Grades Middle School and Up
Journey to NYC Parks
Basketball Catapult

Children will create their own catapult and basketball hoop. Envisioning themselves on the court at Madison Square Garden, they can have fun counting how many baskets their balls will make.

What Will You Learn?
- How a catapult functions
- How levers can be used to lift objects
- The difference between potential and kinetic energy

Materials:
- Straws
- Rubber bands
- Popsicle sticks
- Porcupine balls
- Plastic spoon
- Mini cups
- Cardboard

Instructions:
Building the Catapult
1. Take 5 craft sticks and stack them, one on top of another.
2. Secure one end of the stack with a rubber band. Wrap the rubber band around several times to make it tight.
3. Slide the 6th craft stick between the top craft stick and the remaining 4 sticks in the stack. The 6th craft stick should lay perpendicular to the stack and top stick.

4. Two thirds of the 6th stick should be hanging on the left side of the stack, and 1/3 of the 6th stick should be on the right side of the stack.

5. Secure the other end of the stack with a rubber band. Wrap the rubber band around several times to make it tight. This structure will serve as the base.

6. Flip the base over so that the 6th stick is now towards the bottom.

7. Place the spoon on top, parallel to the 6th stick and perpendicular to the stack. The back of the spoon should be facing down and the spoon cup should be facing up. Align the end of the spoon handle with the 1/3 end of the 6th stick.

8. Secure the end of the spoon handle to the 1/3 end of the 6th stick with a rubber band. Wrap the rubber band around several times to make it tight.

**Building the Basketball Hoop**

1. Lay the top 1 inch of the straw onto the back of the small rectangular cardboard. Make sure the straw is centered. Tape it down.

2. Flip the cardboard over so that the straw is now on the bottom. Draw a border around the cardboard, 1/4 of an inch from the edges. This is the backboard of the basketball hoop.

3. For the hoop, tape the mini cup to the backboard. Draw a small rectangular box directly above the rim of the cup.

4. Cut two 1/2 inch slits at the bottom of the straw; 1 slit on the left side and the other on the right. Lift up the two flaps that are created.

5. Secure the base of the straw to the second cardboard piece by taping down the flaps.
6. Place the porcupine ball into the spoon and launch it into your newly created basketball hoop.

Reflection Questions:
- What happens when the catapult has heavy vs. lighter weight items inside?
- What were some of the challenges you discovered along the way?

Explanation:
- The catapult is a type of lever, which is a simple machine. It consists of a lever (the spoon) propped up by a pivot point called the fulcrum (where the spoon and 6th stick are rubber banded together).
  - The lever magnifies the force applied to it, allowing for the launching of an object with less force than would be required otherwise.
- Catapults utilize the principles of potential and kinetic energy. When the catapult is loaded and pulled back, it stores potential energy in the form of tension or torsion, depending on the type of catapult. When the catapult is released, this potential energy is converted into kinetic energy, propelling the projectile forward.
- Catapults rely on the principles of projectile motion. Once the projectile is released, it follows a curved trajectory influenced by gravity. The range and trajectory of the projectile depend on factors such as the angle of release, the force applied, and the mass of the projectile.
Further Reading Recommendations:

- **I Can Make Fantastic Fliers**
- **The Science Of Basketball With Max Axiom, Super Scientist**
- **Rising Above: The Wataru “Wat” Misaka story**

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