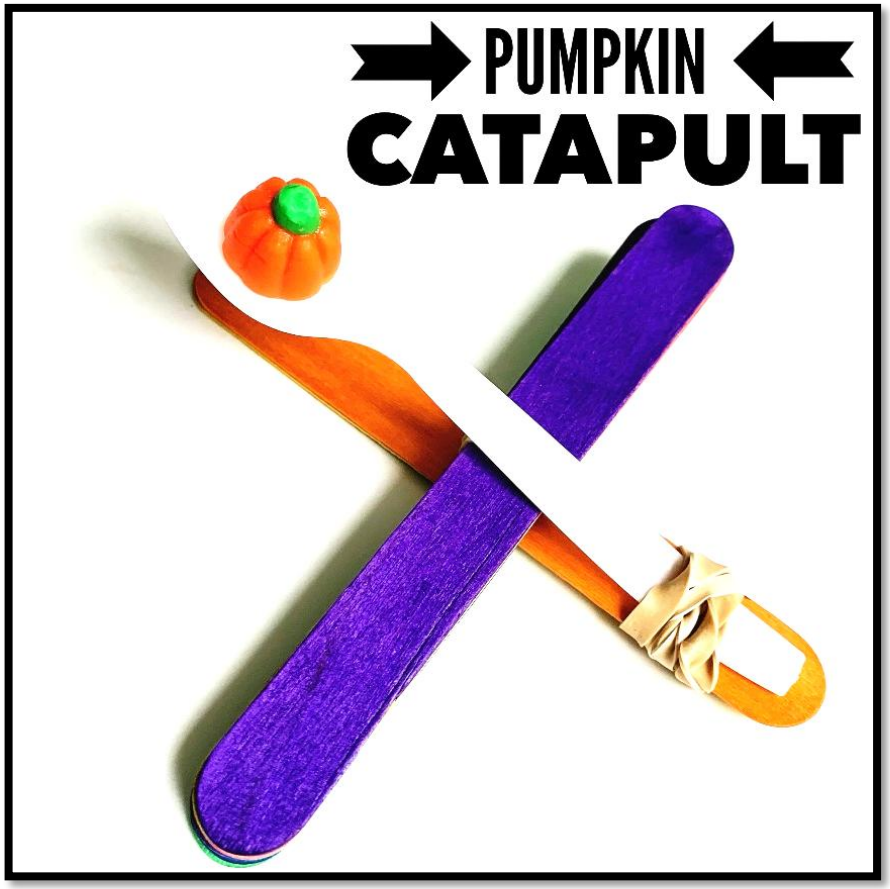
pumpkin catapult

STEM



LOW PREP
HALLOWEEN
STEM CHALLENGE

K-5TH GRADE

CREATED BY BROOKE BROWN

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

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

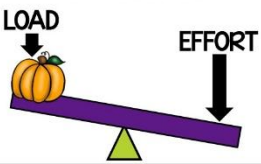
pumpkin catapult

REAL WORLD EXAMPLES

What is similar? What is different?

Examples of Stored (Potential) Energy

How Levers Work



Examples of Working (Kinetic) Energy

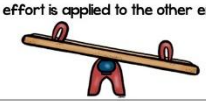
WORDS TO KNOW

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 or lifted by effort or force

O KNOW

unbalanced force

unequal forces that cause a change in motion, such as speed or direction

kinetic energy

working energy when an object is in motion

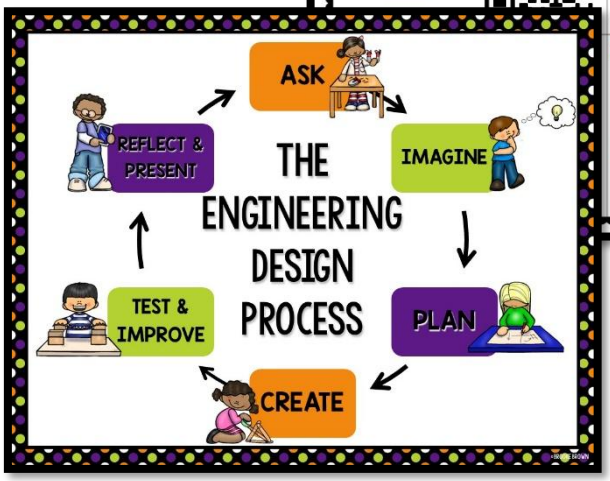
...ces ...se ...e in ...rgy in an object or system

EXPLORE CATAPULTS

LEVERS

BUILD A CATAPULT

POTENTIAL AND KINETIC ENERGY

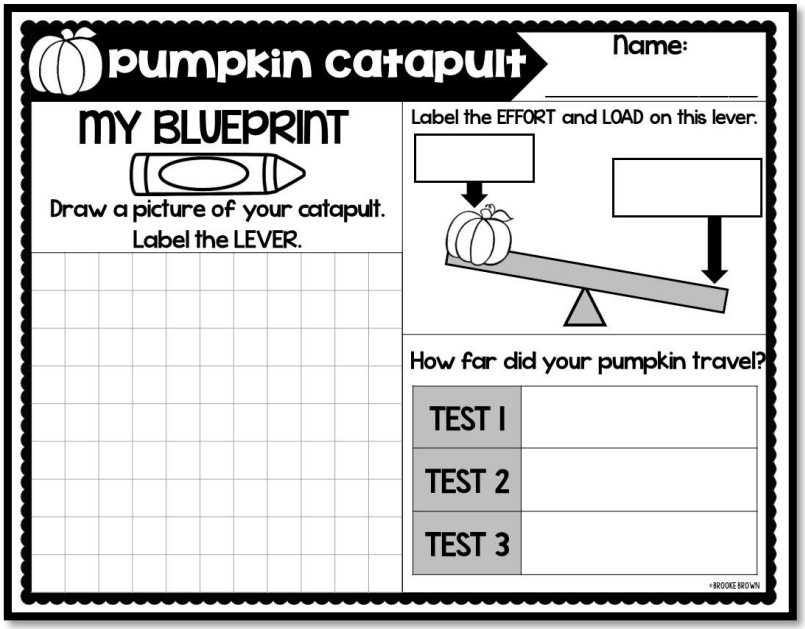


LET'S REFLECT!

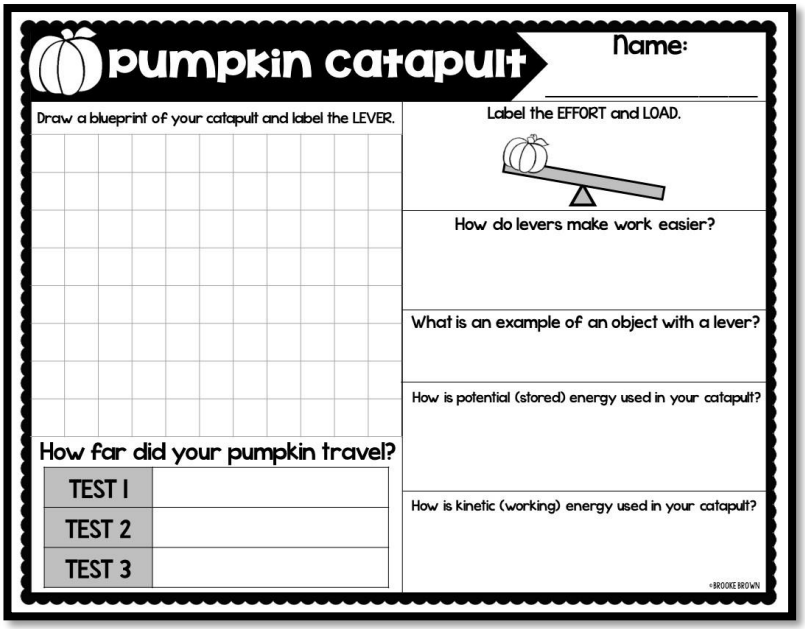
- What was most difficult about this challenge?
- Which one of your launches was the farthest and why do you think so?
- Why is a lever an important feature of a catapult?
- How can levers make work easier?
- How is potential (stored) energy and kinetic (working) energy used in a catapult?
- How are 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?

DIFFERENTIATED RECORDING SHEETS FOR K-5TH GRADE

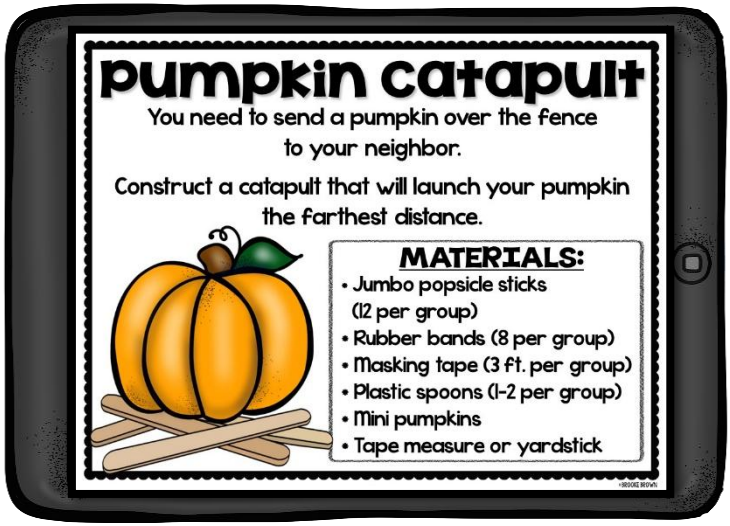
LOWER GRADES

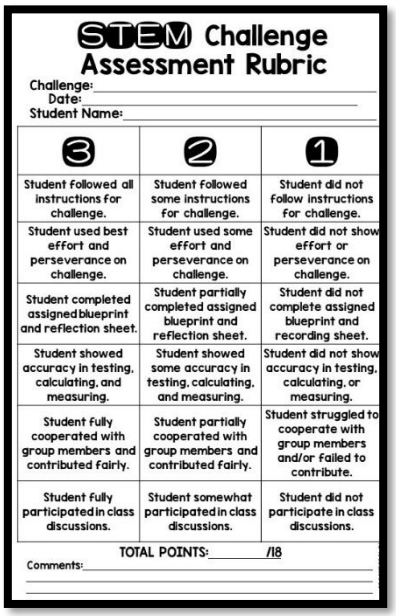


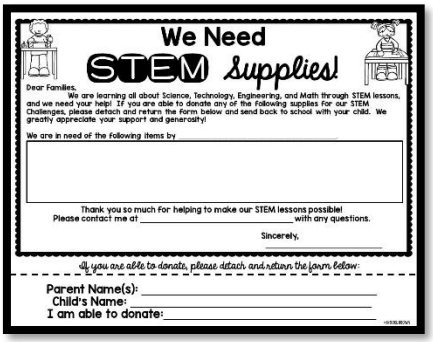
UPPER GRADES



DIGITAL GOOGLE SLIDES NOTEBOOK







pumpkin catapult GAMES

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	
	tape measures or yardsticks	1	

STANDARDS ALIGNMENT

CHALLENGE	ENGINEERING	SCIENCE	MATH
Pumpkin Catapult	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 MP2: Reason abstractly and quantitatively MP4: Model with mathematics MP5: Use appropriate tools strategically MP6: Attend to precision.

SUPPLIES CHECKLIST & STANDARDS ALIGNMENT

CHALLENGE OVERVIEW

MATERIALS

STEP BY STEP INSTRUCTIONS

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 Barrett, 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

SUGGESTED READ ALOUDS

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.