Mini Mechanic Marvel: The Lever Catapult Challenge

Materials: 8-10 popsicle sticks, 5-7 rubber bands, 1 plastic bottle cap or spoon, tape (optional), small soft projectile (e.g., pompom, marshmallow, small eraser), paper, pencil, ruler or measuring tape, markers or crayons (optional).

Lesson Steps:

1. Introduction & Concept (5 mins)

- Briefly discuss simple machines, focusing on levers. Ask: "What is a lever? Where do we see them?" (Seesaw, crowbar, bottle opener).
- Explain the goal: We're building a mini catapult, which uses a lever! Identify the parts: the base, the lever arm, the fulcrum (pivot point), where the effort is applied, and where the load (projectile) sits.

2. Design & Sketch (5 mins)

- Give the student paper and pencil. "Quickly sketch how you think we can assemble these materials into a working catapult. Think about where the pivot point (fulcrum) should be." (Art/Engineering)

3. Build Session (10 mins)

- Guide the student through assembly (or let them follow their sketch):
- Stack 6-8 popsicle sticks together and wrap rubber bands tightly around both ends to create a sturdy base.
- Stack 2 popsicle sticks. Wrap a rubber band tightly around one end ONLY.
- Carefully slide the base stack (from step 1) between the 2 sticks of the lever arm stack (from step 2), positioning it close to the rubber band holding the arm together. This base stack now acts as the fulcrum.
- Secure the bottle cap or spoon head to the top end of the lever arm using rubber bands or tape. This will hold the projectile.
- Adjust the position of the fulcrum (base stack) along the lever arm to see how it might change the launch (a quick pre-test thought).

4. Test, Measure & Calculate (5 mins)

- Place the catapult on a flat surface. Place the projectile in the cap/spoon.
- Press down gently on the free end of the lever arm (applying effort) and release to launch.
- Use the ruler/measuring tape to measure the distance the projectile traveled. Record it. (Math)
- Try launching 2-3 times and record each distance. Briefly discuss why the distance might vary.

5. Describe & Decorate / Wrap-up (5 mins)

- Ask the student to write 1-2 sentences on their paper describing how their catapult works, using the words 'lever' and 'fulcrum'. (English)
- If time permits and desired, let the student decorate their catapult with markers/crayons. (Art)
- Review what was learned: How a lever works, how we measured, and the steps taken to build it. Connect it back to the mechanics interest.