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AN ARCH MADE FROM SUGAR CUBES

Name of the object	Roman Arch
Recommended ages	From 10 to 15 years
Thematic areas combined (STEAM)	Physics, engineering
Materials needed	Material for an arch: - 13 sugar cubes or more - 8 halves of wooden sticks (sticks for ice cream) - small glass, measuring 4-5cm (or something else similarly shaped) - a piece of cardboard for the base - two heavy objects (wooden cubes, books) to use as the buttresses - optionally, glue You can use cubes to build the arch from different materials - wood, paper, ice … Instead of glue you can also use egg whites and sugar or flour and water.
Instructions step by step	**Step 1**: Gather the materials. **Step 2**: Start building an arch. **Step 3**: Try to get the glass out so the arch can stand by itself. **Step 4**: Additional: Try with more cubes (add 2 at a time). **Step 5**: Additional: Try to rotate the sugar cubes. **Step 6:** Additional: Glue the arch.

Step by step: how to build the "Roman arch"

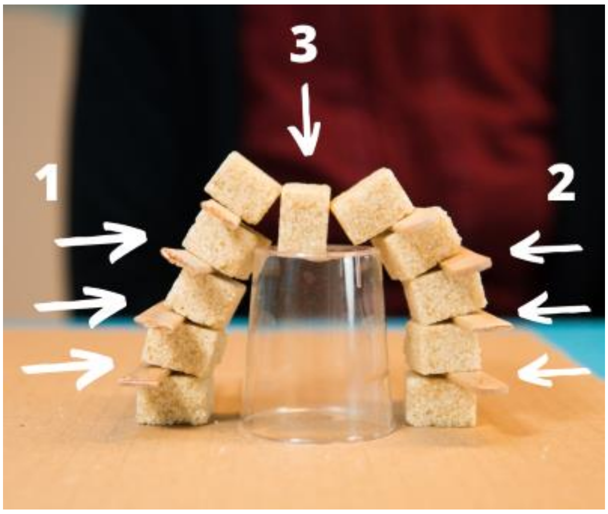
Step 1. Gather the materials

Time needed: 2 minutes

Step 2. Start building an arch

Time needed: 15 minutes

First, put the glass upside-down on the cardboard base. Now it is time to start building. On one side of the glass, place the first sugar cube, and on it put the wooden stick on the outer side of the arch. Continue like this with three sugar cubes and sticks (1 in the picture). This "tower" can be leaned on the glass for stability. Then we do the same thing on the other side of the glass (2 in the picture). Next, we put in the middle of an arch (on the top of the glass) one sugar cube, and two of them on each side of the middle one (3 in the picture).



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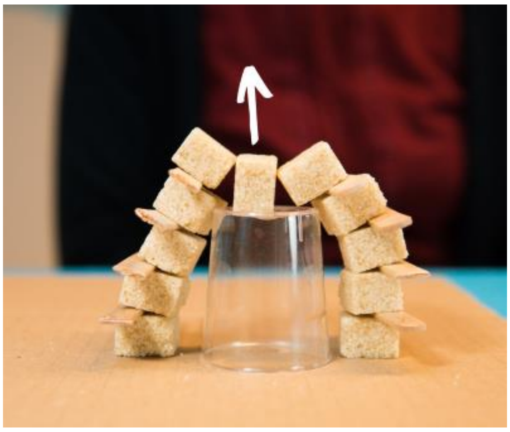
Now comes the tricky part: we have to lift the middle one sugar cube so the sugar cubes on the left and right sides can lean on it. You should ask your schoolmates for help. In pairs it may be easier to make this arch without it falling apart!



Step 3. Try to get the glass out so the arch can stand by itself

Time needed: 5 minutes

With patience and caution, try to slide the glass out from under the arch without the sugar cubes falling.

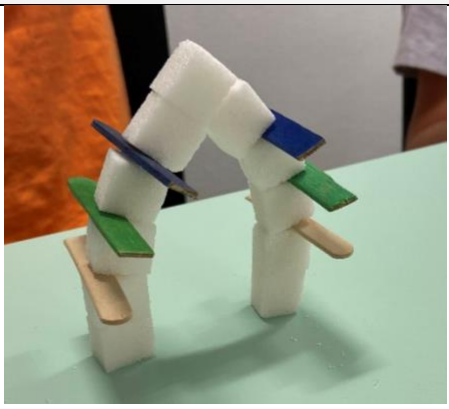
The glue bottle is used as a buttress for better stability.

Step 4. Additional: Try with more sugar cubes (add 2 at a time)

Time needed: 5 minutes

Try to add 2 sugar cubes (on each side of the middle one). See how additional cubes affect the stability of the arch. You can also try to put something like a “wall” on the left and right side of the arch for enhanced stability (look at the picture in the next step). If you have enough sugar cubes, you can build this wall with them.

Step 5:



Time needed: 5 minutes

Additional: Try to rotate the sugar cubes.

Assemble an arch and try to rotate its cubes to compare its stability to the previous one.

Step 6: Additional: Glue the arch

Time needed: 10 minutes

If the glass cannot be removed without the arch falling apart, try to glue the sugar cubes and sticks together. The glue can be used like mortar, and you can spread it on the stick. Do not use too much glue, though, because the sugar cubes will dissolve.