# Valentine's Day STEM


## Candy Box Challenge

CREATED BY BROOKE BROWN

# contents

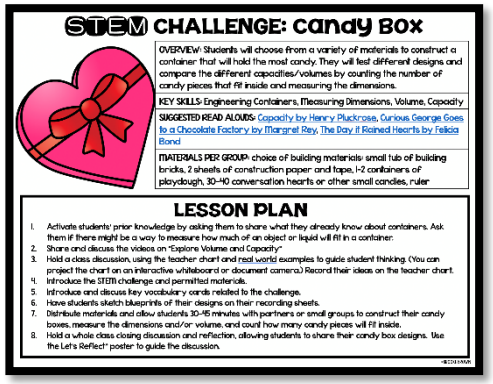
# How to use

The following STEM/STEAM challenge is designed to be completed with partners or in small groups. You will need to allow 45-60 minutes for the full activity to be completed. Needed supplies are inexpensive and can be found in your classroom or at most craft stores.

# components

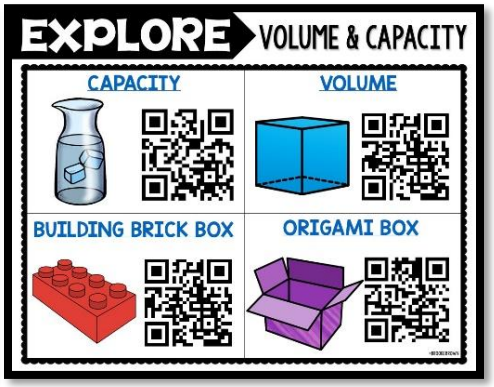
## LESSON PLAN

- Overview
- Skills
- Read Aloud Ideas
- Supplies

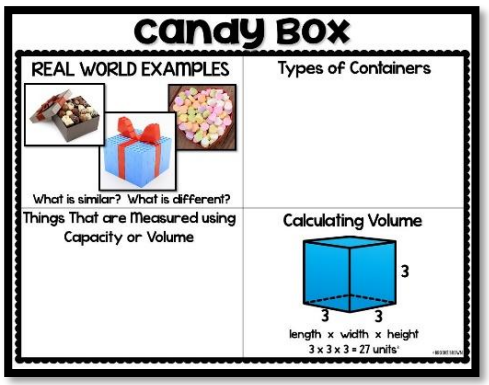



## STUDENT INSTRUCTIONS

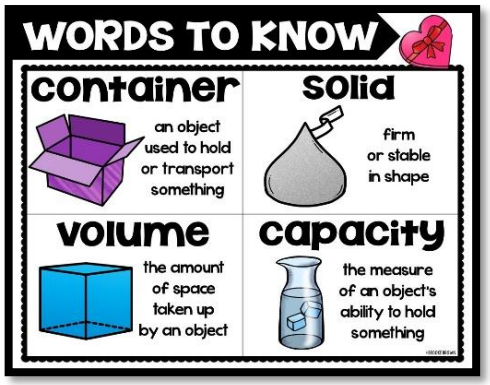

## QR CODE WEBSITES & VIDEOS



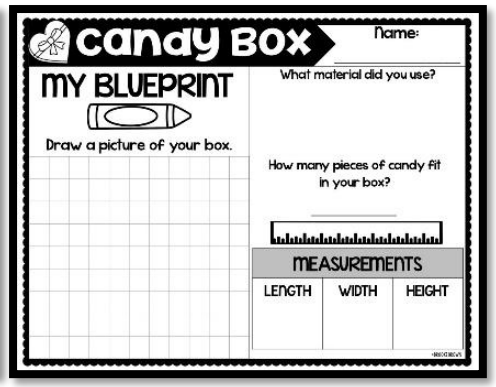

## TEACHER ANCHOR CHART



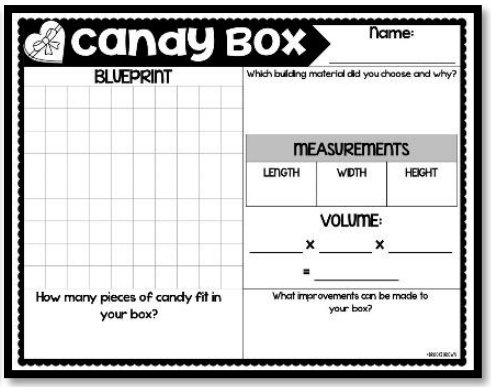

## KEY VOCABULARY



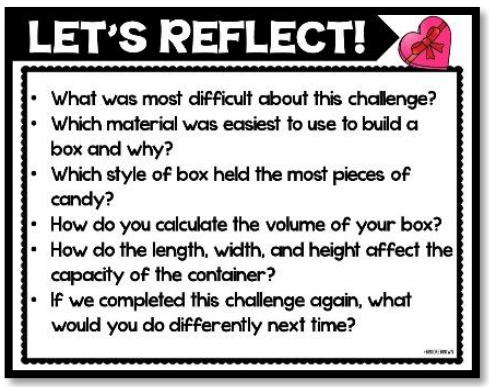

## K-2nd RECORDING SHEET




## 3rd-5th RECORDING SHEET



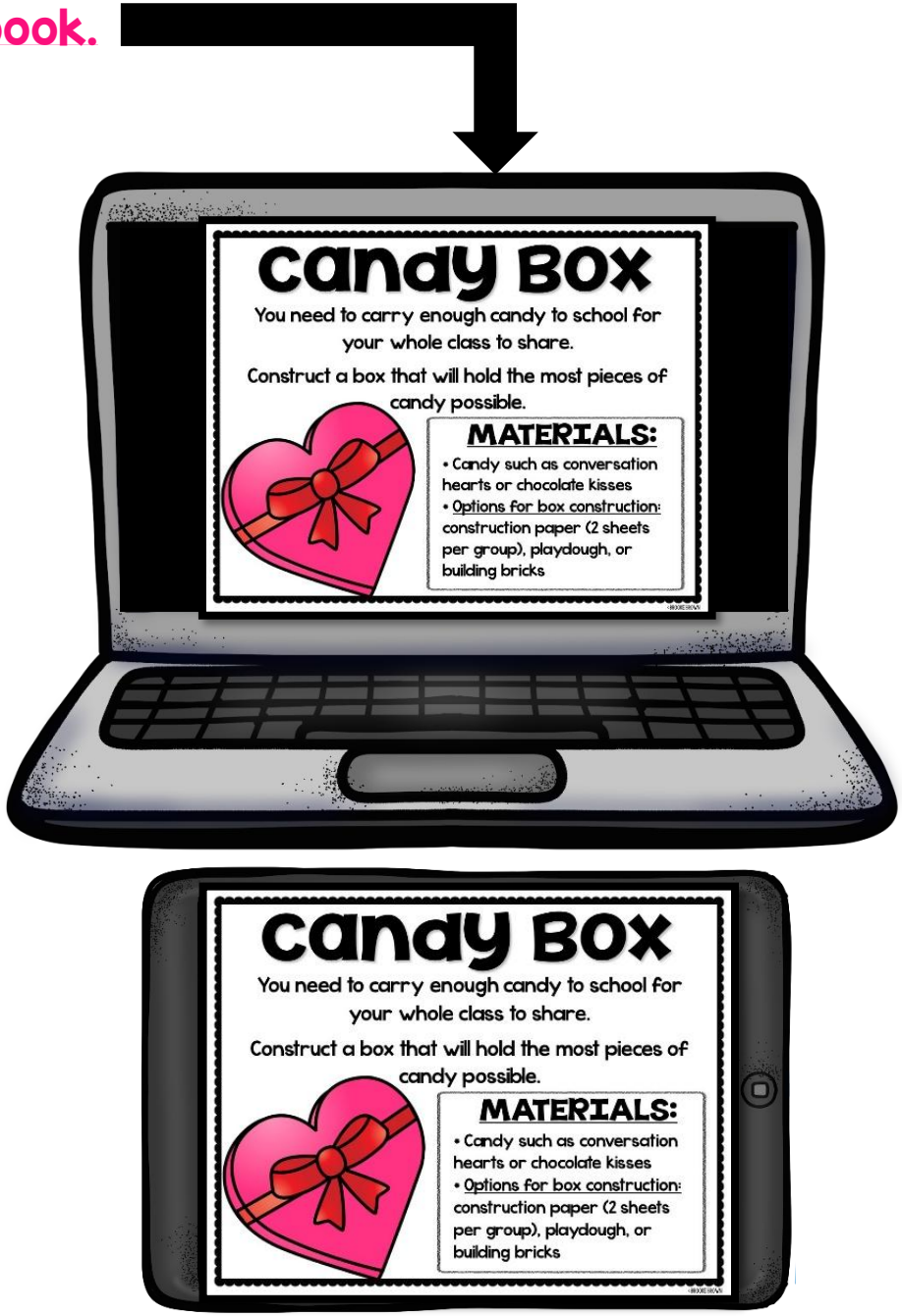

## REFLECTION DISCUSSION QUESTIONS



# Optional Google Slides Notebook

1. Download Link for the Google Slides Notebook.
2. Sign into your Google Account.
3. MAKE A COPY of the notebook.

Each student will need their own Google account if they will be working on their own Digital Interactive notebook using Google Slides. If your students will be using iPads, they will also need to download the Free Google Slides App for the digital notebook to work properly.

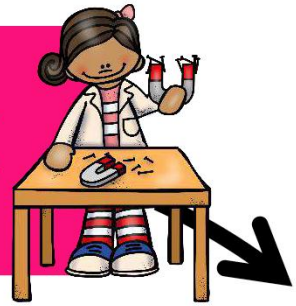



Before you and your students begin editing/filling in your digital notebook, it is VERY important to first save a copy of the file on your own Google Drive, and then edit the copy. Your students will follow these same steps when you share the file with them.

YOU DO NOT WANT YOUR STUDENTS TO EDIT THE ORIGINAL FILE.

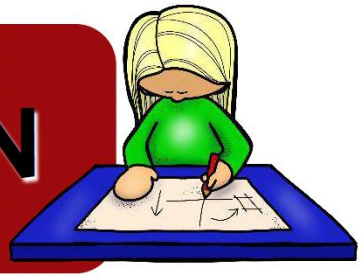
# THE ENGINEERING DESIGN PROCESS

ASK



IMAGINE

PLAN



CREATE

TEST & IMPROVE

REFLECT & PRESENT

# SUPPLIES CHECKLIST

| STEM CHALLENGE | CHOICE OF BUILDING MATERIALS | NUMBER PER GROUP | I HAVE IT |
|---|---|---|---|
| Candy Box | building bricks | small tub | |
| | playdough | 1-2 containers | |
| | construction paper and tape | 2 sheets | |
| | conversations hearts or other small candy | varies | |
| | ruler | 1 | |

# STANDARDS ALIGNMENT

| CHALLENGE | ENGINEERING | SCIENCE | MATH |
|---|---|---|---|
| Candy Box | K-2-ETSI Engineering Design: K-2-ETSI-1, 3-5 ETSI-2, 3-5 ETSI-3<br><br>3-5-ETSI Engineering Design: 3-5-ETSI-1, 3-5 ETSI-2, 3-5 ETSI-3 | 2.Structure and Properties of Matter<br><br>•Volume and Capacity | MP1: Make sense of problems and persevere in solving them<br>MP.2: Reason abstractly and quantitatively<br>MP.4: Model with mathematics<br>MP.5: Use appropriate tools strategically<br>MP.6: Attend to precision<br>MP.7: Look for and make use of structure |

# STEM CHALLENGE: Candy Box

**OVERVIEW:** Students will choose from a variety of materials to construct a container that will hold the most candy. They will test different designs and compare the different capacities/volumes by counting the number of candy pieces that fit inside and measuring the dimensions.

**KEY SKILLS:** Engineering Containers, Measuring Dimensions, Volume, Capacity

**SUGGESTED READ ALOUDS:** Capacity by Henry Pluckrose, Curious George Goes to a Chocolate Factory by Margret Rey, The Day it Rained Hearts by Felicia Bond

**MATERIALS PER GROUP:** choice of building materials: small tub of building bricks, 2 sheets of construction paper and tape, 1-2 containers of playdough, 30-40 conversation hearts or other small candies, ruler

## LESSON PLAN

1. Activate students' prior knowledge by asking them to share what they already know about containers. Ask them if there might be a way to measure how much of an object or liquid will fit in a container.
2. Share and discuss the videos on "Explore Volume and Capacity"
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 30-45 minutes with partners or small groups to construct their candy boxes, measure the dimensions and/or volume, and count how many candy pieces will fit inside.
8. Hold a whole class closing discussion and reflection, allowing students to share their candy box designs. Use the Let's Reflect" poster to guide the discussion.

# Candy Box

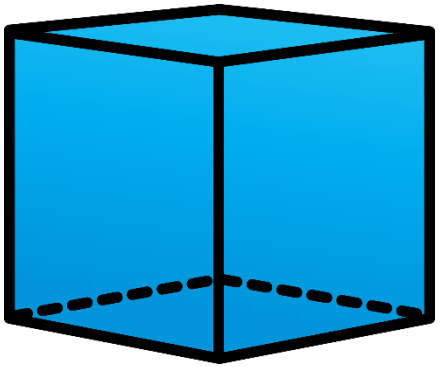
## POSSIBLE PRODUCTS

(for teacher reference only)

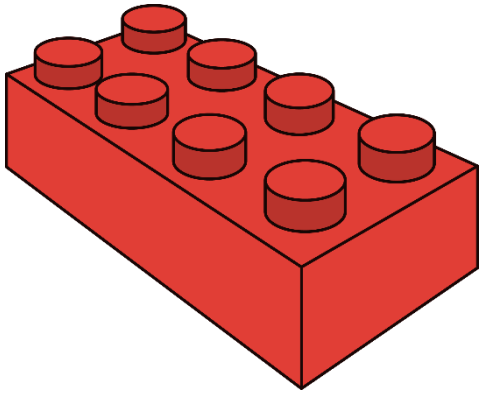
# EXPLORE VOLUME & CAPACITY

## CAPACITY

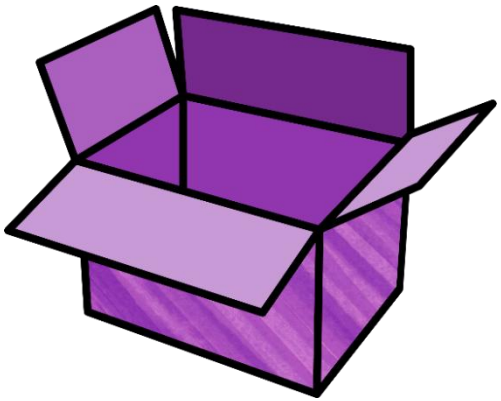
## VOLUME



## BUILDING BRICK BOX



## ORIGAMI BOX



# Candy Box

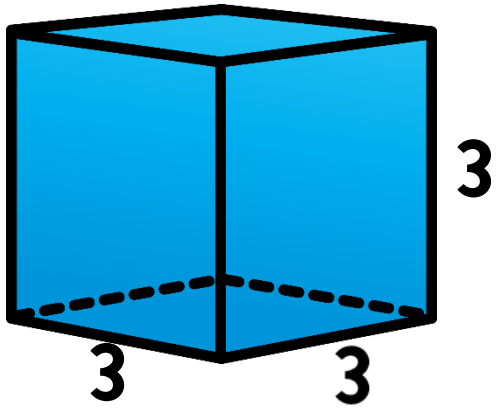
## REAL WORLD EXAMPLES

What is similar? What is different?

## Types of Containers

## Things That are Measured using Capacity or Volume

## Calculating Volume




length x width x height

$3 \times 3 \times 3 = 27$ units$^3$

# 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.

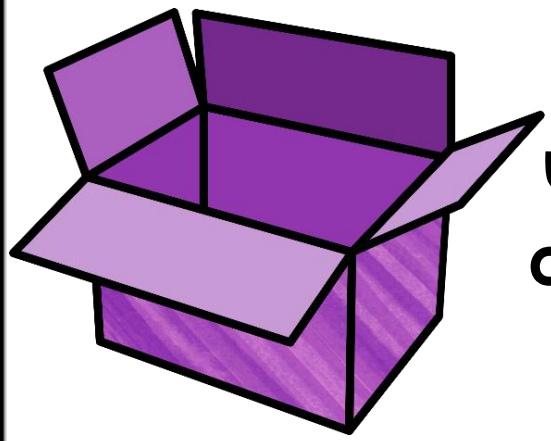
## MATERIALS:

* Candy such as conversation hearts or chocolate kisses

* Options for box construction: construction paper and tape, playdough, or building bricks

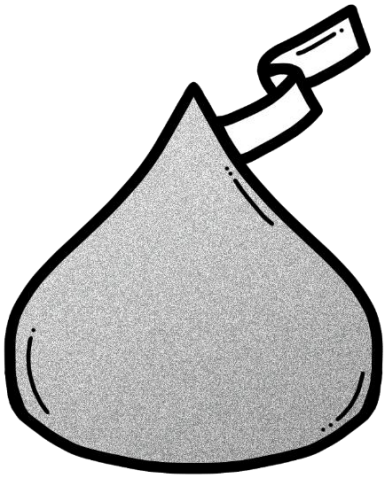
# WORDS TO KNOW

## container



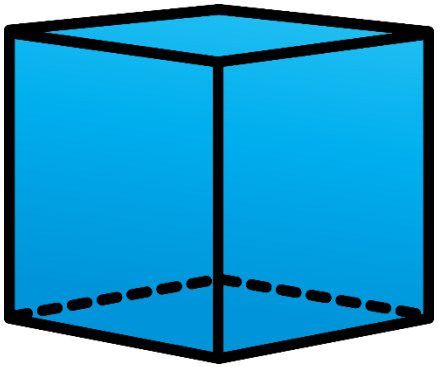
an object used to hold or transport something

## solid



firm or stable in shape

## volume



the amount of space taken up by an object

## capacity

the measure of an object's ability to hold something

# Candy Box

Name: _____

## MY BLUEPRINT

Draw a picture of your box.

What material did you use?

How many pieces of candy fit in your box?

_____

| MEASUREMENTS | | |
|---|---|---|
| LENGTH | WIDTH | HEIGHT |
| | | |

# Candy Box

Name: _____

## BLUEPRINT

How many pieces of candy fit in your box?

Which building material did you choose and why?

## MEASUREMENTS

| LENGTH | WIDTH | HEIGHT |
|---|---|---|
| | | |

## VOLUME:

_____ x _____ x _____

= _____

What improvements can be made to your box?

# 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?

# 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: _____



# 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: _____

©BROOKE BROWN

# STEAM 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: _____



# STEAM Challenge Assessment Rubric

Challenge: _____

Date: _____

Student Name: _____

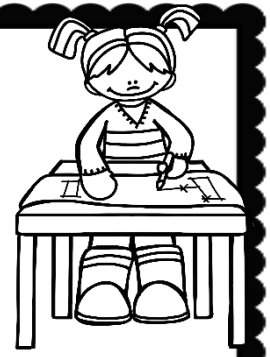
| 3 | 2 | 1 |
|---|---|---|
| Student followed all instructions for challenge. | Student followed some instructions for challenge. | Student did not follow instructions for challenge. |
| Student used best effort and perseverance on challenge. | Student used some effort and perseverance on challenge. | 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: _____

©BROOKE BROWN

# 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,

_____

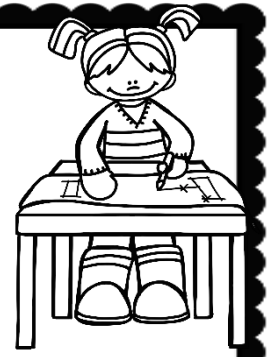
*If you are able to donate, please detach and return the form below:*

**Parent Name(s):** _____

**Child's Name:** _____

**I am able to donate:** _____

# We Need STEAM Supplies!



Dear Families,

We are learning all about Science, Techology, Engineering, Art, and Math through STEAM lessons, and we need your help! If you are able to donate any of the following supplies for our STEAM 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 STEAM 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:** _____

# Credits

## Created by Brooke Brown

## Thank you for your purchase!

kimberly geswein fonts

WHIMSY CLIPS

EDUCLIPS DESIGN
Dream it. Wish it. Do it.

UtahRoots

i teach.
WHAT'S YOUR SUPER POWER?

Ashley Hughes

ZIP-A-DEE DOO-DAH Designs

http://www.teacherspayteachers.com/Store/Zip-a-dee-doo-dah-Designs