



MAKE:

# Catapult Challenges

## CHALLENGE #1

Can you build a simple catapult that can launch an object?

**BIG IDEA:** A **catapult** is a device that can launch an object, transferring it from one location to another. It uses potential energy stored in the device and converts it to kinetic energy to propel an object in the air.

### Materials:

Plastic spoon (1)

Rubber bands (4)

Craft sticks (6)  
(Don't have craft sticks? Substitute with 2 sticks - 1 large diameter stick and 1 small diameter stick)

### INSTRUCTIONS:

#### With Craft Sticks:

1. Stack 5 craft sticks on top of each other.
2. Rubber band the two ends of the stack of craft sticks.
3. Stack a spoon and a craft stick together.
4. Put a rubber band around the end of the handle of the spoon and the craft stick.
5. Separate the spoon and craft stick stack and put the stack of 5 craft sticks in between.
6. Put a rubber band around both stacks to hold them together.
7. Put an object in the cup of the spoon, push down on the tip of the spoon and release to launch the object.



## INSTRUCTIONS:

### With Regular Sticks:

1. Stack a spoon and the small stick together.
2. Put a rubber band around the end of the handle of the spoon and the craft stick.
3. Separate the spoon and craft stick stack and put the larger stick in between the spoon and smaller stick.
4. Use a rubber band to secure all three items together.
5. Put an object in the cup of the spoon, push down on the tip of the spoon and release to launch the object.



**Test Your Catapult:** Build a tower using index cards, pipe cleaners, playing cards or plastic cups and see if you can knock down the tower launching an object with your catapult.

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## CHALLENGE #2:

Can you design and build a mini trebuchet that can launch an object?

**BIG IDEA:** A **trebuchet** is a specific type of catapult. It uses a force like gravity to pull down one end of a lever to move the other end and propel the object. Catapults were used in battles. An engineering criteria for catapults is that they must launch objects over long distances and be accurate enough to hit targets.

### *Materials:*

Paper ruler

### *Example of Other Materials to Use:*

Plastic spoon

Rubber bands

Craft sticks

Straws

Masking tape

Plastic cups

Cardboard

**INSTRUCTIONS:**

1. **Plan the design of your trebuchet:** Take a look at different trebuchet found online or check out the trebuchet resources in the “Want to Know More” section of this document.
2. Sketch a design of the trebuchet you will build. Consider the materials you have available as you sketch your design.
3. **Build your trebuchet:** Once you’ve sketched your design, build your design with the materials you have.
4. **Test your trebuchet:** Place your trebuchet on the flat surface. Using your ruler, measure 30” away from your trebuchet and set up a tower made of index cards, playing cards, pipe cleaners, or plastic cups (recommended 3 on bottom, 2 in the middle, 1 on top). Do this 3 times
5. **Redesign your trebuchet:** Consider the following areas of improvement:
  - a. How can you increase the power to knock down the tower?
  - b. How can you increase the accuracy to hit any target?
  - c. How can you make your trebuchet more accurate and more powerful?
6. **Re-test your trebuchet.**



RULER

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2 \_\_\_\_\_

3 \_\_\_\_\_

4 \_\_\_\_\_

5 \_\_\_\_\_

6 \_\_\_\_\_

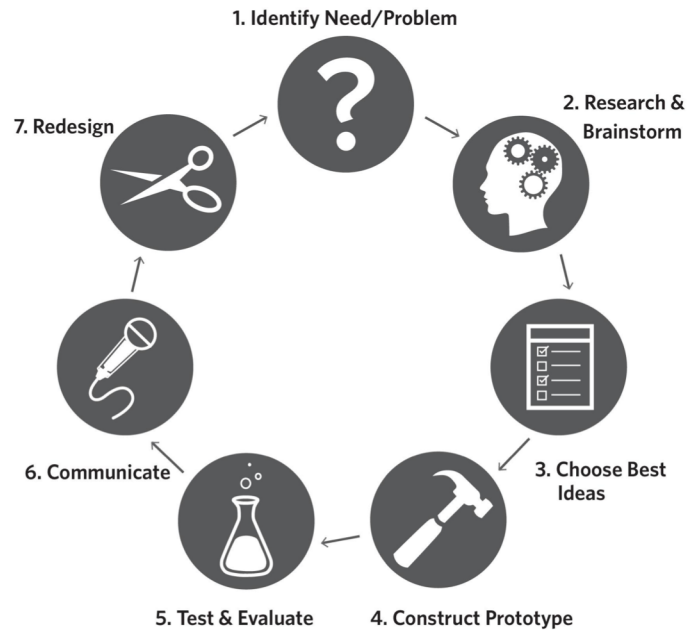
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# The Engineering Design Cycle



## Want to know more?:

[tinyurl.com/STLhtwt](https://tinyurl.com/STLhtwt) - Learn how a trebuchet works with National Geographics How Things Work.

[tinyurl.com/STLkiwi](https://tinyurl.com/STLkiwi) - KiwiCo's background information on trebuchets

[tinyurl.com/STLtreb](https://tinyurl.com/STLtreb) - Trebuchet design with craft sticks

[tinyurl.com/STLtrebqlue](https://tinyurl.com/STLtrebqlue) - Trebuchet design with paper

[tinyurl.com/STLtrebpencil](https://tinyurl.com/STLtrebpencil) - Trebuchet design with pencils

## WE WANT TO SEE & SHARE YOUR CREATIONS!

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1. Tweet us using the hashtag #aBitofSTEM
2. Text us at 314-285-9663
3. Use this google form and we'll show off your creation. [Submit Here](https://tinyurl.com/STLsubmit) ([tinyurl.com/STLsubmit](https://tinyurl.com/STLsubmit))

For more challenges visit: [STEMchallenges.wustl.edu](https://STEMchallenges.wustl.edu)