

pumpkin catapult

STEM

→ PUMPKIN ←
CATAPULT



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

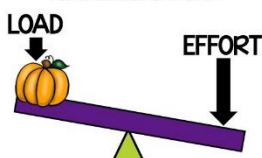
REAL WORLD EXAMPLES



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



WHAT YOU 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



EXPLORE CATAPULTS

LEVERS



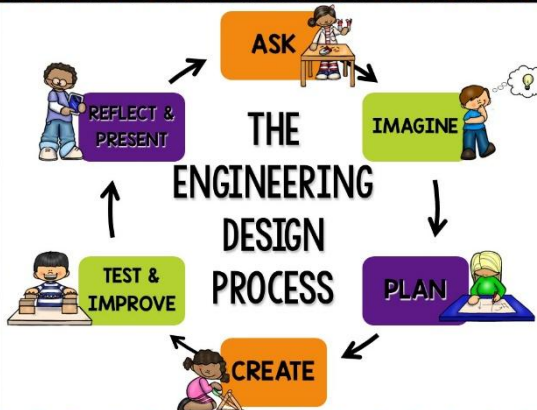
BUILD A CATAPULT



POTENTIAL AND KINETIC ENERGY



THE ENGINEERING DESIGN PROCESS




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

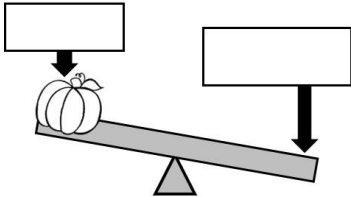
UPPER GRADES

 **pumpkin catapult** Name: _____

MY BLUEPRINT

 Draw a picture of your catapult.
Label the LEVER.


Label the EFFORT and LOAD on this lever.



How far did your pumpkin travel?


TEST 1	
TEST 2	
TEST 3	

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 **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?

How is potential (stored) energy used in your catapult?

How far did your pumpkin travel?

TEST 1	
TEST 2	
TEST 3	

How is kinetic (working) energy used in your catapult?


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DIGITAL GOOGLE SLIDES NOTEBOOK

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- Masking tape (3 ft. per group)
- Plastic spoons (1-2 per group)
- Mini pumpkins
- Tape measure or yardstick

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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 reflection 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 Challenge, 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: _____

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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 MP3: Model with mathematics MP5: Use appropriate tools strategically MP6: Attend to precision

SUPPLIES CHECKLIST & STANDARDS ALIGNMENT

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 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

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.

SUGGESTED READ ALOUDS

STEP BY STEP INSTRUCTIONS