THE JCB ACADEMY

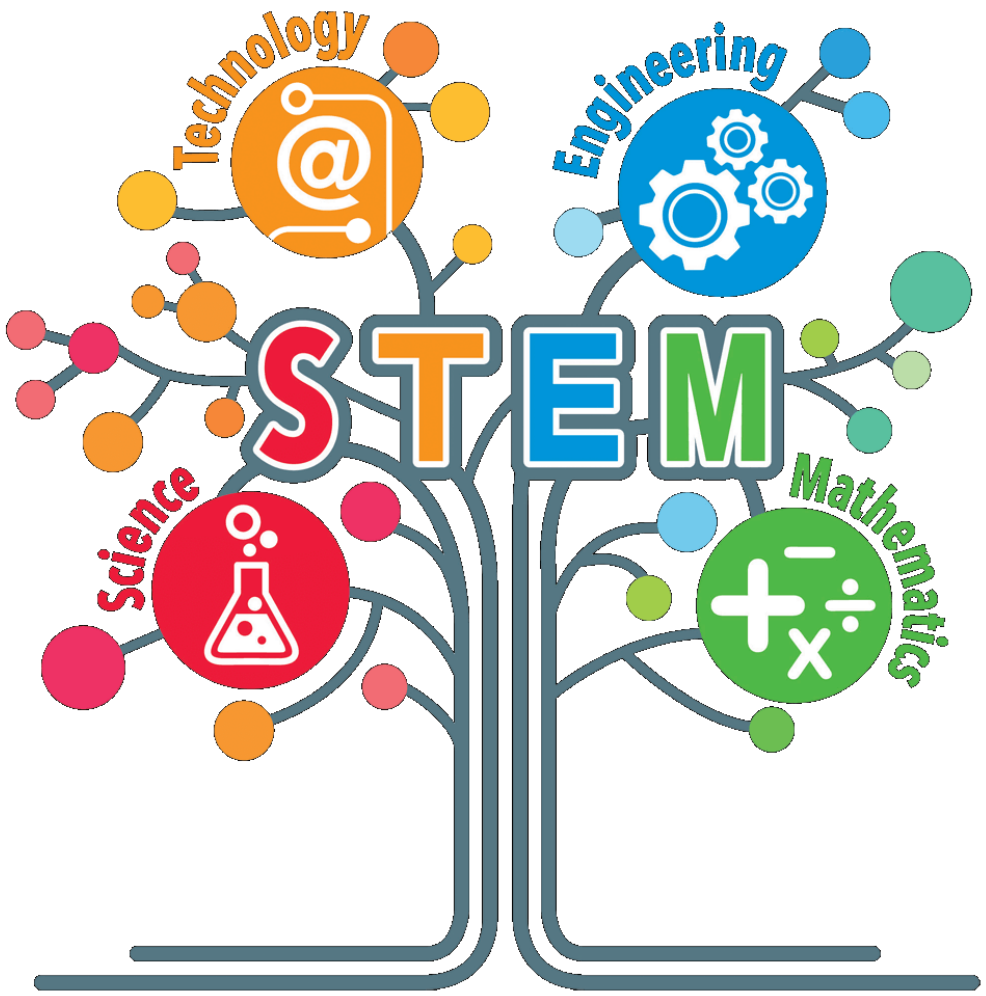
STEM Challenges

What's it like at the JCB Academy?

https://jcb-academy.com/

STEM Challenge

What is STEM?



STEM stands for -

Science

Technology

Engineering

Mathematics

These subjects are linked directly to each other and this task will highlight your skills in each of these subject areas.

Objectives To understand what is meant by STEM. To understand how STEM skills are used when completing a manufacturing

Classroom STEM Challenge

Manufacture a catapult from wooden lolly sticks by following a production plan

The Challenge

You are going to manufacture an Catapult using wooden lolly sticks.

The lolly sticks will be joined together to make a 2 equilateral triangles for the catapult frame. A larger wooden stick will be needed to make the catapult arm (lever) to amplify the force applied by you and fire the projectile.

You can think about improvements to this design to make it fire a further distance?

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Manufacture a catapult from wooden sticks card by following a production plan

What you will need -

- Wooden icelolly sticks – 8 to 9 per catapult
- Wide craft sticks – 2 per catapult
- A bamboo skewer
- A straw – either plastic or paper
- A paper cup
- Hot glue gun
- Scissors

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Job Roles

During this task, you will fulfil many roles –

- Come up with ideas to improve the power of your catapult (creative designer)
- Assemble the frame of the catapult (manufacturing engineer)
- Check the frame structure is strong enough to take the stresses and strain from its operation (quality control engineer)
- Add in a pivot that allows the firing arm to move freely (assembly engineer)
- Support the structure when its getting built (structural engineers)
- Test the catapult (quality control engineer)

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Step 1: Grab 6 sticks and warm up the glue gun. I actually used some mini lolly sticks for my instruction photos and then made a catapult with full size popsicle sticks afterwards. The process is the same. I think I like the full size popsicle stick catapult better, but both of them work well!

Top Tip

Make sure you let the glue gun warm up fully so there is a good bond between the wooden lolly sticks.

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Step 2: Make two triangles by gluing three craft sticks together. Then grab a straw and a bamboo skewer.

Top Tip

Stagger the over lap of the lolly sticks so they line up better and are not bent or distorted.

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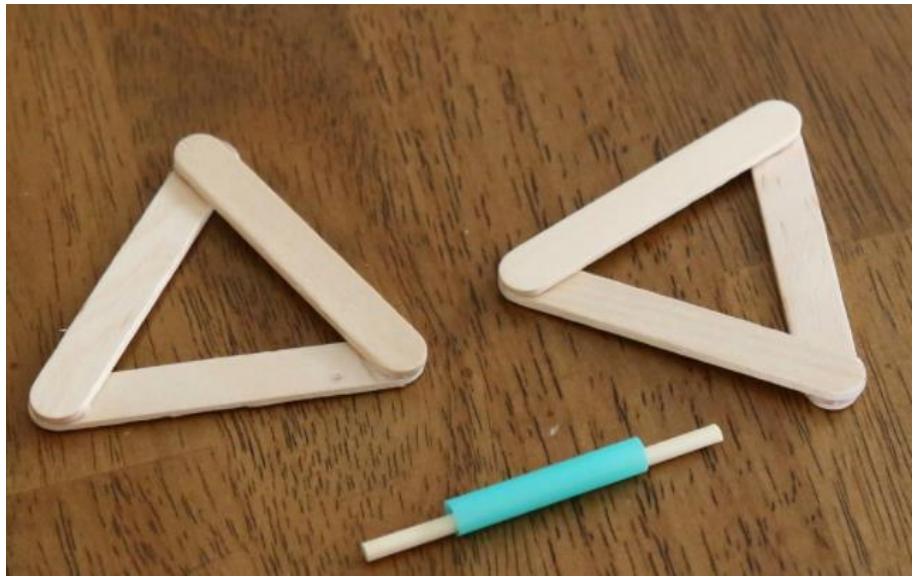
Step 3: Cut a piece from the bamboo skewer. Then cut a shorter segment from the straw.



Step 4: Hot glue the skewer to each of the triangles.

Environmental Considerations

Recycling waste materials. We can recycle material by reusing it and repurposing it. This cuts down on waste as we aren't throwing material away after its first use. The sticks were used to make lolly's and now we have used them to make a toy catapult. This can be done with all sorts of products and materials. See if you can think of 3?

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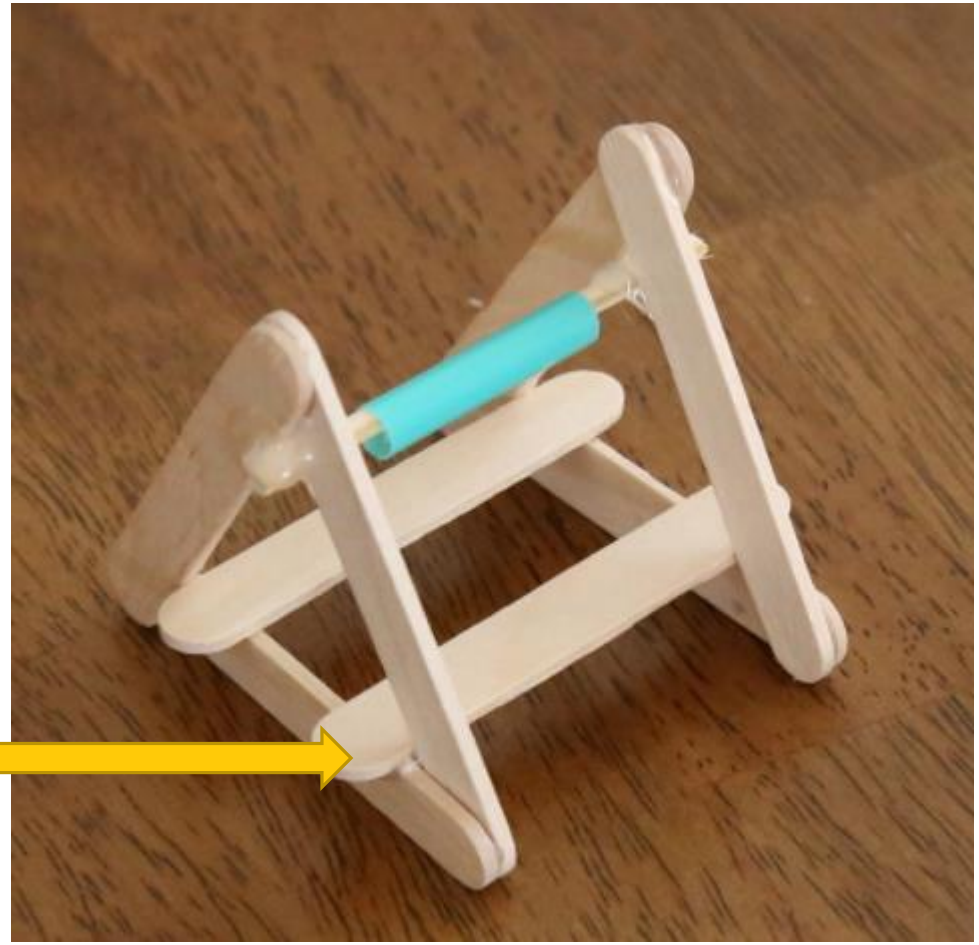
Step 5:

Glue a couple of lolly sticks to the base of the catapult for stability.



Top Tip

Glue the base lolly sticks into the corners of the triangle for extra stability.

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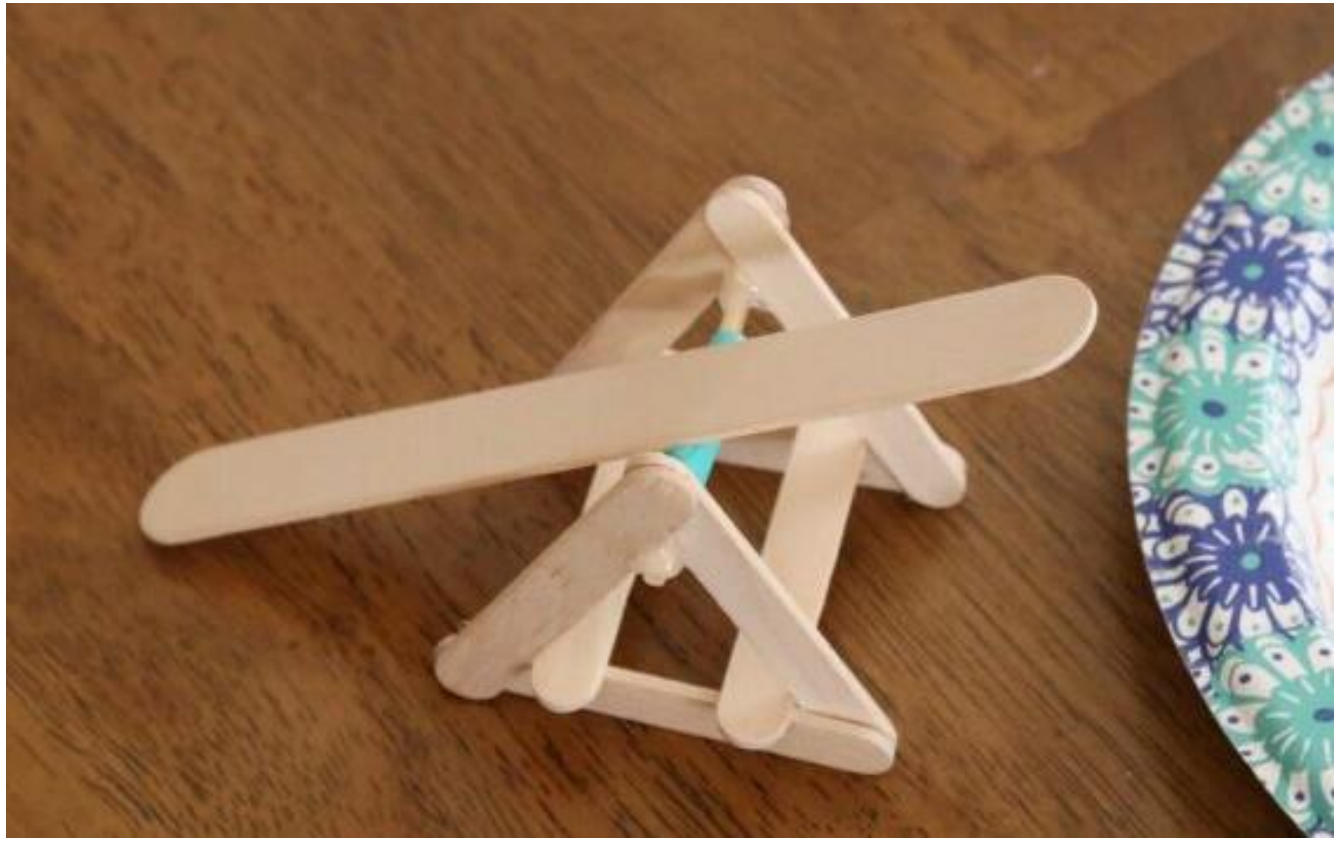
Step 6:
Glue a wide craft stick to the straw to create the shooting arm of the catapult.



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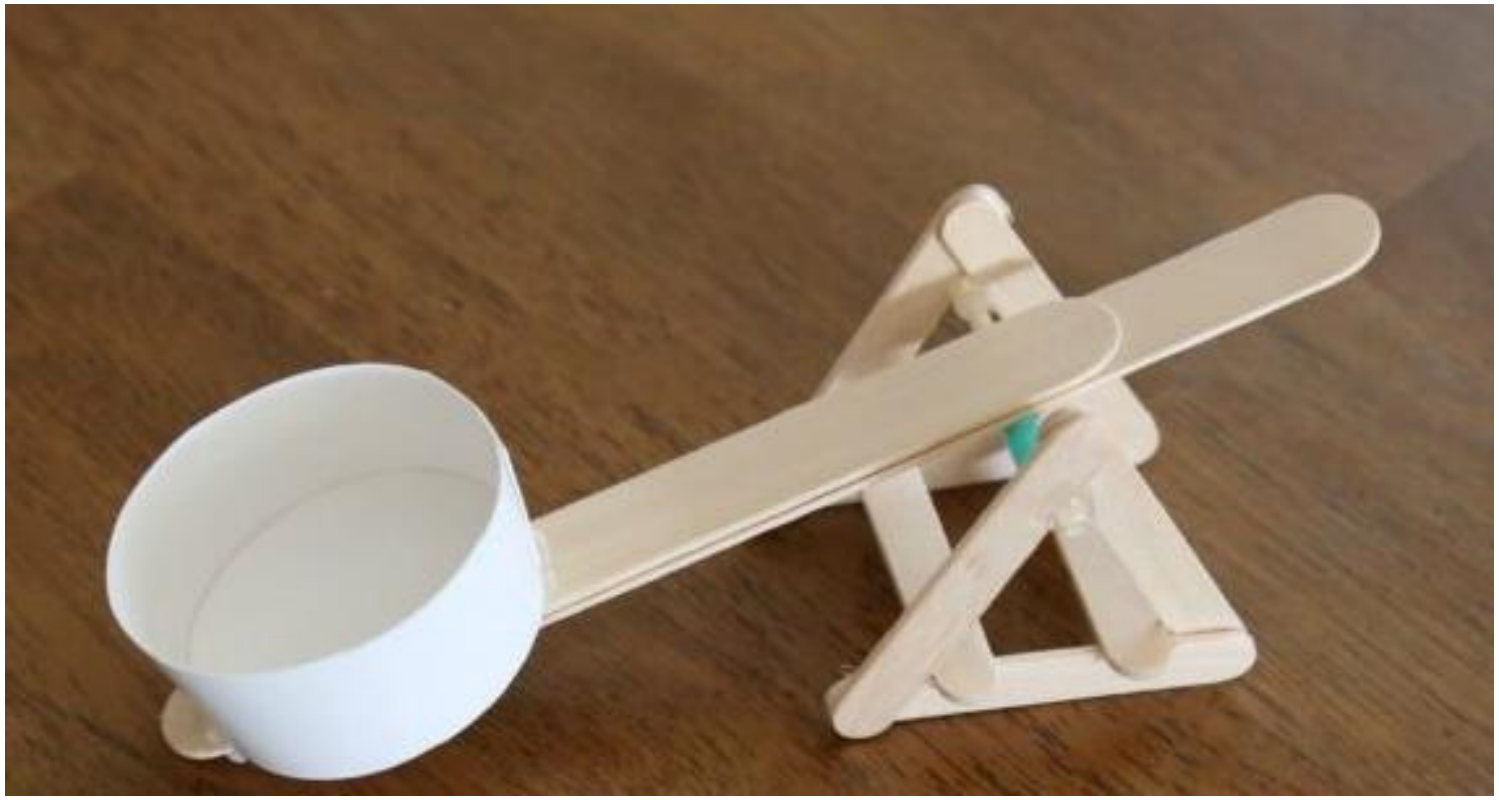
Step 7:
Cut a paper cup so that there is just an inch or two left at the bottom. Glue a second wide craft stick to the catapult and then glue on the cup.



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Manufacture a catapult from wooden lolly sticks by following a production plan

Now you're ready to try it out! Here's the larger version that I created out of regular size lolly sticks.

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If you use full size lolly sticks (the size I linked to in the supply list) or simply wait until you have eaten a few lolly's, you'll need to add one more stick across the front of the catapult. You can experiment with the position of this final stick so that it stops the shooting arm at the best position for launching the ball.

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Time to evaluate

Engineers always evaluate a process when they have completed it. It helps them to improve their processes next time. Here are some things to think about -

Did you enjoy making it?

Why?

How accurate is your catapult?

Does it fire straight?

What went Well?

How could you improve?

Is it sturdy enough?

How could you increase the strength of the catapult?

Is your structure creative?

Have you been able to improve the design?

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What's next?

- **Share your achievements**
  - Send pictures or videos of your activities to us. Make sure its clear what school you are from.

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- **Try some more Challenges from our website!**