

# October STEM

**LOW PREP**

**Halloween Challenges**

**CANDY TOWER**



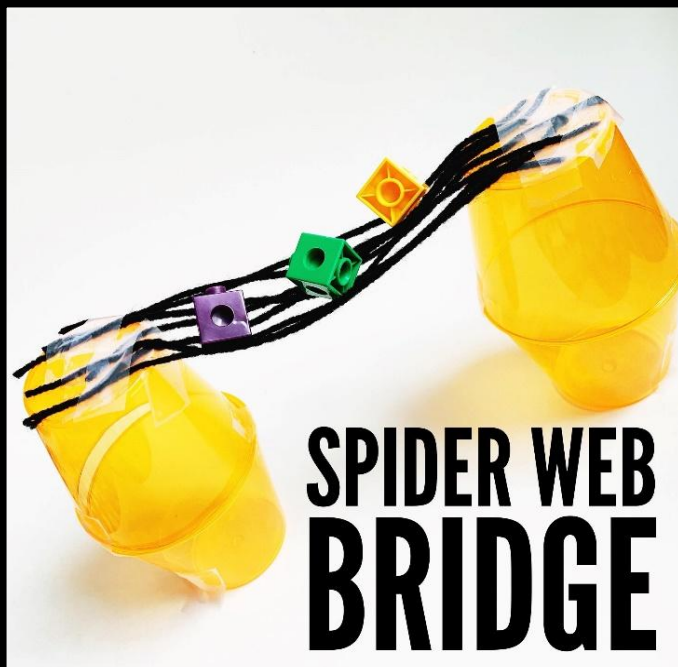
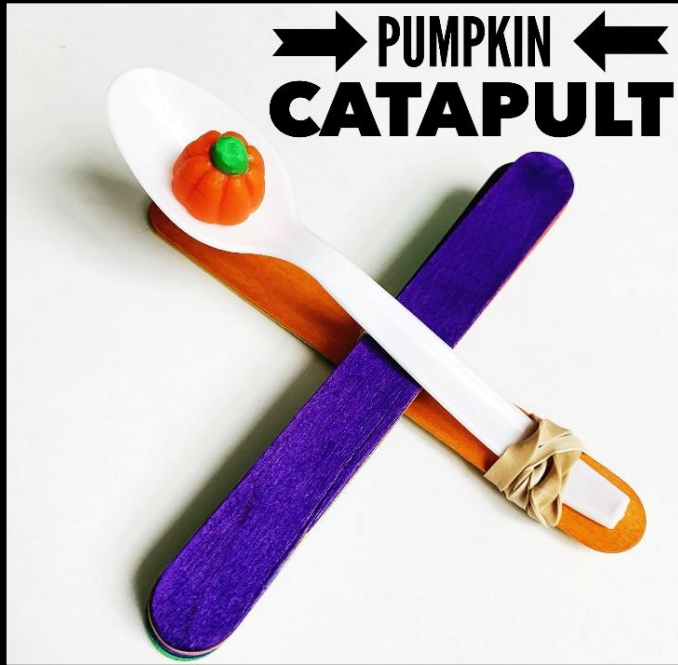
**→ PUMPKIN  
CATAPULT ←**



**SPIDER WEB  
BRIDGE**

CREATED BY BROOKE BROWN

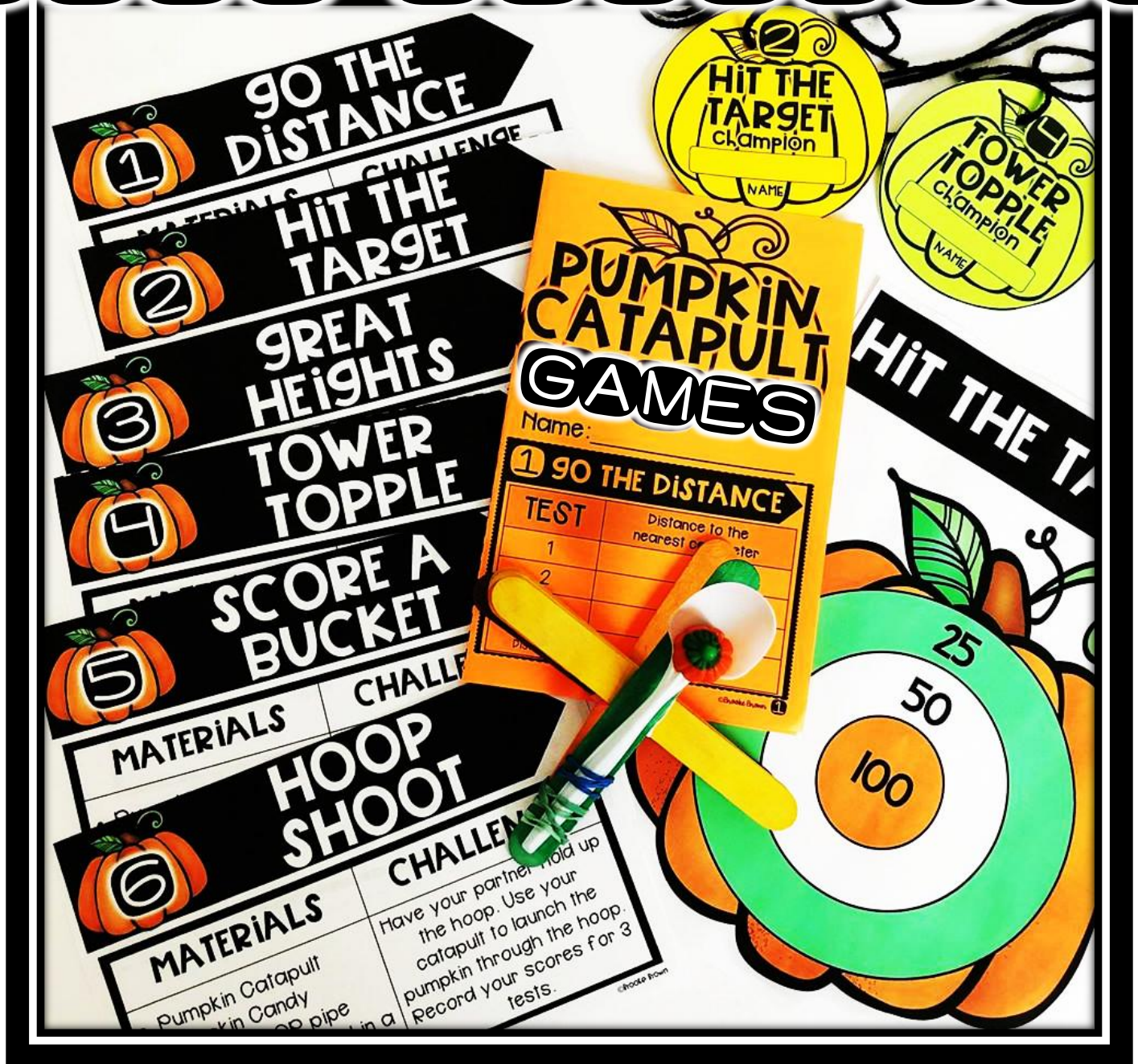
# 3 LOW PREP STEM CHALLENGES + BONUS BRAINBUILDER ACTIVITY





# pumpkin catapult

## GAME STATIONS

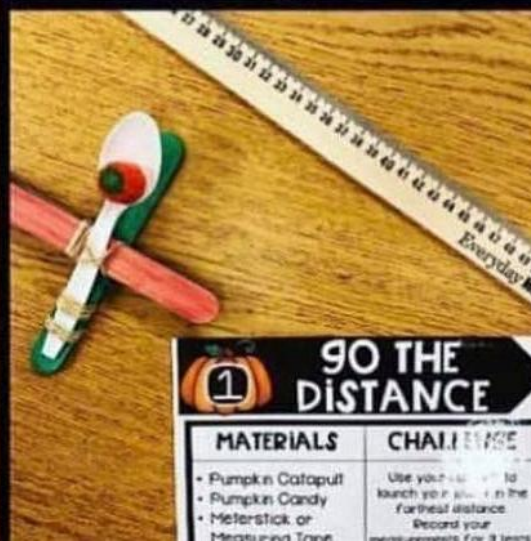






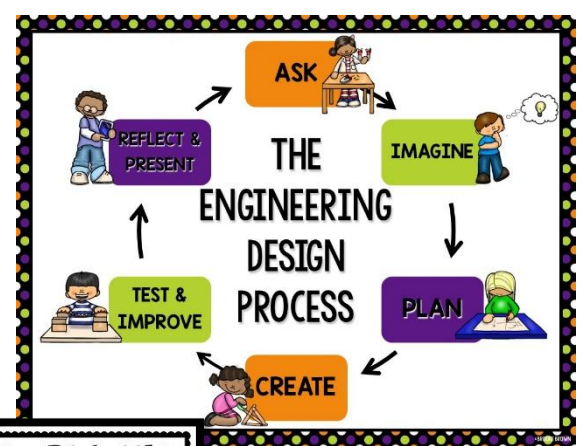
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# PUMPKIN CATAPULT GAME STATIONS





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



## pumpkin catapult

You need to send a pumpkin over the fence to your neighbor.

Construct a catapult that will launch your pumpkin the farthest distance.



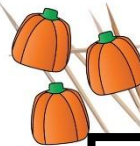
### MATERIALS:

- Jumbo popsicle sticks (12 per group)
- Rubber bands (8 per group)
- Masking tape (3 ft. per group)
- Plastic spoons (1-2 per group)
- Mini pumpkins
- Tape measure or yardstick

## candy tower

You've been asked to create a special centerpiece for a Halloween party.

Construct the tallest possible tower for the table that stands on its own.



### MATERIALS:

- Candy pumpkins, gummy pumpkins, or pumpkin marshmallows (24 per group)
- Toothpicks (20 per group)
- Ruler

## Spider Web Bridge

The spiders need to cross the river without falling in.

Construct a bridge that holds as many spiders as possible.



### MATERIALS:

- Cups (4 per group)
- Yarn (2-3 yards per group)
- Masking tape (3 feet per group)
- Linking cubes (spiders)

## BRAINBUILDER

## spooky illusions



Work with a partner to create spooky spinning optical illusions!

You will need crayons, scissors, scotch tape, and 3-5 straws to create your illusions.

## pumpkin catapult

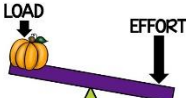
### REAL WORLD EXAMPLES



What is similar? What is different?

Examples of Stored (Potential) Energy

### How Levers Work



Examples of Working (Kinetic) Energy

## candy tower

### REAL WORLD EXAMPLES



What is similar? What is different?

Common 2D Shapes found in Towers

### Other Famous Towers or Skyscrapers



Common 3D Shapes found in Towers



## Spider Web Bridge

### REAL WORLD EXAMPLES



What is similar? What is different?

Types of Bridges

### Main Parts of a Bridge



Spider Web Facts

## WORDS TO KNOW

### launch



to start or set in motion

### lever

a bar that rests on a fulcrum that is used to move a load with one end when effort is applied to the other end



### effort

energy that is used to

### load

an object that needs to be moved by effort or force



## WORDS TO KNOW

### pyramid



a three-dimensional solid with a polygonal base and triangular faces that meet at a point (apex)

### cube



a three-dimensional solid made up of six equal squares

### prism



a three-dimensional solid with

### joint



a point at which parts of a structure are joined

## WORDS TO KNOW

### piers



supports on the end of a bridge that withstand vertical pressure

### deck



the main horizontal surface of a bridge

### tension

the act of stretching

### intersect

when two lines meet or cross



## EXPLORE CATAPULTS

### TYPES OF CATAPULTS



### PUNKIN' CHUNKIN'



### LEVERS



### POTENTIAL AND KINETIC ENERGY



## EXPLORE BRIDGES

### STRONG BRIDGES



### FAMOUS BRIDGES



### TYPES OF BRIDGES



### STRONG SPIDER WEBS

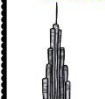


## EXPLORE STRUCTURES

### STRONG STRUCTURES



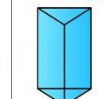
### SKYSCRAPERS



### 5 TALLEST BUILDINGS



### 3D SHAPES



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

**pumpkin catapult** Name: \_\_\_\_\_

Draw a blueprint of your catapult and label the LEVER.

Label the EFFORT and LOAD.

How do levers make work easier?

What is an example of an object with a lever?

**candy tower** Name: \_\_\_\_\_

BLUEPRINT

Measure the height of your tower:

TEST 1 (5 min)

TEST 2 (10 min)

TEST 3 (15 min)

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

**spider web bridge** Name: \_\_\_\_\_

BLUEPRINT

How many spiders does your bridge hold?

TEST 1

TEST 2

TEST 3

Label this PERS and the DECK.

**pumpkin catapult** Name: \_\_\_\_\_

**MY BLUEPRINT**

Draw a picture of your catapult. Label the LEVER.

How far did your pumpkin travel?

TEST 1

TEST 2

TEST 3

**candy tower** Name: \_\_\_\_\_

**MY BLUEPRINT**

Draw a picture of your tower.

Measure the height of your tower:

TEST 1 (5 min)

TEST 2 (10 min)

TEST 3 (15 min)

**spider web bridge** Name: \_\_\_\_\_

**MY BLUEPRINT**

Draw a picture of your bridge.

Label the PERS and the DECK.

How many spiders does your bridge hold?

TEST 1

TEST 2

TEST 3

**Spinning Illusions**

Color the pictures, cut out each of the circles and place them back to back with the A circles aligned. Flip a coin between the set of circles and have the circles to back to the top of the arrow. Put the bottom end of the arrow between your hands. Gently slide your hands back and forth to build the arrow so that the images rotate equally. What is happening to the images and why?

W O E  
S T  
A B  
A B  
A B

**LET'S REFLECT!**

- What was most difficult about this challenge?
- Why are bridges important?
- What are some different types of bridges?
- How did you make the deck (horizontal section) as strong as possible?
- How did you make the piers (vertical columns) as strong as possible?
- Which design held the most blocks (spiders) and why do you think so?
- How is the deck similar to a real spider web?
- If we completed this challenge again, what would you do differently next time?

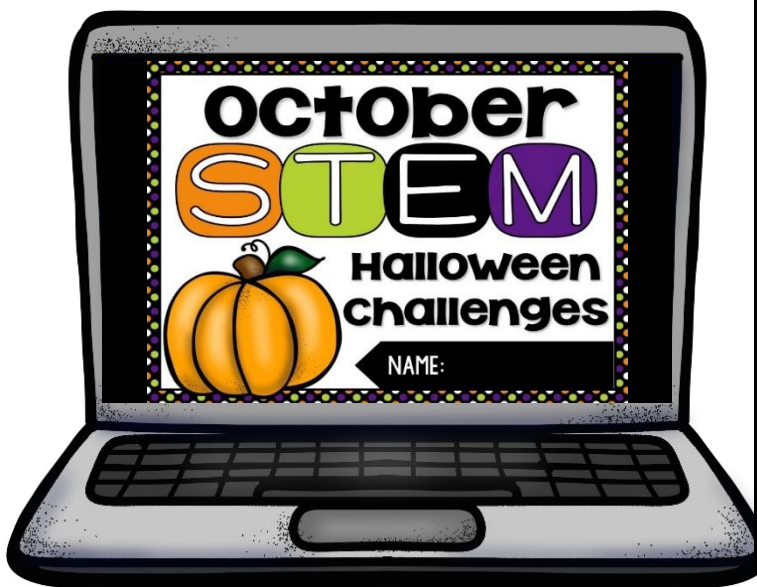
**LET'S REFLECT!**

- What was most difficult about this challenge?
- What types of two-dimensional and three-dimensional shapes did you use in your design?
- How do you think the shapes and patterns might relate to the strength of your tower?
- Which design was the highest and why do you think so?
- What parts of your tower were most important for it to be the most balanced and stable?
- How are real tower designs similar to and different from your design?
- If we completed this challenge again, what would you do differently next time?

**LET'S REFLECT!**

- What was most difficult about this challenge?
- Which one of your launches was the farthest and why do you think so?
- Why is a lever an important feature of a catapult?
- How can levers make work easier?
- How is potential (stored) energy and kinetic (working) energy used in a catapult?
- How are balanced forces (no motion) and unbalanced forces (motion) used in a catapult?
- What are some different ways catapults can be useful?
- 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: \_\_\_\_\_

**My October 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

CHALLENGE	ITEM	NUMBER PER GROUP	I HAVE IT
Pumpkin Catapult	mini pumpkins (small candy or decorative)	1	
	plastic spoons	2	
	rubber bands	8	
	masking tape	3 feet	
	jumbo popsicle sticks	12	
Candy Tower	tape measures or yardsticks	1	
	candy such as candy pumpkins, gummy candy, or pumpkin shaped marshmallows	24	
	toothpicks	20	
Spider Web Bridge	rulers	1	
	yarn	2-3 yards	
	plastic cups	4	
BONUS BRAINBUILDER: Spooky Illusions	masking tape	3 feet	
	linking cubes	12	
BONUS BRAINBUILDER: Spooky Illusions	Spooky Illusions templates	1 set	
	Plastic straws	5	
	Scotch tape	1 roll	

## STANDARDS ALIGNMENT

OCTOBER STANDARDS ALIGNMENT			
CHALLENGE	ENGINEERING	SCIENCE	MATH
Pumpkin Catapult	K-2-ETS1 Engineering Design: K-2-ETSH, 3-5-ETSH-2, 3-5-ETSH-3 3-5-ETS1 Engineering Design: 3-5-ETSH, 3-5-ETSH-2, 3-5-ETSH-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. MP2: Reason abstractly and quantitatively. MP3: Model with mathematics. MP5: Use appropriate tools strategically. MP6: Attend to precision.
Candy Tower	K-2-ETS1 Engineering Design: K-2-ETSH, 3-5-ETSH-2, 3-5-ETSH-3 3-5-ETS1 Engineering Design: 3-5-ETSH, 3-5-ETSH-2, 3-5-ETSH-3	2-Structure and Properties of Matter 4-tension and compression forces, weight and 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. MP6: Attend to precision. MP7: Look for and make use of structure.
Spider Web Bridge	K-2-ETS1 Engineering Design: K-2-ETSH, 3-5-ETSH-2, 3-5-ETSH-3 3-5-ETS1 Engineering Design: 3-5-ETSH, 3-5-ETSH-2, 3-5-ETSH-3	4-Action/Reaction forces, tension and compression forces, measuring 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.
BONUS Brainbuilder: Spooky Illusions	K-2-ETS1 Engineering Design: K-2-ETSH, 3-5-ETSH-2, 3-5-ETSH-3 3-5-ETS1 Engineering Design: 3-5-ETSH, 3-5-ETSH-2, 3-5-ETSH-3	1-Waves: Light and Sound 4-PS4 Waves and their Applications in Technologies for Information Transfer	MP2: Look for and make use of structure.

## CHALLENGE OVERVIEW

### STEM CHALLENGE: pumpkin catapult



**OVERVIEW:** Basic catapult designs are shown in the video links and real world example photos, although students will surprise you with their creative designs during this challenge! Through their construction and tests, students will discover that their catapult needs a base, a lever to launch or throw the pumpkin, and a method of lifting up the lever (usually by wedging a stack of sticks in an intersecting design). A basic design may need to be modeled and discussed with younger students before they attempt to make their own. I would suggest taping off a "starting line" for students to launch pumpkins so that measurements are consistent.

**KEY SKILLS:** Simple Machines (Levers), Pushes and Pulls, Potential and Kinetic Energy, Balanced and Unbalanced Forces, Engineering Catapults

**SUGGESTED READ ALOUDS:** [The Marshmallow Incident by Ron and Judi Barnett](#), [Big Pumpkin by Erica Silverman](#), [Forces Make Things Move by Kimberly Bradley](#), [Scoop, Seesaw, and Raise: A Book About Levers by Michael Dahl](#)

**MATERIALS PER GROUP:** 1 mini pumpkin (candy or decorative), 2 plastic spoons, 8 rubber bands, 12 jumbo popsicle sticks, 3 ft. of masking tape, 1 tape measure or yardstick

## KEY SKILLS

## MATERIALS

## LESSON PLAN

1. Activate students' prior knowledge by asking them to share what they already know about catapults, what they're used for, and what important parts they might have.
2. Share and discuss the videos/websites on "Explore Catapults."
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 catapults, test their effectiveness, and measure the distances that their pumpkin travels.
8. Hold a whole class closing discussion and reflection, allowing students to share their catapult designs. Use the "Let's Reflect" poster to guide the discussion.
9. If time permits, allow students to rotate through the "Pumpkin Catapult Games" stations with their catapults.

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## SUGGESTED READ ALOUDS

## STEP BY STEP INSTRUCTIONS

# CHECK OUT MY ALL YEAR BUNDLE WITH 9 MONTHS OF STEM ACTIVITIES!

OVER  
**40%  
OFF!**

