**📍 Station 4: Find the Pattern!**

**NGSS: 3-PS2-2**

**🎯 Your Mission:**

Experiment with your catapult by launching at **three different angles**: 30°, 45°, and 60°. Measure how far the cotton ball travels for each angle. Then, look for patterns and figure out which launch angle works best!

**🛠️ Materials at this Station:**

* Your completed catapult
* Cotton balls or pom-poms
* Ruler or measuring tape
* Angle guide (or printed protractor card)
* Data table
* Pencil

**Student Directions:**

**Step 1: Set up your catapult for 30°**

* Use the angle guide to tilt your catapult to approximately **30 degrees**.
* Secure it in place using tape, a clipboard, or another support if needed.
* Place a cotton ball in the spoon, pull back gently, and **launch**.
* Measure how far the cotton ball travels from the catapult to where it first hits the ground.
* **Record the distance (in cm)** in your data table.

**Step 2: Test at 45°**

* Adjust your catapult’s launch angle to **45 degrees**.
* Launch again, measure the distance, and record it.

**Step 3: Test at 60°**

* Tilt your catapult to a **60-degree angle**.
* Launch, measure, and record the result.

**📋 Record Your Results Below:**

| **Launch Angle** | **Distance Traveled (cm)** |
| --- | --- |
| 30° |  |
| 45° |  |
| 60° |  |

**⭐ Think About It:**

**→ Which launch angle helped the cotton ball travel the farthest? Why do you think that angle worked best?**  
→ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  
→ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**💬 Wrap-Up Reflection**

1. **What did you learn about force and motion today?**  
   → \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  
   → \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
2. **How did your catapult change stored energy into motion?**  
   → \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  
   → \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
3. **If you could make a super-powered catapult, what would you add or upgrade?**  
   → \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  
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📍 **Station 4: Find the Pattern!**  
🔬 **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.

✅ **ITEEA STEL Standards – Elementary School**

**STEL 1B** – Technologies are developed to meet human needs and wants.  
 → Students use their catapults to solve the real-world challenge of identifying the best launch angle.

**STEL 2B** – The core concepts of technology apply to all technological activities.  
 → Learners explore cause and effect by adjusting angles and observing motion outcomes.

**STEL 4B** – The engineering design process includes defining the problem, generating ideas, testing, and refining solutions.  
 → Students conduct controlled tests with different angles to identify which design choice performs best.

**STEL 5A** – Asking questions and gathering information helps solve problems.  
 → Learners collect and compare data to spot patterns in the results and answer the question: “Which angle works best?”

**STEL 7B** – Mathematics helps support technological development.  
 → Students measure distances, organize data in tables, and interpret patterns to support design decisions.

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

**3.MD.B.4** – Generate measurement data by measuring lengths using rulers marked with standard units and show the data by making a line plot.  
 → Students measure and record travel distances, then look for trends across angles.

**4.MD.A.1** – Know relative sizes of measurement units within one system of units.  
 → Students consistently measure in centimeters and compare results across trials.

**4.MD.A.2** – Use the four operations to solve word problems involving distances, intervals of time, and more.  
 → Students compare measurements and draw conclusions about which angle performed best.

**5.OA.B.3** – Analyze patterns and relationships.  
 → Students analyze the relationship between angle and distance to identify predictable trends.

💡 **Summary:**  
This activity helps students discover patterns in motion by adjusting variables and recording quantitative results. It integrates engineering design, physical science, and mathematics, supporting NGSS science inquiry, ITEEA technological literacy, and Common Core Math standards in measurement and pattern recognition.