



2020 Cub Scout Backyard Challenge



Popsicle Stick Catapult

Category: STEM

Difficulty: Intermediate

Description:

Design 1: Catapult with Popsicle Sticks, Rubber Bands, and Spoon

Materials:

1. Popsicle Sticks or Craft Sticks
2. Rubber Bands
3. Plastic Spoon
4. Soft Ammunition – Styrofoam Balls or Marshmallows



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Directions:

1. Make a stack of 7 popsicle sticks and use rubber bands to tie them together on both ends.



2. Make a stack of 2 popsicle sticks and use a rubber band to tie them together on one end only.



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3. Pull the 2 popsicle sticks apart and wedge the stack of 7 popsicle sticks between them.



4. Use two rubber bands, secure the plastic spoon to the upper popsicle stick.



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5. Place the ball onto the spoon.

6. Hold the catapult with one hand, use the other hand to push down the spoon.



7. Release the spoon and watch the ball fly!





Design 2: Catapult with Popsicle Sticks, Rubber Bands, and Bottle Cap

This popsicle stick catapult design is very similar to the one above, except you are replacing the spoon with the bottle cap. To do this, you need a hot glue gun and a cap from a water bottle or sports drink bottle.

Simply hot glue the bottle cap to the end of the popsicle stick where the spoon was from the other design.



With the bottle cap, the catapult felt more stable. I also like it because you can put different objects in the cap and not risk having them fall out since the cap is deeper than the spoon. However, since the spoon extended the arm of the catapult, the catapult with the spoon could shoot farther. The catapult with the bottle cap seemed to shoot higher, but the horizontal distance of the projectile was shorter.





Design 3: Catapult with Popsicle Sticks, Binder Clip, and Bottle Cap

Materials:

- Popsicle sticks
- Binder clip
- Hot glue
- Bottle cap

Directions:

1. Form a triangle with 3 popsicle sticks and glue the ends together.



2. Glue one popsicle stick one of the points of the triangle and glue the other end to where it bisects the opposing side.





3. Glue the binder clip to the end of the top popsicle stick. I used extra glue around the metal part of the binder clip to make sure it will stay attached to the popsicle stick.



4. Glue a popsicle stick to the top of the binder clip. Again, I applied extra glue to the metal part of the binder clip.



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5. Hot glue the bottle cap to the other end of the popsicle stick.



This popsicle stick catapult design is simple yet effective. With just a little pressure on the bottle cap, you are able to really launch the projectile far.

The Science Behind the Popsicle Stick Catapult

The biggest benefit of STEM projects is that you can show your kids the science visually, which helps them understand the concepts. That's how I learned physics at school!

You probably heard of Newton's Three Laws of Motion (source):

1. An object at rest stays at rest and an object in motion stays in motion with the same speed and in the same direction unless acted upon by an unbalanced force.
2. When an external force acts on a body, it produces an acceleration (change in velocity) of the body in the direction of the force.
3. Every action has an equal and opposite reaction.

You can explain to your child how without touching the catapult, nothing happens. The ball is not going to launch itself without you applying force.





When you pull back the spoon and let go, you overcome the ball's inertia and fling the ball into the air. The force of the spoon exerted on the ball produces acceleration upward and makes the ball fly into the air. The action of letting go of the spoon causes the reaction of the ball getting launched. You can also explain that because of gravity and air friction, the ball was pulled down to the ground instead of flying in the air forever. Then when the ball hits the ground, it bounced and rolled until the friction of the floor eventually stopped it.

If you have preschoolers, Newton's laws may be a little complicated for them. However, you can always try to explain everything in simple terms and start introducing the concept of force and motion to them. You never know what they absorb and remember!

Popsicle Stick Catapult Activities

There are so many fun activities you can do with a popsicle stick catapult! You will find that your child may come up with his own ideas, but here are some to get you started:

Attack the Castle:

Build a castle with some lightweight blocks or even LEGO (without snapping the pieces together). Hurl balls at the castle and blast the castle wall open! Just make sure the blocks are not too heavy so that the balls have enough force to knock them over.

Go the Distance:

Make multiple catapults and see who can launch the ball the farthest!

True Aim:

This one is difficult, but fun at the same time! Place a bunch of cups on the floor. Have your child fling the balls at the cups and see how many balls land in the cups!

Switch It Up:

Try different objects to shoot heavier objects go farther? How about flatter objects? You can even try chucking a slime ball (provided it's not too sticky) at the wall or glass door and watch the slime ball go "splat!"

I hope you and your kids have lots of fun with this popsicle stick catapult activity! I love how it's mess-free and I didn't have to run out to the store to buy any materials to build the catapults.

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And if you are finished playing with the popsicle stick catapults, you can always just take it apart and use the popsicle sticks for other crafts or projects! Check out this easy popsicle stick rainbow craft your kids will love!

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