CHALLENGE #3: CATAPULT (EXPLORATORY)

YOUTH WILL DESIGN AND BUILD A CATAPULT THAT CAN LAUNCH A SMALL PROJECTILE

MATERIALS: Craft sticks, unsharpened pencils, an empty tissue box, paint stirrers, chopsticks, straws, skewers, plastic spoons, milk caps, rubber bands, pompoms, paper cups, glue, ruler, pencil, and a recording sheet.

VOCABULARY:

POTENTIAL ENERGY: Stored energy. When the rubber bands are stretched and the catapult is ready to be released, the energy in the rubber bands is **POTENTIAL ENERGY**.

KINETIC ENERGY: Energy of motion. When the rubber band is released and moves the catapult arm to launch the projectile, the type of energy becomes **KINETIC.**

LIFE SKILLS

4-H LIFE SKILL:

RECORD KEEPING: As you perform multiple tests of each projectile, keep **RECORDS** to determine which projectile consistently launched the farthest.

PERSONAL SAFETY: When launching, choose only soft projectiles that won't hurt yourself, other people, your pets or your walls.

DO: YOUTH COMPLETE THE ACTIVITY

Watch the challenge: **https://go.umd.edu/catchallenge**

CHALLENGE #3: CATAPULT (GUIDED)

YOUTH WILL DESIGN AND BUILD A CATAPULT THAT CAN LAUNCH A SMALL PROJECTILE

MATERIALS: 8 craft sticks, 5 rubber bands, plastic spoon, pompom, pencil cap eraser, ruler, pencil, recording sheet, and calculator (optional).

VOCABULARY:

POTENTIAL ENERGY: Stored energy. When the rubber bands are stretched and the catapult is ready to be released, the energy in the rubber bands is **POTENTIAL ENERGY**.

KINETIC ENERGY: Energy of motion. When the rubber band is released and moves the catapult arm to launch the projectile, the type of energy becomes **KINETIC.**

LIFE SKILLS

4-H LIFE SKILL:

RECORD KEEPING: As you perform multiple tests of each projectile, keep **RECORDS** to determine which projectile consistently launched the farthest.

PERSONAL SAFETY: When launching, choose only soft projectiles that won't hurt yourself, other people, your pets or your walls.

DO: YOUTH COMPLETE THE ACTIVITY

Watch the challenge: https://go.umd.edu/catchallenge
then follow steps 1-5 on the following page.

CHALLENGE #3: CATAPULT (GUIDED STEPS ONE THROUGH FIVE)

STEP 1. IDENTIFY THE PROBLEM

Design and build a catapult that can launch a craft pompom and pencil cap eraser. Measure and record how far each lands from the catapult.

STEP 2. IMAGINE SOLUTIONS

Think about all of the possible ways you can make your catapult. Consider how you'll build a base that is sturdy enough to hold the launch arm. You could build a frame out of craft sticks, unsharpened pencils, paint stirrers, or chopsticks. Another idea for a base is to start with an empty tissue box. Add an "arm" that can move to launch the projective. Bending a plastic spoon is one idea. Another idea is to glue a paper cup or milk cap onto a craft stick and then attach it to the base. A straw on top of a skewer will allow it to rotate, and adding a rubber band on the opposite end of the "arm" will add more power to your catapult.

STEP 3. PLAN POSSIBLE SOLUTIONS (SKETCH IT HERE):

STEP 4. CREATE YOUR CATAPULT AND TEST IT

Try different projectile types to see which type launches the farthest. Remember to keep **PERSONAL SAFETY** in mind when selecting your projectiles. Projectile ideas are pompoms, eraser caps, dried beans, and popcorn kernels. Repeat the launch of each projectile at least three times to get an average (the sum of the distances divided by the number of launches).

STEP 5. IMPROVE YOUR DESIGN

Do you need to change anything to make your catapult work better by increasing the **POTENTIAL ENERGY**? You can go back to Step 1, and start the process again to make the changes to improve your catapult.

CHALLENGE #3: CATAPULT RESULTS

Recording Sheet (in inches)

	Pompom Distance	Eraser Distance
Trial One		
Trial Two		
Trial Three		
Trial Four		

1. Add the pompom distances: ___ + ___ + ___+ ___ = ___ (sum)

2. Divide the total pompom distance by 4 to calculate the average. ____ (sum) ÷ 4 = _____ (average)

3. Add the eraser distances: ___ + ___ + ___+ ___ = ___ (sum)

4. Divide the total eraser distance by 4 to calculate the average. ____ (sum) ÷ 4 = _____ (average)

5. On average, which went farther? Circle one: Pompom Eraser

CHALLENGE #3: CATAPULT

REFLECT: GUIDE YOUTH THROUGH THE REFLECTION PROCESS

See a solution here: **https://go.umd.edu/csolution**

Which projectile flew the farthest? Did it fly the farthest every time? How did **KEEPING RECORDS** and finding an average help you decide?

Why do you think one projectile flew farther than the other?

Why was **PERSONAL SAFETY** one of the 4-H life skills for this challenge?

APPLY: CHALLENGE THE YOUTH TO APPLY WHAT THEY'VE LEARNED TO OTHER PARTS OF THEIR LIVES

Think of another time you kept **RECORDS** of something. Why was it useful?

What are examples of ways that adults **KEEP RECORDS** of things? Why do you think they do that?

REFERENCES:

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