TRISPASTOS

Name of the object	TRISPASTOS, Roman Crane
Recommended ages	10-15 years old
Thematic areas combined (STEAM)	Engineering, Mathematics, Technology
Materials needed	This project can be built with different materials. Option A: Craft pieces • Sticks of wood • Wood glue • Rope • 2 pulleys with 2cm diameters • 1 pulley with a 1cm diameter • Wire • 1 nail • 2 eyebolts • 1 rigid surface (Cork, plywood). • 1 S-shaped hook or similar. • Small sticks of wood and 2 round pieces of wood. Option B: Pieces of Lego (or other bricks building game). Following the same instructions and recreate the pieces needed with the possibilities of the bricks building game.
Instructions step by step	The building of this model needs to be careful with the drying times of the wood glue. **Step 1**: Select and prepare materials and tools **Step 2**: Prepare the surface

	Step 3: Build the structure of the crane **Step 4**: Build the pulley system and test it **Step 5**: Description of the Trispastos

Step by step: how to build the "TRISPASTOS"

Step 1 - Select and prepare materials and tools

Time needed – 15 minutes

Collect all the materials needed:

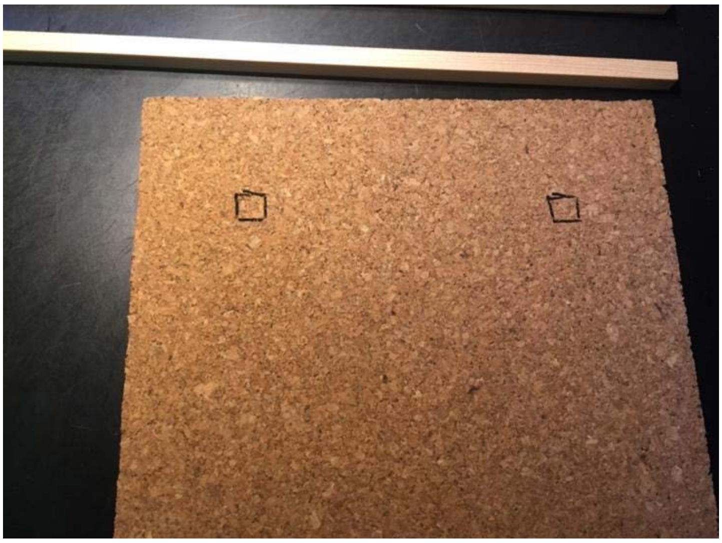
- Sticks of wood
- Wood glue
- Rope
- 2 pulleys with 2cm diameters
- 1 pulley with a 1cm diameter
- Wire
- 1 nail
- 2 eyebolts
- 1 rigid surface (Cork, plywood).
- 1 S-shaped hook or similar.
- Small sticks of wood and 2 round pieces of wood.

Step 2 - Prepare the surface

Time needed – 25 minutes

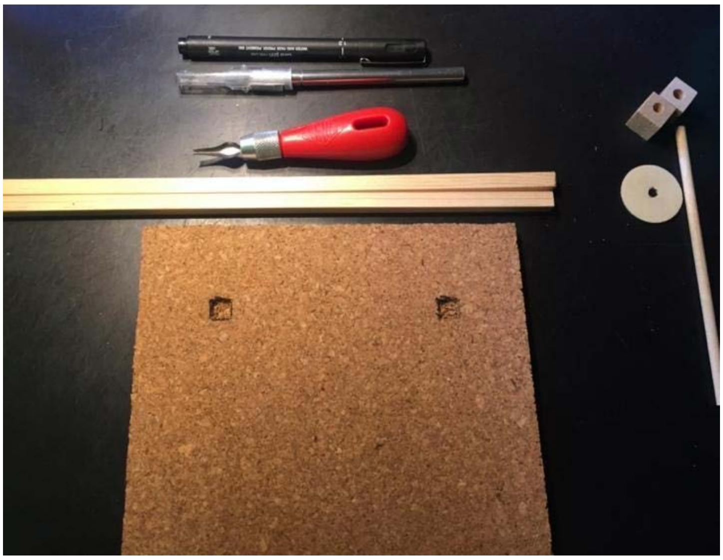
Prepare the surface of the crane.

The cork or the plywood must be prepared.
- Draw the spaces to attach the wood sticks (30cm square wood sticks), (Image1).



(Image1)

- Cut out the marks to a depth of about 2 millimetres. (Image2).



(Image2)

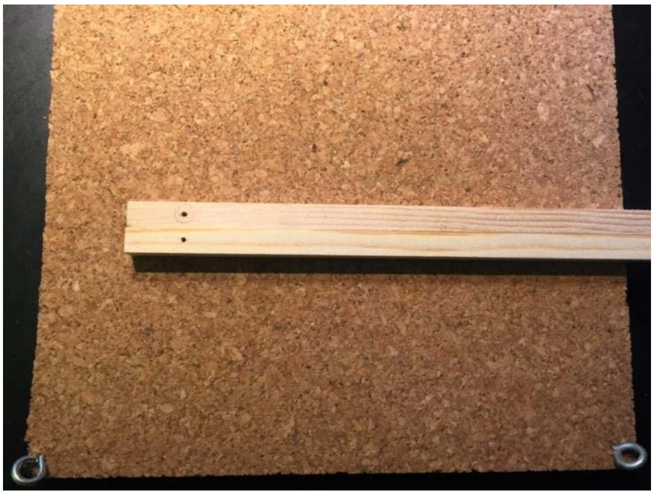
- Screw the eyebolts in the opposite corners as shown in Image3.

(Image3)

Step 3 - Build the structure of the crane

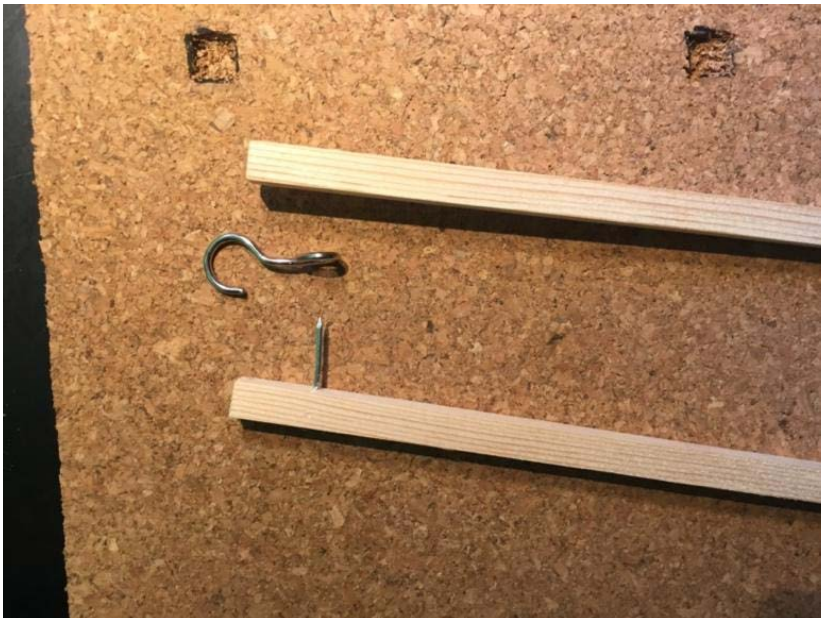
Time needed – 25 minutes

- Drill holes through the 30cm wooden sticks to put the nail in. (Image4)



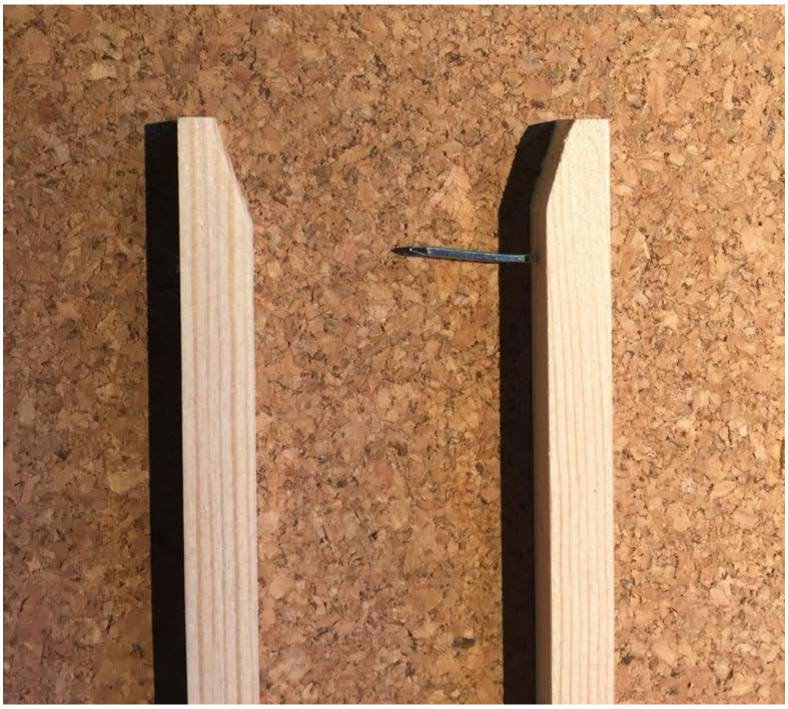
(Image4)

- Place the nail to see the tension generated when the ends of the wooden sticks are separated (Image5).



(Image5)

- This will help us to know how to adapt the cuts in the wood so that they can make the angle (Image6).



(Image6)

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- Attach the hook that will support the pulley structure. (Image7)

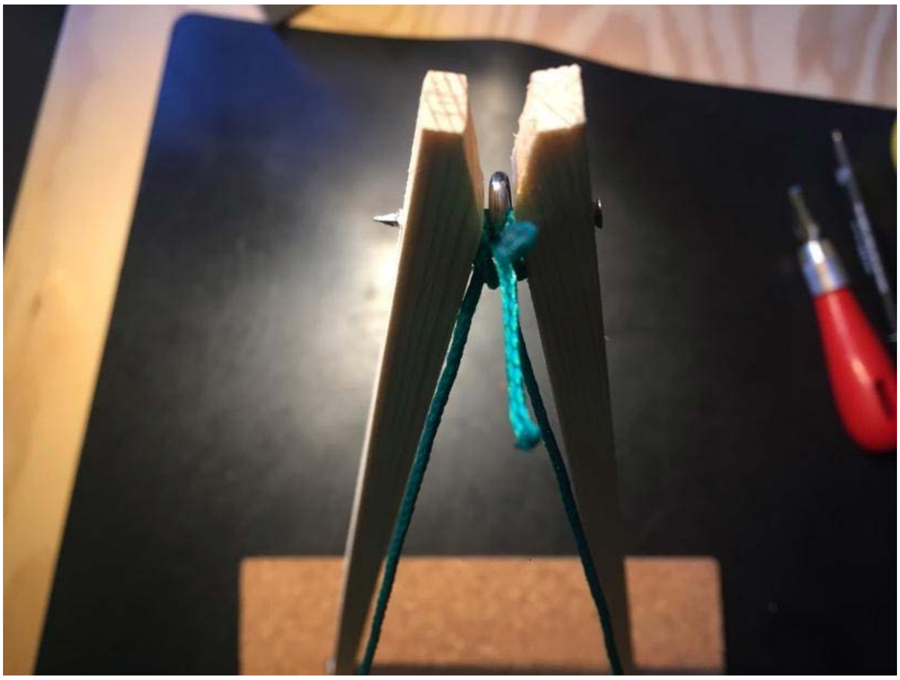
(Image7)

- Put wood glue on the base to place the wooden sticks. (Image8)

(Image8)

- Place the rope from the eyebolts to the structure (Image9), at the point where the nail is, on both sides of the hook (Image10).

(Image9)



(Image10)

Step 4 - Build the pulley system and test it

Time needed – 30 minutes

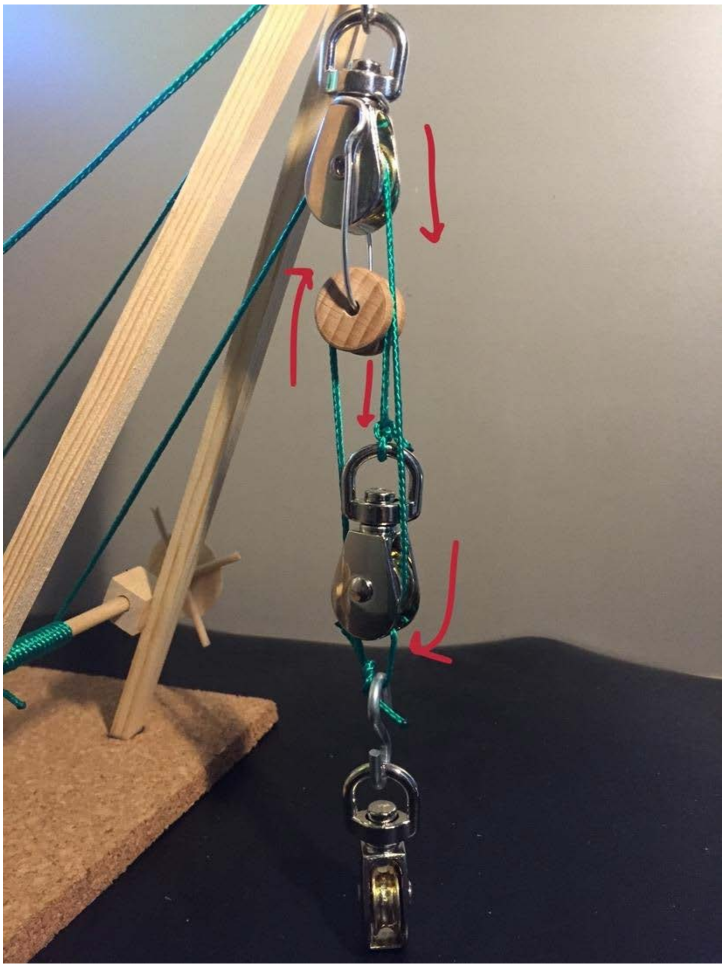
- Build the winch that collects the rope. Glue it to the structure of the wooden sticks. A horizontal axis with a cross of thin wooden sticks to be able to rotate (Image11).

(Image11)

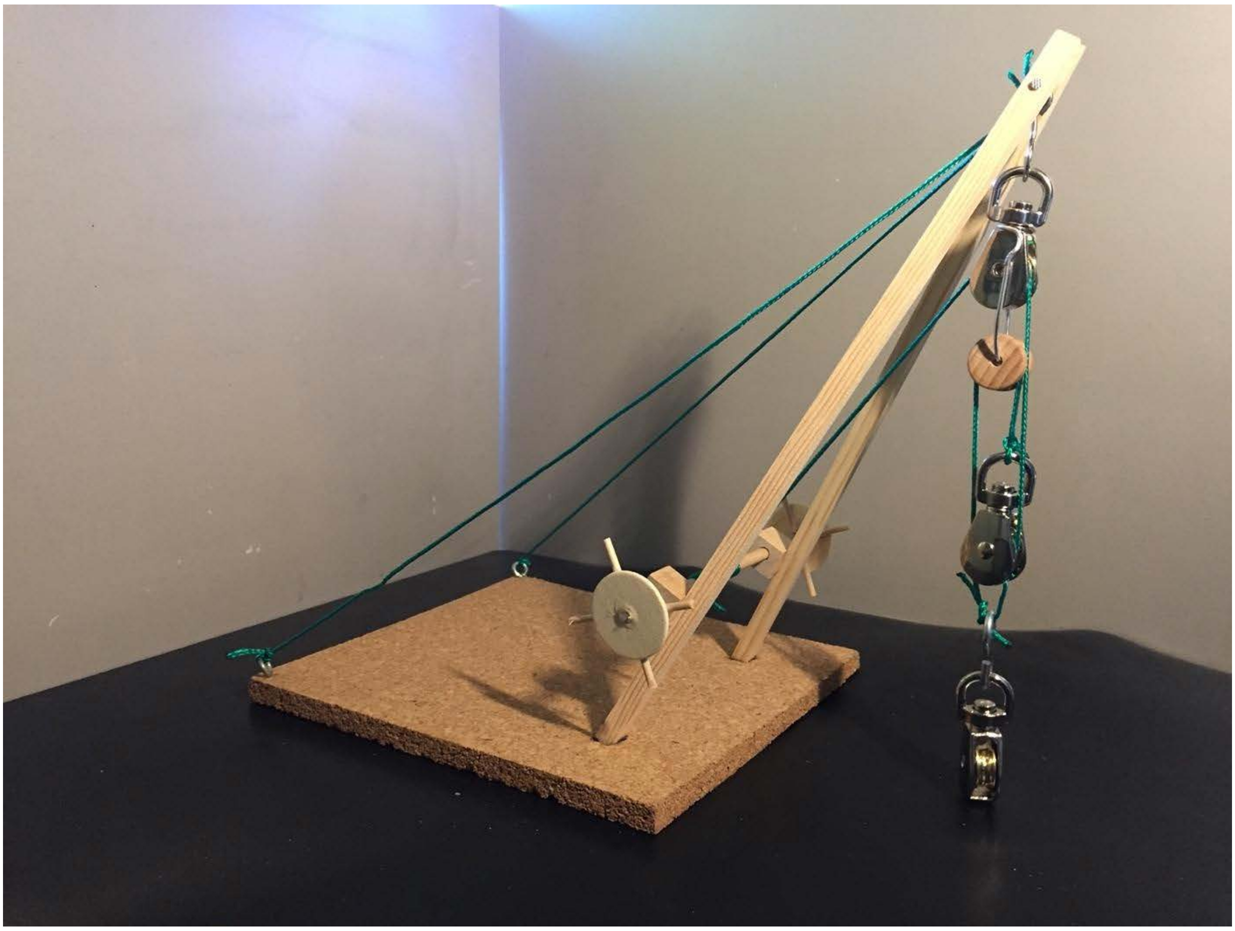
- Place the rope in the winch and collect a good amount of it (Image12).

(Image12)

- Pass the rope through the pulleys as shown in image13.


(Image13)

- The Trispastos should look as shown in Image14.


(Image14)

Step 5 – Description of the Trispastos

Time needed – 10 minutes

The trispastos is the simplest Roman crane consisting of a single girder gallows, a winch, a rope and a block containing three pulleys, which gave a mechanical advantage of 3 to 1, so that a man who could exert an effort of 50 kilograms could lift 150 kilograms (3 pulleys × 50 kg = 150 kg). This assumes that 50 kilograms represents the maximum effort that a man can exert over a long period.

You can see a model of a trispastos used for this purpose in the photo below.