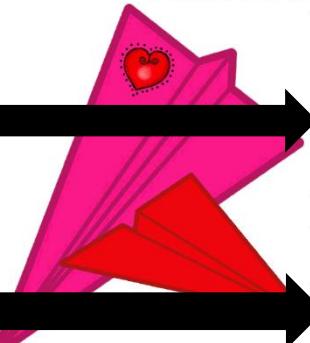
STEM CHALLENGE	ITEM	NUMBER PER GROUP	I HAVE IT
House of Cards	playing cards or index cards	40	
	masking tape	6 ft.	
	ruler	1	
Candy Box	building bricks	1 small tub	
	construction paper	2 sheets	
	playdough	1 cup	
	candy conversation hearts (or other small candies)	30	
Air Mail	ruler	1	
	copy paper	3-4 sheets	
	secret code template	1	
BONUS BRAINBUILDER: Candy Dispenser	yardstick or measuring tape	1	
	toilet paper rolls	2	
	scissors and markers	1	
	aluminum foil	1 ft.	
	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-ETS1-2, 3-5-ETS1-3 3-5-ETS1 Engineering Design: 3-5-ETS1-1-3-ETS1-2, 3-5-ETS1-3	2 Structure and Properties of Matter •Action/Reaction Forces, tension and compression forces, weight, balance, stability	MP1 Make sense of problems and persevere in solving them MP2 Reason abstractly and quantitatively MP3 Model with mathematics MP5 Use appropriate tools strategically MP7 Look for and make use of structure
Candy Box	K-2-ETS1 Engineering Design: K-2-ETS1-1-3-ETS1-2, 3-5-ETS1-3 3-5-ETS1 Engineering Design: 3-5-ETS1-1-3-ETS1-2, 3-5-ETS1-3	2 Structure and Properties of Matter •Volume and Capacity	MP1 Make sense of problems and persevere in solving them MP2 Reason abstractly and quantitatively MP3 Model with mathematics MP5 Use appropriate tools strategically MP7 Attend to precision MP8 Look for and make use of structure
Air Mail	K-2-ETS1 Engineering Design: K-2-ETS1-1-3-ETS1-2, 3-5-ETS1-3 3-5-ETS1 Engineering Design: 3-5-ETS1-1-3-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	MP1 Make sense of problems and persevere in solving them MP2 Reason abstractly and quantitatively MP3 Model with mathematics MP5 Use appropriate tools strategically MP6 Attend to precision MP8 Use appropriate tools strategically
BONUS BRAINBUILDER: Candy Dispenser	K-2-ETS1 Engineering Design: K-2-ETS1-1-3-ETS1-2, 3-5-ETS1-3 3-5-ETS1 Engineering Design: 3-5-ETS1-1-3-ETS1-2, 3-5-ETS1-3	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 MP3 Model with mathematics MP5 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

MATERIALS

KEY SKILLS

SUGGESTED READ ALOUDS

STEP BY STEP INSTRUCTIONS

LESSON PLAN

- Activate students' prior knowledge by asking them to share what they already know about forces of flight and how airplanes work.
- Share and discuss the videos on "Explore Flight."
- 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.
- Introduce the STEM challenge and permitted materials.
- Introduce and discuss key vocabulary cards related to the challenge.
- Have students sketch blueprints of their designs on their recording sheets.
- 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.
- 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.