**📍 Station 3: Aim for the Target!**

**NGSS: 3-PS2-2, 4-PS3-4**

**🎯 Your Mission:**

Test how well your catapult can **hit a target** placed exactly **100 cm away**. You’ll try launching **3 times**, changing the **angle** or **pull-back force** to improve your aim. Track your results and record what changes helped you aim better!

**🛠️ Materials at this Station:**

* Your built catapult
* 3 cotton balls or pom-poms
* 1 paper cup or printed target
* Measuring tape
* Ruler (optional for measuring angle)
* Data table and pencil

**Student Directions:**

**Step 1: Set up your target.**

* Use a measuring tape to place the paper cup or printed target exactly **100 cm (1 meter)** away from your catapult.
* Mark the spot where your catapult will stay. Do **not** move it during testing.

**Step 2: Get ready for Trial #1.**

* Use your default setup—don’t change anything yet.
* Pull back your catapult and launch the cotton ball toward the target.
* Record in the chart if you **hit or missed**.
* If you missed, take a note of what might have gone wrong.

**Step 3: Adjust and try again!**

* **Trial #2:** Change **one thing**—either the **angle of launch** or how far you **pull back the spoon**.
* Launch again and record the result.
* Write down what you changed to improve your aim.

**Step 4: One last adjustment.**

* **Trial #3:** Try again and adjust a **different variable** if needed (maybe use more force or lower the spoon angle).
* Launch, observe, and record your result in the table.

**📋 Record Your Results Below:**

| **Try #** | **Did You Hit the Target?** | **What Did You Change?** |
| --- | --- | --- |
| 1 | ☐ Yes  ☐ No | (default settings) |
| 2 | ☐ Yes  ☐ No | \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |
| 3 | ☐ Yes  ☐ No | \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |

**💡 Wrap-Up Question:**

**→ What helped improve your accuracy the most?**
→ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
→ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

📍 **Station 3: Aim for the Target!**
🔬 **NGSS Connection:**
**3-PS2-2** – Make observations and/or measurements of an object’s motion to provide evidence that a pattern can be used to predict future motion.
**4-PS3-4** – Apply scientific ideas to design, test, and refine a device that converts energy from one form to another.

✅ **ITEEA STEL Standards – Elementary School**

**STEL 1B** – Technologies are developed to meet human needs and wants.
 → Students refine their catapult to meet the challenge of accurately hitting a target.

**STEL 2B** – The core concepts of technology apply to all technological activities.
 → Students explore force, motion, and accuracy through hands-on testing and modification of a physical system.

**STEL 4B** – The engineering design process includes defining the problem, generating ideas, testing, and refining solutions.
 → Students adjust one variable at a time and record outcomes to improve design and accuracy.

**STEL 5A** – Asking questions and gathering information helps solve problems.
 → Students analyze their results to figure out which change improved accuracy.

**STEL 7B** – Mathematics helps support technological development.
 → Students measure and record data such as distance and angle, and track performance across trials.

✅ **Common Core Math Standards – Elementary School**

**3.MD.A.1** – Tell and write time to the nearest minute and measure time intervals in minutes.
 → (Optional) Students could time each launch and compare intervals or reaction times.

**3.MD.B.4** – Generate measurement data and represent it using line plots.
 → Students gather motion data and can optionally plot successful vs. unsuccessful trials.

**4.MD.A.1** – Know relative sizes of measurement units within one system of units.
 → Students consistently use centimeters and meters to set up and measure distance to the target.

**4.MD.A.2** – Use the four operations to solve word problems involving distances.
 → Students calculate and analyze changes in their performance using measured outcomes.

💡 **Summary:**
This station strengthens systems thinking, engineering design skills, and measurement accuracy. Students observe how small changes in angle or force affect the motion and accuracy of their catapult, aligning closely with NGSS physical science goals, ITEEA technology and engineering practices, and Common Core Math measurement and data standards.