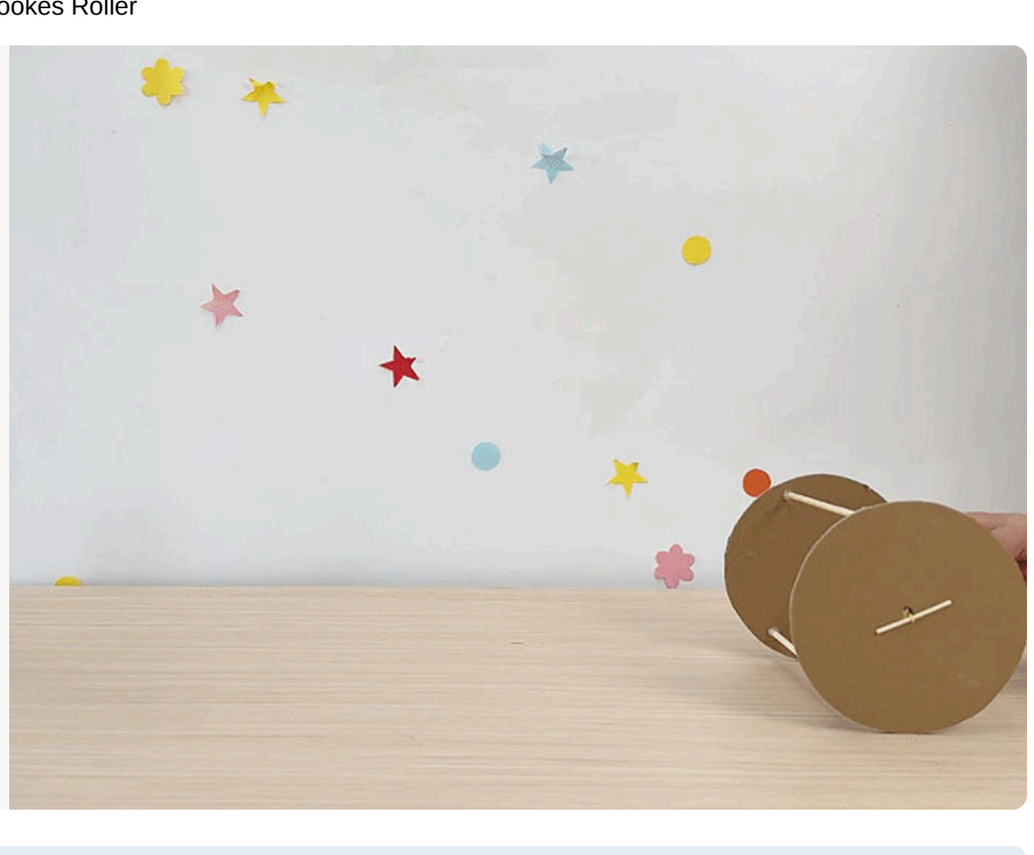
Hooke's Roller

Stem Activities

Ages: 6-8

Less than 30 minutes

Grownup needed



Have you noticed how rubber bands or springs always bounce back to their original shape when stretched? Behind this lies an fascinating scientific law—Hooke's Law! Create a Hooke's roller using simple materials to observe how rubber bands store and release energy.

Materials Needed

Cardboard
Bowl
Hot glue gun
Battery
Rubber bands
Cotton swabs
Pencil
Scissors
3 wooden sticks
Ruler
Tape

Step-by-step tutorial

Step 1

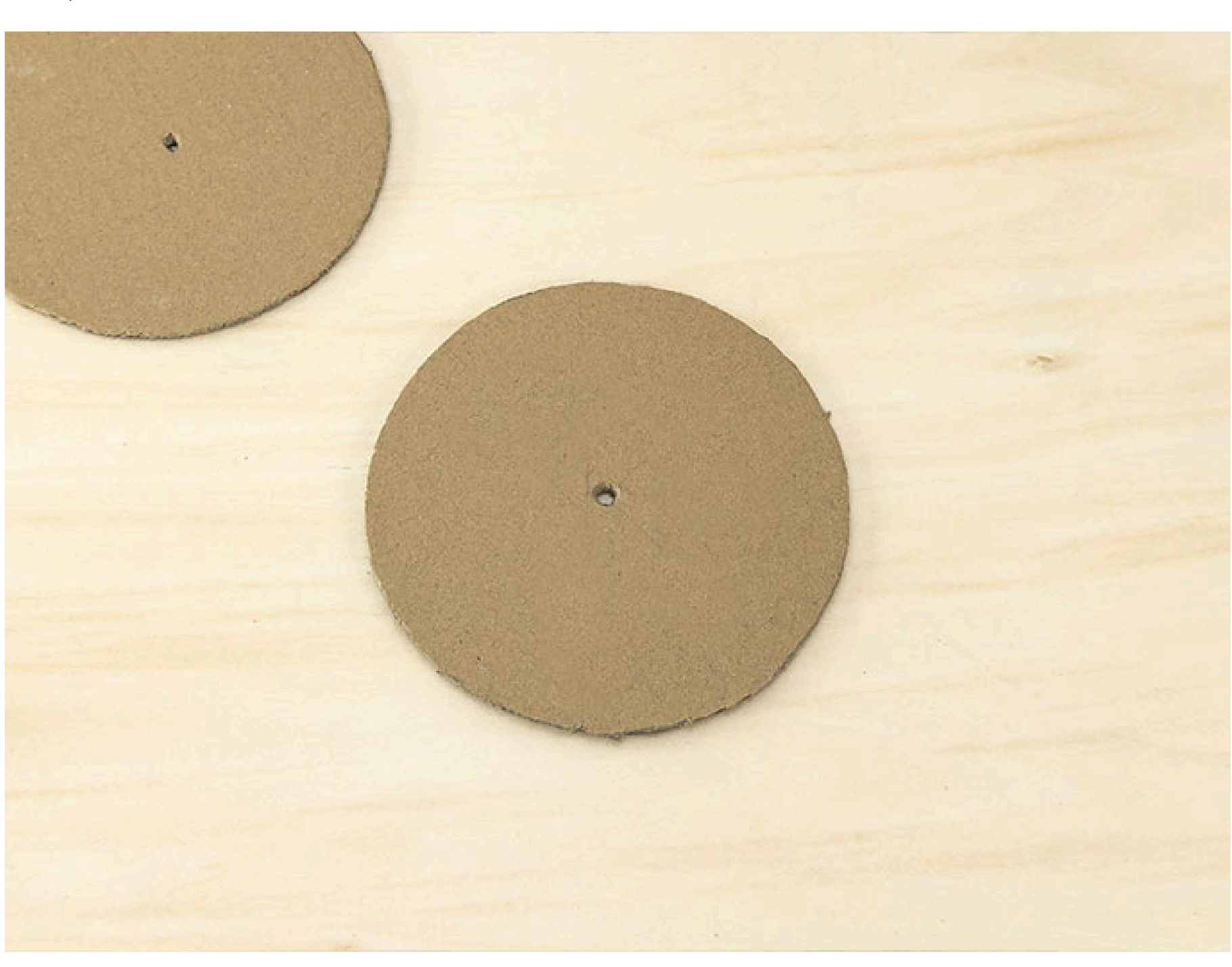
Place the bowl upside down on the cardboard and trace its outline with a pencil. You'll need to trace two circles in total.

Step 2

Use scissors to cut out the circles along the outlines.

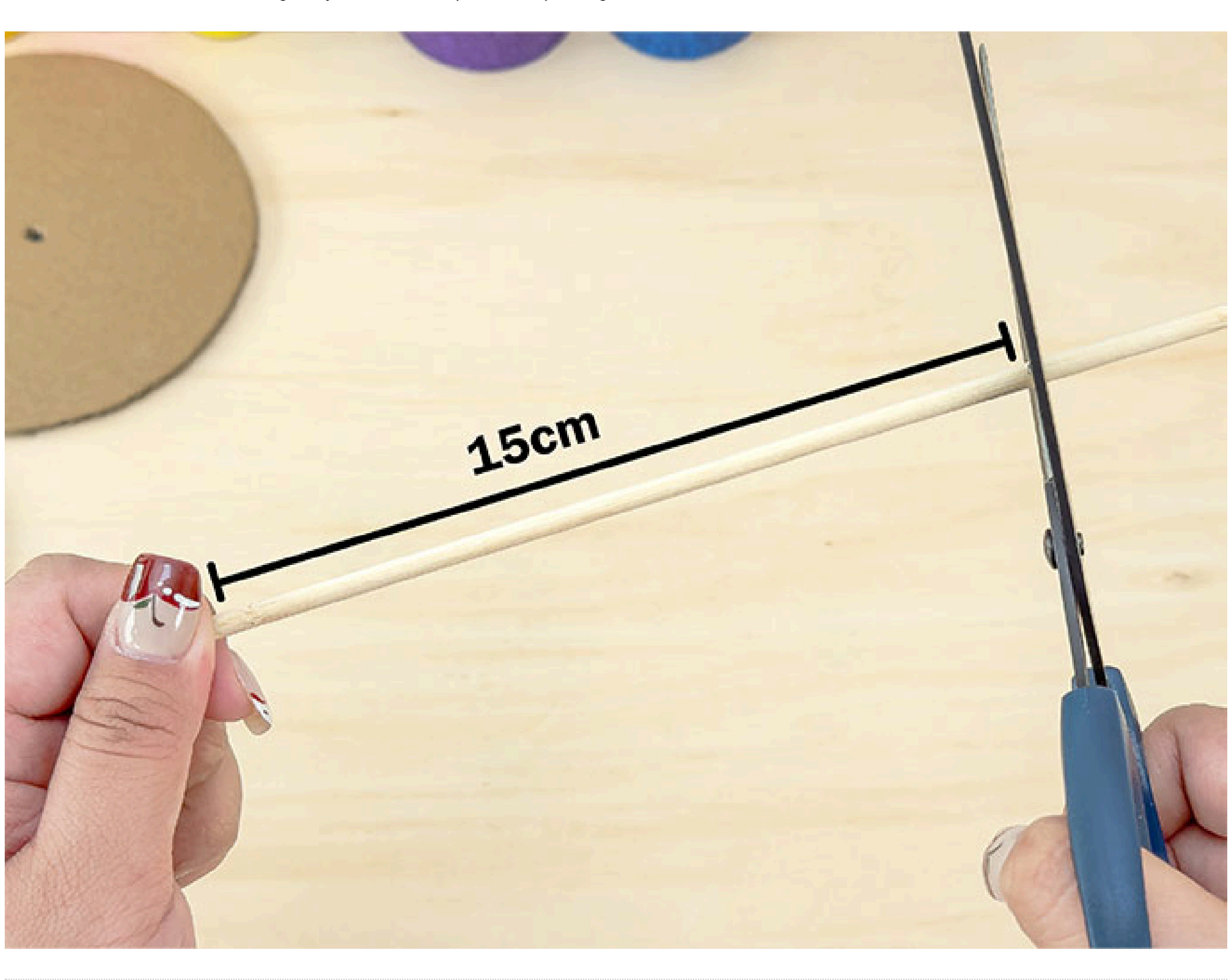
Step 3

Use the pencil to make a hole in the centre of both cardboard circles.



Step 4

Cut the wooden sticks into 15cm lengths - you'll need three pieces of equal length.



Step 5

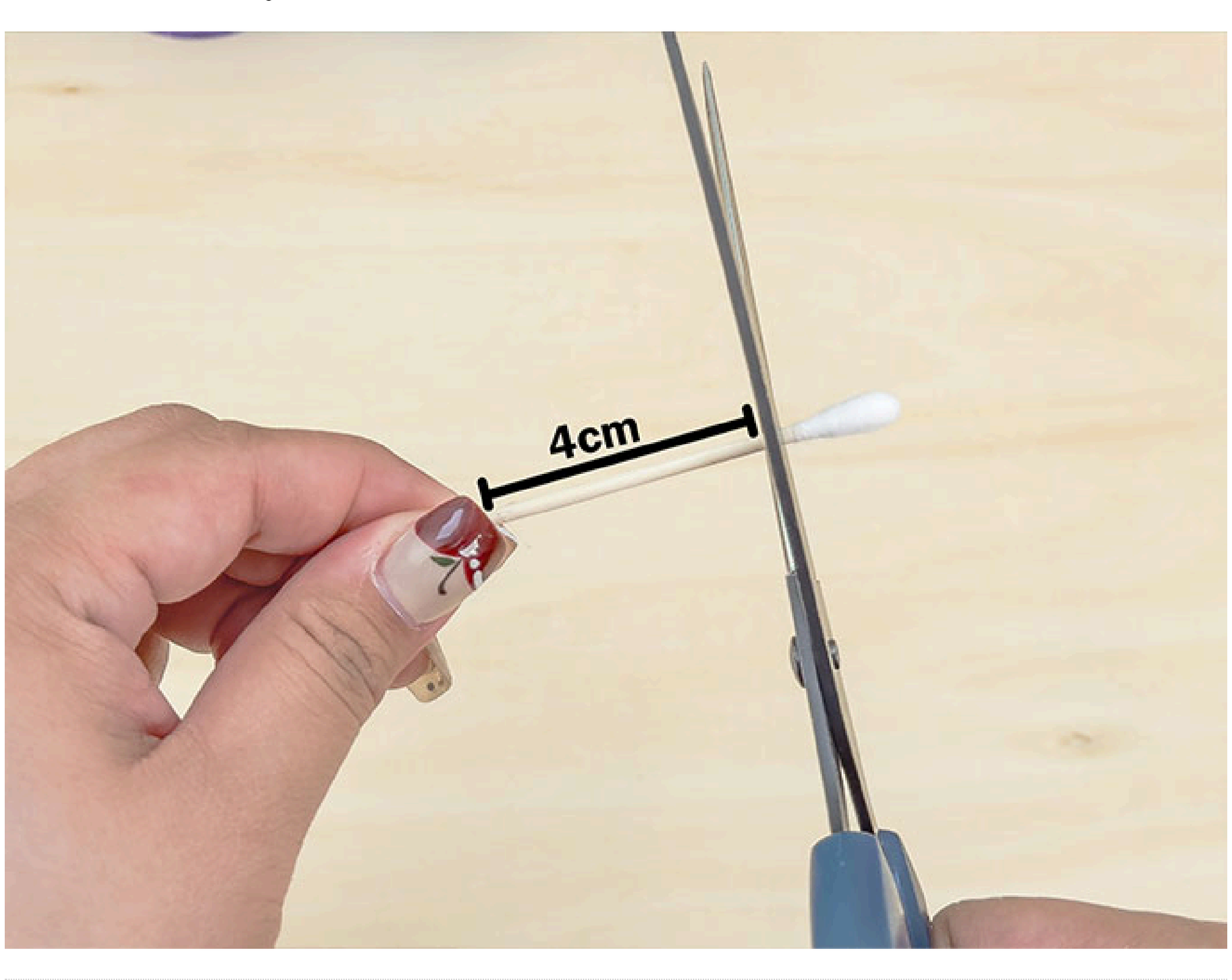
Using hot glue, attach the three 15cm wooden sticks to the cardboard. Try to keep equal spacing between the sticks.

Step 6

Glue the second cardboard circle onto the wooden sticks. Make sure it aligns with the bottom circle.

Step 7

Cut two cotton swabs into 4cm lengths.



Step 8

Take the rubber band and thread one end through the centre hole of the cardboard circle.

Step 9

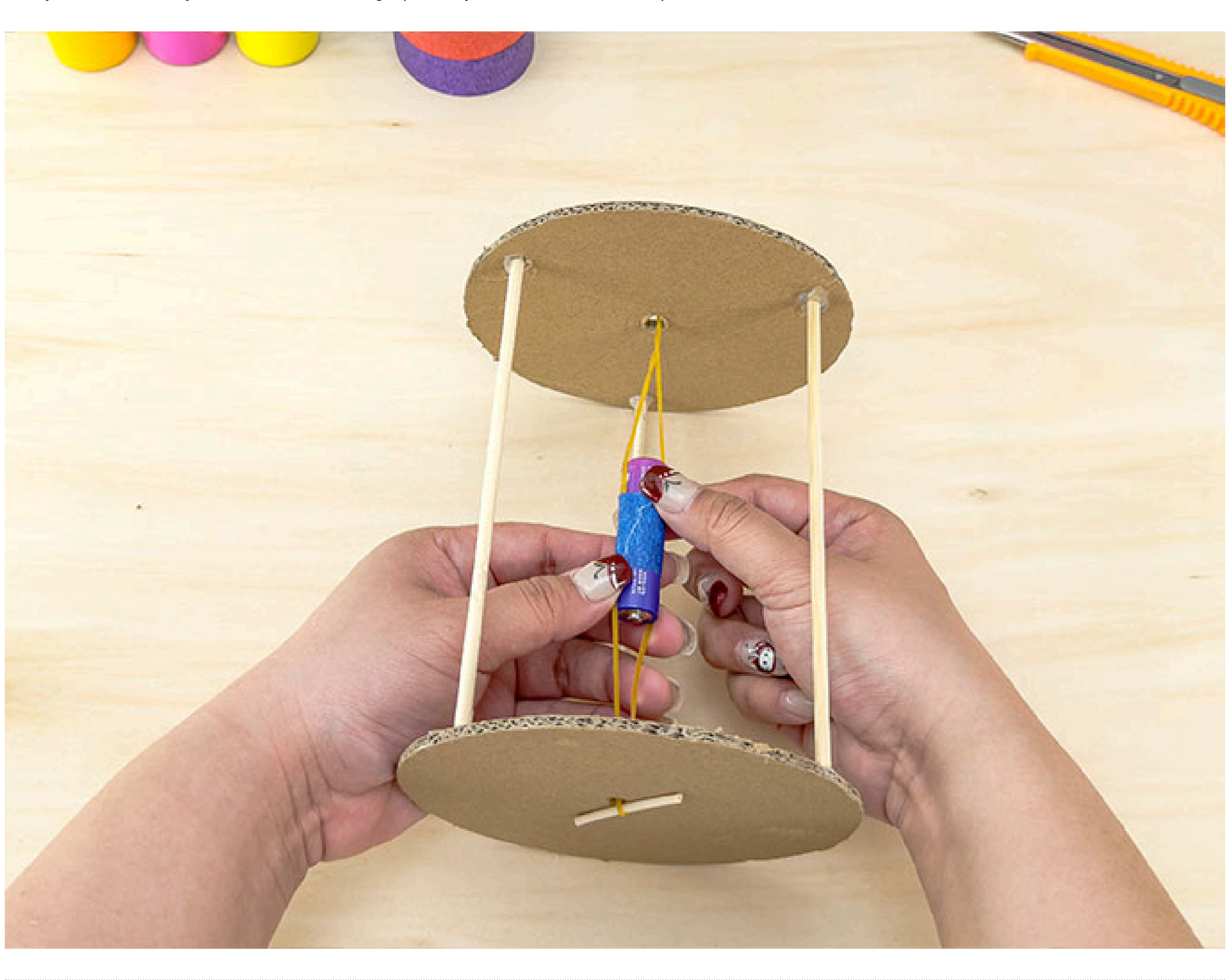
Then, as shown in the picture, thread the 4cm cotton swab piece through the rubber band to secure it.

Step 10

Secure the rubber band on the other cardboard circle in the same way.

Step 11

Finally, attach the battery to the rubber band using tape, and your Hooke's roller is complete.



Step 12

Now, push the Hooke's roller forward and observe the magical phenomenon that occurs!

The Science Behind It:

The core principle of the Hooke's roller is Hooke's Law, which describes the relationship between the pulling force and extension of rubber bands. When you pull the roller, the rubber band stretches and stores elastic energy. When released, the rubber band returns to its original state, converting the stored energy into rotational motion of the roller. The roller oscillates back and forth because the rubber band continuously stores and releases energy, eventually stopping due to friction!