



Kilonion

Name of the object	"Kilonion" (Shantuf)
Recommended ages (from...)	9-14
Thematic areas combined (STEAM)	Technology Engineering
Materials needed	<p>1. One paper box approx. 20x15x5cm and some gravel</p>  <p>2. Two bowls like the following, plastic yogurt cups, or something similar</p>  <p>3. 4 sticks about 25 cm long and a thin branch about 30 cm long.</p> 



	<p>4. 2 rubber bands, a small cap, some cord and a small weight (e.g., a screw nut)</p>  <p>5. Some waterproof material (e.g., paper from a milk box) to act as a channel for the water transfer</p> 
<p>Instructions step by step</p>	<p>Step 1. Create and stabilize the wooden level.</p> <p>Step 2. Add the pumping bucket and the counterbalance weight.</p> <p>Step 3. Putting it to the test.</p>

"Kilonion" (Shantuf) is an ancient mechanism for pumping water. It was created by Mesopotamian civilizations. It was made up of a long wooden lever with the pumping bucket on one end and a stone as a counterbalance on the other. The manipulator used his own weight to lower the empty bucket and a counterbalance to raise the full bucket of water.



Step by step: how to build a water pumping system (Kilonion)

Step 1. Create and stabilize the wooden level

Time needed: 25 minutes

Put the sticks as in Fig .1 so that they are supported on the inside corners of the paper box. Then tie them together with a rubber band (or a small cord) as seen in Fig. 1.



Fig. 1

Add the gravel inside the paper box to stabilize the lever. Place the two bowls on each side of the paper box (Fig. 2). The purpose is to get water from one bowl (i.e. the river) and pump it to the other bowl (i.e. the tank or the field to be watered).



Fig. 2

Add the thin branch on the top of the wooden stick formation and tie it with the second rubber band (or a small cord) as in Fig 3. Add the waterproof channel to connect the two tanks.



Fig. 3



Step 2. Add the pumping bucket and the counterbalance weight

Time needed: 10 minutes

Use the small cap and with some rope to make a small bucket. Add the small counterbalance weight on the side where the water channel is flowing (See Fig 4).



Fig. 4

Step 3. Putting it to the test

Time needed: 5 minutes

Pour some water into the bowl on the right-hand side and immerse the bucket in the bowl (Fig. 5).



Fig. 5

Press the left end (with the weight) to see how easily the bucket is lifted (Fig. 6). Pour the water from the small bucket into the channel and it should flow towards the bowl on the left-hand side.



Fig. 6