



GRADES: 2–6

DIFFICULTY: ● ○ ○

TIME NEEDED: 60 mins

PROJECT OVERVIEW

Create a catapult that can launch a Velcro-covered ping-pong ball to hit a Velcro-covered target four meters away. The catapult launching mechanism must be self-propelling.

PROJECT SEQUENCE

DREAM

1. Ask students to think about how catapults launch objects.

DESIGN

2. Have students determine what materials they will use to build the catapult structure, ping-pong ball holder, and launching mechanism.
3. Have students sketch a model for each catapult part. Remind them to label the materials they're using for structure and movement.
4. As students sketch the different parts of their structures, have them ponder the questions about catapults in their guide.

MAKE

5. Have students pick their best ideas and then begin building their models.
6. Have them test and modify as needed. Remind them to update their sketch pages as they make modifications.

SHARE

7. Ask students to share their designs and describe why they built them the way that they did.

REFLECT

8. Have students reflect on what they learned by answering the reflection questions in a group.

SUGGESTED MATERIALS

- Ping-pong balls
- Adhesive-backed Velcro
- Construction paper
- Index cards
- Card stock
- Rubber bands
- Craft sticks
- Tape, glue sticks, and/or hot glue
- K'NEX
- TeacherGeek catapult kits
- Copies of the student guide (one per student or group)

TEACHER TIPS

1. Think about how you would like to control or manage the materials.

- Will students have free rein?
- Will you limit the motors or building materials?
- Will you assign "cost" to materials as an added dimension of rigor?
 - ◆ Will students have a budget or spending limit?

2. Think about student grouping.

- Do you want students to complete this challenge independently or in teams?
- If students work in teams, how will you ensure they share the workload and responsibilities?
 - ◆ Will students choose their teams, or will you select the teams yourself?

3. Consider how students will reflect and communicate.

- How will you facilitate communication between students?
 - ◆ Will they share daily reflections?
 - ◆ Will they give one another feedback?
 - ◆ Will they have time to reflect on what they've shared with other students or teams?
 - ◆ Can students comment on their classmates' projects or provide constructive feedback?

4. Be on the lookout for students who jump into iteration instead of planning ahead of time.

- This will also be important as they prototype, test, and modify. It is important that students track the changes they make and keep their sketches up to date.

EXTENSION ACTIVITIES

1. Have students consider constraints of lever length.

- This will require students to manipulate fulcrum location.

2. Connect this activity to math:

- If 1 cm (model) = 2.5 meters (real life), what would the dimensions of your catapult be if created to scale?
- What size box would be necessary to store your catapult?
 - ◆ Model =
 - ◆ Scaled size =

3. Connect this activity to history:

- When, where, and why were catapults used?
- Compare historic designs with student designs. Ask: What components would you incorporate into your design to improve your catapult? If there is time, have students add a component from historic models.