Elementary Trades and ADST Projects at Home

Project: Pyramid Catapult

Time required: 45 minutes

Theme: Simple Machines, Geometry, Physics, Elastic Energy. This activity can be used as a lead up to building larger catapults or trebuchets and was adapted from
https://www.instructables.com/id/Pyramid-Catapult/

Grades: K-7 with parental support

Tools and Materials:

10 craft sticks (or substitute)

5 barbeque skewers (or substitute)

3 straws (cut into quarters)

1 small cup (fruit cup, pudding cup or make a cup with cardboard)

1 rubber band

Masking tape

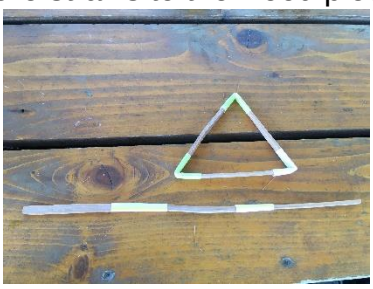
Scissors

Procedure:

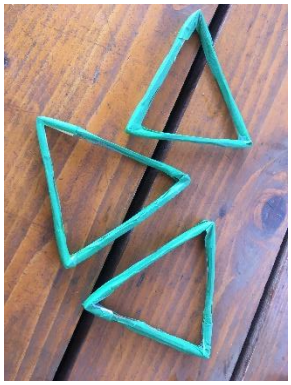
1. Gather and prepare your materials with the help of a parent or adult. Craft sticks and barbeque skewers can be substituted with any suitable wood materials of similar size. We used carefully cut thin strips of cedar. Please ensure students are guided through the preparation of materials as cutting with scissors may be required.


We substituted a fruit cup by cutting, folding and taping a + shaped piece of cardboard.

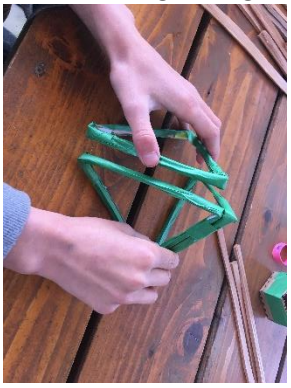
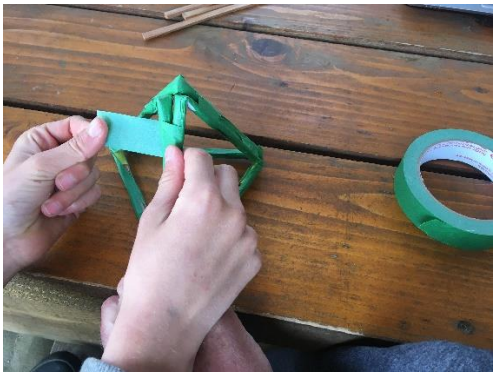
2. Create the three pyramid frames, triangles, by inserting a craft stick half way into a straw segment. Repeat until there are three craft sticks, or substitute, inserted into three straw segments. Fold the sticks at the straw joints to create a triangle. Tape can be used to fasten the straws to the wood pieces before folding into triangles.



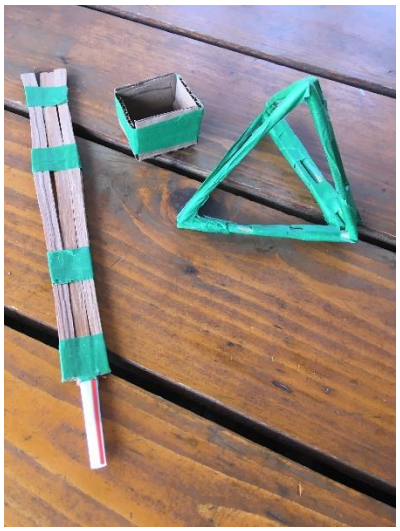
Repeat two more times and wrap a piece of masking tape completely around each triangle to secure.

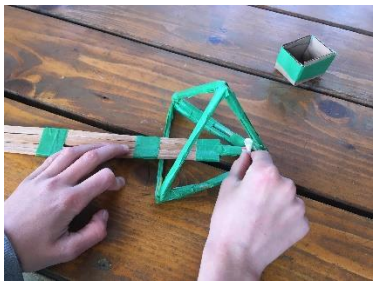
3. Lean triangles against each other to form a pyramid and secure with tape.

4. Create the catapult arm by placing 5 barbeque skewers, or substitute, neatly lined up. Keeping the skewers flat, tape the catapult arm in several places and add a craft stick to stiffen if you wish. Next, insert the three middle skewers halfway into the remaining straw segment and secure with tape. As we used 3 strips of cedar, the middle one was used for this step.

5. To attach the arm to the pyramid base of the catapult, insert the straw end of the arm into the front face, or open side of the base, and secure the folded up straw to the lower corner with tape. This connection will allow the arm to move, like an elbow, as the catapult is fired.




6. Next, attach your rubber band by sliding it over the arm, weaving it through the top of the pyramid to the opposite side and stretching back over the end of the throwing arm. As this step is tricky, and requires dexterity, please use a partner to help and refer to https://www.instructables.com/id/Pyramid-Catapult/ if you need further instruction.

7. To finish your catapult, tape your cup to the end of your throwing arm while leaving a small portion of the arm overhanging the cup. This will help act as a trigger when firing your catapult!

8. Your catapult is now ready to be fired! Once loaded with something safe, and wearing safety glasses, you can position one hand inside the pyramid frame with the fingertips of the other hand at the end the throwing arm. While standing clear, carefully push down and slide your fingers off the arm to release the remarkable action of the catapult! Have fun and be safe!

Extensions:

- Experiment with different building materials and various weighted objects to be launched, varying throwing arm length and rubber band tension.
- Gain accuracy with practice and create a game where shooting targets awards points for competition among friend or family.
- Create a collapsible catapult by referring to https://www.instructables.com/id/Pyramid-Catapult/
- Research the history and types of catapults https://sites.google.com/site/physicsofcatapults/home/history-of-catapults and try to recreate another catapult version.
- Discover the physics of catapults and trebuchets https://www.real-world-physics-problems.com/catapult-physics.html
- Create a Lego catapult https://frugalfun4boys.com/two-ways-build-lego-catapult/

Assessment:

- What variables affected the distance of your throws?
- How did you become more accurate?
- Did the weight of the object being thrown affect distance and accuracy?
- Did the angle of launch affect the distance? What is the best angle to launch the greatest distance?

https://curriculum.gov.bc.ca/sites/curriculum.gov.bc.ca/files/curriculum/continuous-views/en_ADST_k-9_big_ideas.pdf (connections with Big Ideas in BC's ADST Curriculum)

Resources and Links:

https://www.instructables.com/id/Pyramid-Catapult/ (Adapted from complete lesson)

https://sites.google.com/site/physicsofcatapults/home/history-of-catapults (History and types of catapults)

https://littlebinsforlittlehands.com/popsicle-stick-catapult-kids-stem-activity/ (Other simple catapult designs)

https://curriculum.gov.bc.ca/sites/curriculum.gov.bc.ca/files/curriculum/continuous-views/en_ADST_k-9_big_ideas.pdf (BC's ADST Curriculum)