UNIT: CATAPULT

ENERGY DETECTIVE-POTENTIAL TO KINETIC

Your Mission:

You are an **Energy Detective**! Your task is to uncover how energy is stored in your launcher before a launch (potential energy) — and how it transforms into motion energy (kinetic energy) once released. Your job is to test different pull-back distances and track what happens to your projectile’s speed and distance.

Focus: **Force, Motion & Energy Transfer**

Materials:

* Spoon launcher or catapult (from Station 1)
* Ruler or measuring tape
* Marker or tape for measuring pull-back distance
* Cotton balls or safe projectiles
* Stopwatch or phone timer
* Data recording sheet

STUDENT DIRECTIONS:

**🔧 Setup:**

1. Get your spoon launcher or mini catapult from Station 1.
2. Use a ruler to mark pull-back distances on the spoon or arm (e.g., 2 cm, 4 cm, 6 cm). You can mark them with a small piece of tape or pen.
3. Set up a launch area with enough space to test how far your cotton ball will travel.

**🚀 Experiment:**

1. Choose your first pull-back distance (start with 2 cm).
2. Place the cotton ball in the spoon and pull it back to the marked point.
3. Let go to launch the cotton ball.
4. Use your measuring tape to measure how far it traveled (from launcher to landing spot).
5. Use a stopwatch to record the time of flight (optional if accurate timing is difficult).
6. Repeat steps 4–8 for each pull-back distance (e.g., 4 cm and 6 cm).
7. Make careful observations about height, speed, or other noticeable changes.

**Data Table – Record Your Results:**

| **Trial** | **Pull-Back Distance (cm)** | **Estimated Potential Energy** | **Distance Traveled (m)** | **Observations** |
| --- | --- | --- | --- | --- |
| 1 | 2 cm | Low |  |
| 2 | 4 cm | Medium |  |
| 3 | 6 cm | High |  |

**Science Notes:**:

* **Potential Energy**: This is the stored energy when you bend the spoon back.
* **Kinetic Energy**: This is the energy of motion when the cotton ball flies through the air.

Use this idea to think:

More pull-back = more stored energy = more powerful launch!

REFLECTION:

1. Where was the energy stored before the launch?  
   → \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
2. Where did the energy go after the launch?  
   → \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
3. What happened when you increased the pull-back distance?  
   → \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
4. How do real machines (like springs, slingshots, or bows) use this same idea?  
   → \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Standards Alignment

NGSS: HS-PS3-1, HS-PS3-2 STEL: STEL 1H, STEL 2H, STEL 3I, STEL 4G, STEL 5G CCSS: HSN.Q.A.1, HSN.Q.A.2, HSA.CED.A.2, F.IF.B.4