STEM @ HOME GUIDE: Tiny Catapult

- **Aim: To create a simple machine to launch small objects**

- **Materials required:**
  - ✓ 10 popsicle sticks
  - ✓ Rubber bands
  - ✓ Plastic Spoon or bottle cap
  - ✓ Marshmallows, beads, pom poms to launch
  - ✓ Scissors
  - ✓ Optional: hot glue gun

HELPFUL TIPS

Make sure you move the stack of popsicle sticks closer to the notched ends for more leverage

Using a glue gun can help keep things together

- **Questions to think about before you start:**
  - ✓ How can use these materials to shoot an object over a distance

- **Instructions:**

Make sure to perform the experiment as a team (parent and student).

  - **Parent:** Take two of the popsicle sticks and at cut a small notch or grove on each side of one of the ends
  - **Student**: Take the other 8 popsicle sticks into a stack. Wrap a rubber band around each end of the pile
  - **Student**: Take one of the notched popsicle sticks and push it under the top stick of the stack. Flip over the stack so that the stick you pushed through is now on the bottom
  - **Parent:** Lay the second notched stick on top of the popsicle stack and wrap a rubber band around the two popsicle sticks. The area you notched will help keep the rubber band in place
  - **Student:** Use rubber bands to attach the spoon or bottle cap to the popsicle stick. You can also use a glue gun if you have one (Make sure you have an adult help you!)
  - **Student:** You are now ready to launch thigs with your catapult

- **Extensions Activities:**
  - ✓ Try catapulting different size and weighted items to see which ones fly father
  - ✓ Try applying different amounts of force to see how far you can get objects to fly
  - ✓ Try building another catapult using more or fewer popsicle sticks in the stack, what happens?
  - ✓ Try making the lever arm longer and see how that affects how far your objects fly.

- **The science behind the fun:**

When you pull down on the lever arm or spoon you are transferring energy into the arm. The farther you pull it back the more energy you transfer and the farther your object should move in the air. This concept is known as one of Newton's Laws of Motion that every action causes an equal and opposite reaction.

- **Vocabulary:**
  Potential energy: Stored energy an object has because of its position
  Kinetic energy: Energy in motion

- **Real world application:**
  Simple machines like this catapult have been around for centuries and understanding Newton's laws of motion has allowed people to create all sorts of machines from simple catapults, pulleys and wheels to complex machines like cars, cranes and elevators.

Did you know?

- Catapults have been used since ancient times for protection and in warfare.
- The concept of catapults is the same one used in slingshots, some types of rollercoasters and is used for takeoff of airplanes on aircraft carriers.

Materials

Step 1

You should have 2 grooves in one end of the popsicle stick

Step 2

Step 3

Flip it over

Step 4

Step 5

Launch!