Back to School

STEM

pom pom popper challenge

CREATED BY BROOKE BROWN

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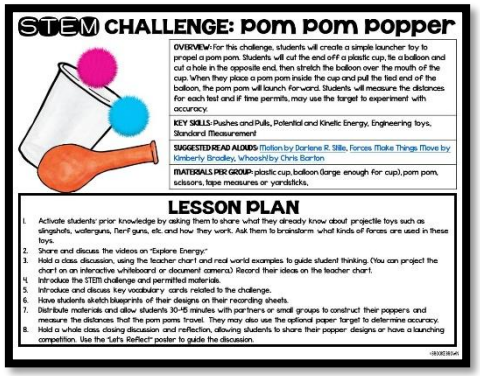
How to use

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 can be found in your classroom or at most craft stores.

components

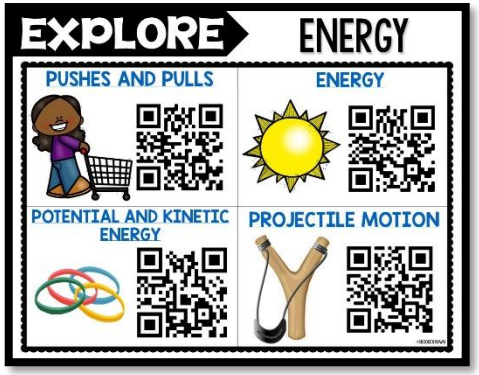
LESSON PLAN

- Overview
- Skills
- Read Aloud Ideas
- Supplies

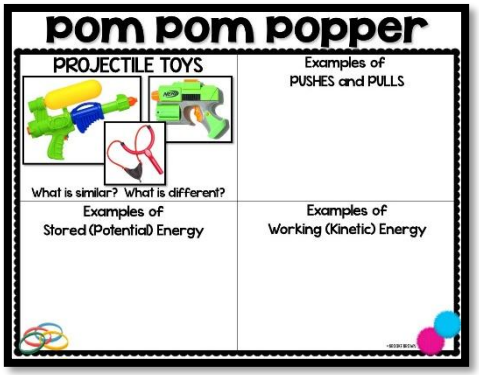


STUDENT INSTRUCTIONS

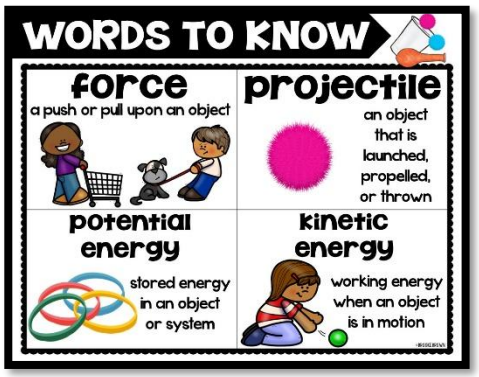
QR CODE WEBSITES & VIDEOS



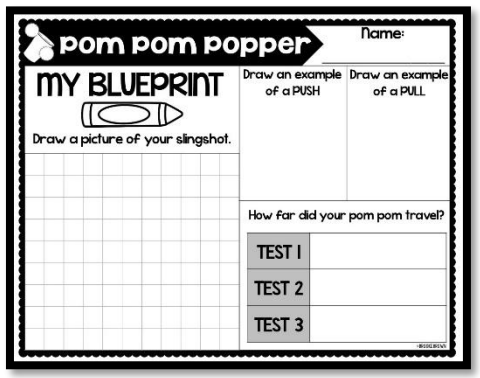
TEACHER ANCHOR CHART



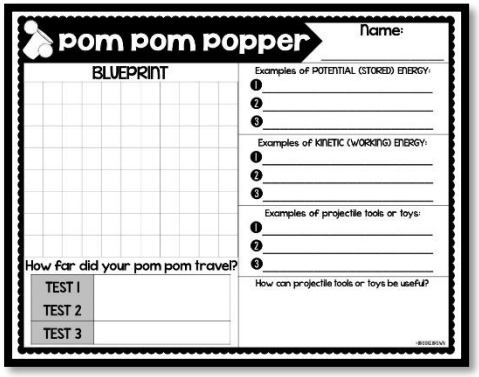
KEY VOCABULARY



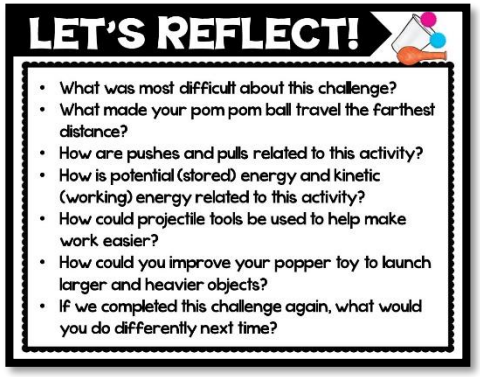
K-2nd RECORDING SHEET



3rd-5th RECORDING SHEET



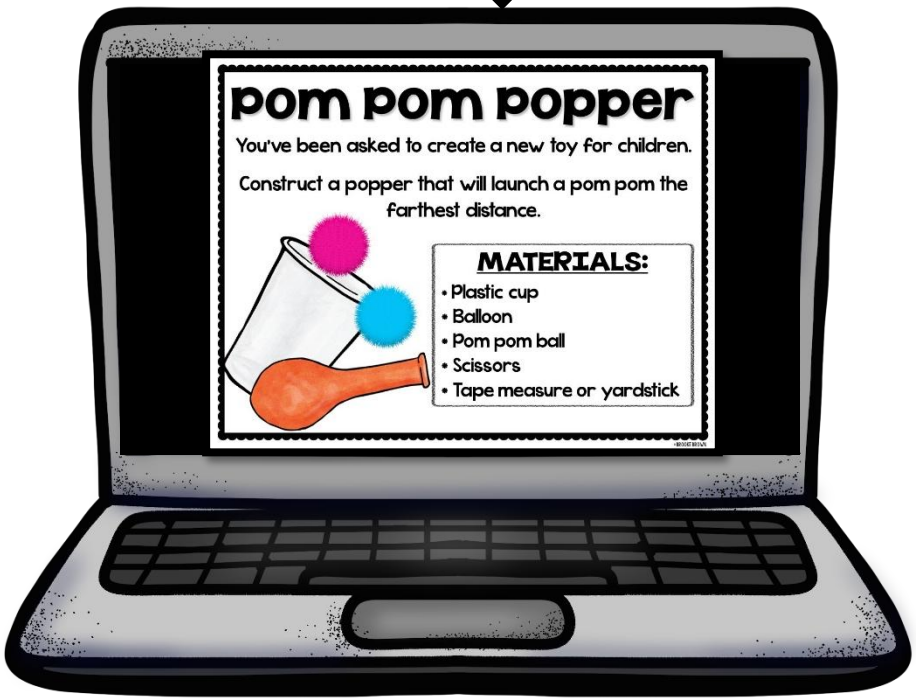
REFLECTION DISCUSSION QUESTIONS



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.

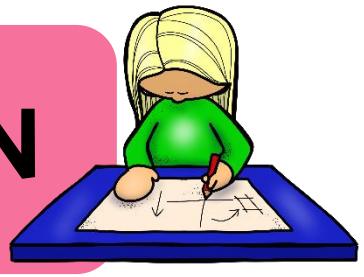
YOU DO NOT WANT YOUR STUDENTS TO EDIT THE ORIGINAL FILE.

THE ENGINEERING DESIGN PROCESS

ASK

IMAGINE

PLAN



CREATE

TEST & IMPROVE

REFLECT & PRESENT

SUPPLIES CHECKLIST

STEM CHALLENGE	ITEM	NUMBER PER GROUP	I HAVE IT
Pom Pom Popper	plastic cup (small/medium)	1	
	balloon (large enough for cup)	1	
	pom pom	1-2	
	tape measures or meter sticks	1	
	scissors	1	
	markers (optional to decorate)	small tub	
	paper target	1	

STANDARDS ALIGNMENT

CHALLENGE	ENGINEERING	SCIENCE	MATH
Pom Pom Popper	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 5-PS2 Motion and Stability: Forces and Interactions	MP1: Make sense of problems and persevere in solving them MP.2: Reason abstractly and quantitatively MP.4: Model with mathematics MP.5: Use appropriate tools strategically

STEM CHALLENGE: pom pom popper

OVERVIEW: For this challenge, students will create a simple launcher toy to propel a pom pom. Students will cut the end off a plastic cup, tie a balloon and cut a hole in the opposite end, then stretch the balloon over the mouth of the cup. When they place a pom pom inside the cup and pull the tied end of the balloon, the pom pom will launch forward. Students will measure the distances for each test and if time permits, may use the target to experiment with accuracy.

KEY SKILLS: Pushes and Pulls, Potential and Kinetic Energy, Engineering toys, Standard Measurement

SUGGESTED READ ALOUDS: Motion by Darlene R. Stille, Forces Make Things Move by Kimberly Bradley, Whoosh! by Chris Barton

MATERIALS PER GROUP: plastic cup, balloon (large enough for cup), pom pom, scissors, tape measures or yardsticks,

LESSON PLAN

1. Activate students' prior knowledge by asking them to share what they already know about projectile toys such as slingshots, waterguns, Nerf guns, etc. and how they work. Ask them to brainstorm what kinds of forces are used in these toys.
2. Share and discuss the videos on "Explore Energy."
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 poppers and measure the distances that the pom poms travel. They may also use the optional paper target to determine accuracy.
8. Hold a whole class closing discussion and reflection, allowing students to share their popper designs or have a launching competition. Use the "Let's Reflect" poster to guide the discussion.

pom pom popper

POSSIBLE PRODUCT

(for teacher reference only)

pom pom popper

You've been asked to create a new toy for children.

Construct a popper that will launch a pom pom the farthest distance.

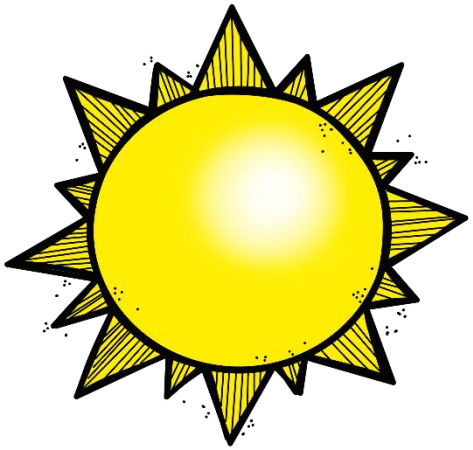
MATERIALS:

- Plastic cup
- Balloon
- Pom pom ball
- Scissors
- Tape measure or yardstick

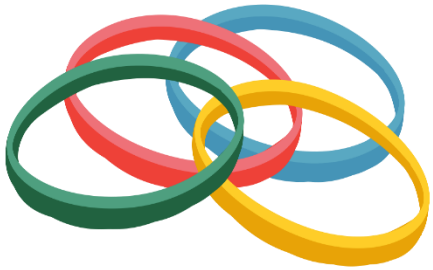
EXPLORE ENERGY

PUSHES AND PULLS

ENERGY



POTENTIAL AND KINETIC ENERGY



PROJECTILE MOTION

pom pom popper

PROJECTILE TOYS

What is similar? What is different?

Examples of PUSHES and PULLS

Examples of Stored (Potential) Energy

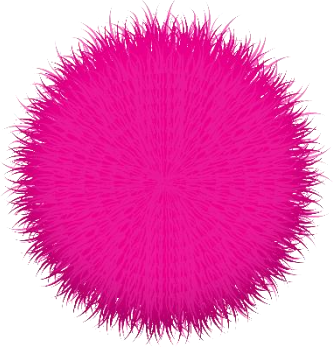
Examples of Working (Kinetic) Energy

WORDS TO KNOW

force

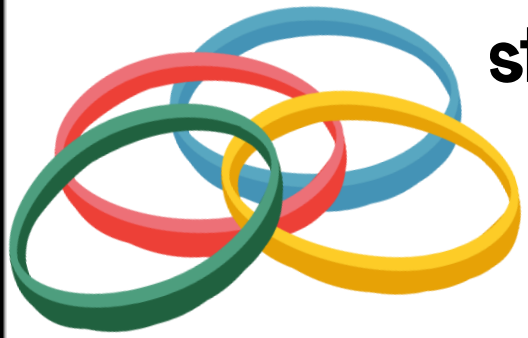
a push or pull upon an object

projectile



an object that is launched, propelled, or thrown

potential energy



stored energy in an object or system

kinetic energy

working energy when an object is in motion

pom pom popper

Name: _____

MY BLUEPRINT

Draw a picture of your slingshot.

Draw an example of a PUSH

Draw an example of a PULL

How far did your pom pom travel?

TEST 1	
TEST 2	
TEST 3	

pom pom popper

Name: _____

BLUEPRINT

How far did your pom pom travel?

TEST 1	
TEST 2	
TEST 3	

Examples of POTENTIAL (STORED) ENERGY:

1. _____
2. _____
3. _____

Examples of KINETIC (WORKING) ENERGY:

1. _____
2. _____
3. _____

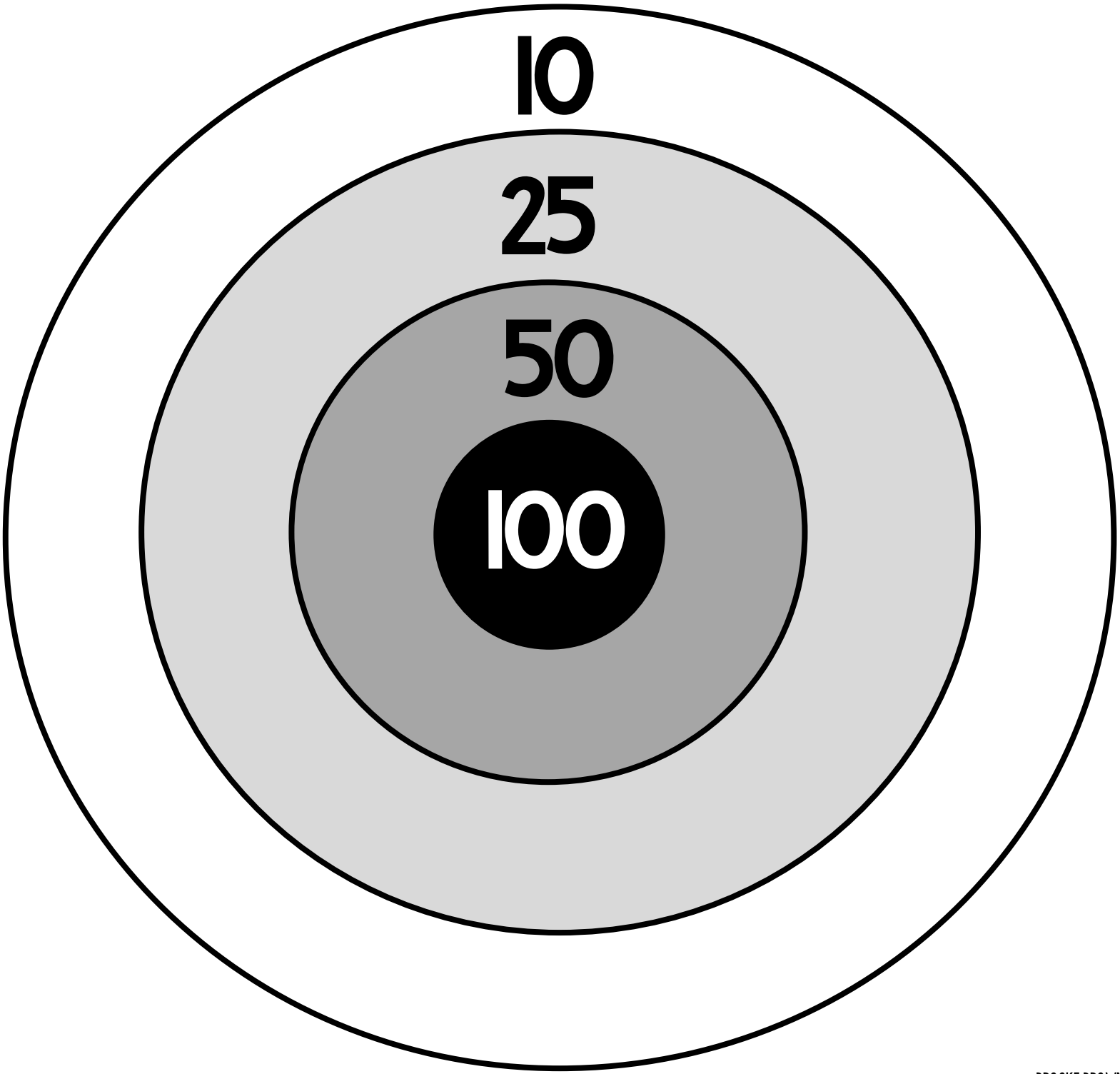
Examples of projectile tools or toys:

1. _____
2. _____
3. _____

How can projectile tools or toys be useful?

Hit the Target!

Launch a pom pom at the target.
How many points can you earn
in 5 shots?



LET'S REFLECT!

- What was most difficult about this challenge?
- What made your pom pom ball travel the farthest distance?
- How are pushes and pulls related to this activity?
- How is potential (stored) energy and kinetic (working) energy related to this activity?
- How could projectile tools be used to help make work easier?
- How could you improve your popper toy to launch larger and heavier objects?
- 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: _____

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TOTAL POINTS: _____ /18

Comments: _____

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STEAM Challenge Assessment Rubric

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Date: _____

Student Name: _____

3	2	1
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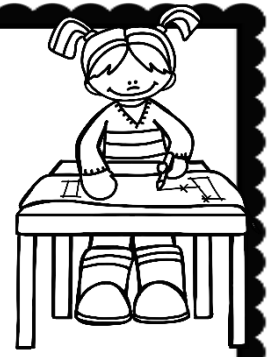
We Need STEM Supplies!



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,

_____

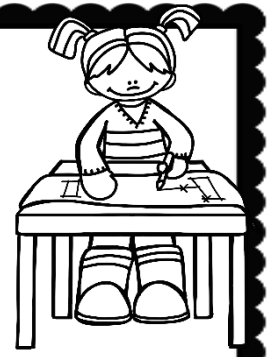
If you are able to donate, please detach and return the form below:

Parent Name(s): _____

Child's Name: _____

I am able to donate: _____

We Need STEAM Supplies!



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Credits

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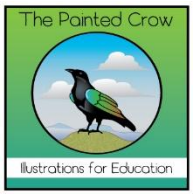
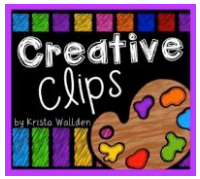
Thank you for your purchase!





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