

DIY HAND-CRANKED HYDRAULIC WATER PUMP



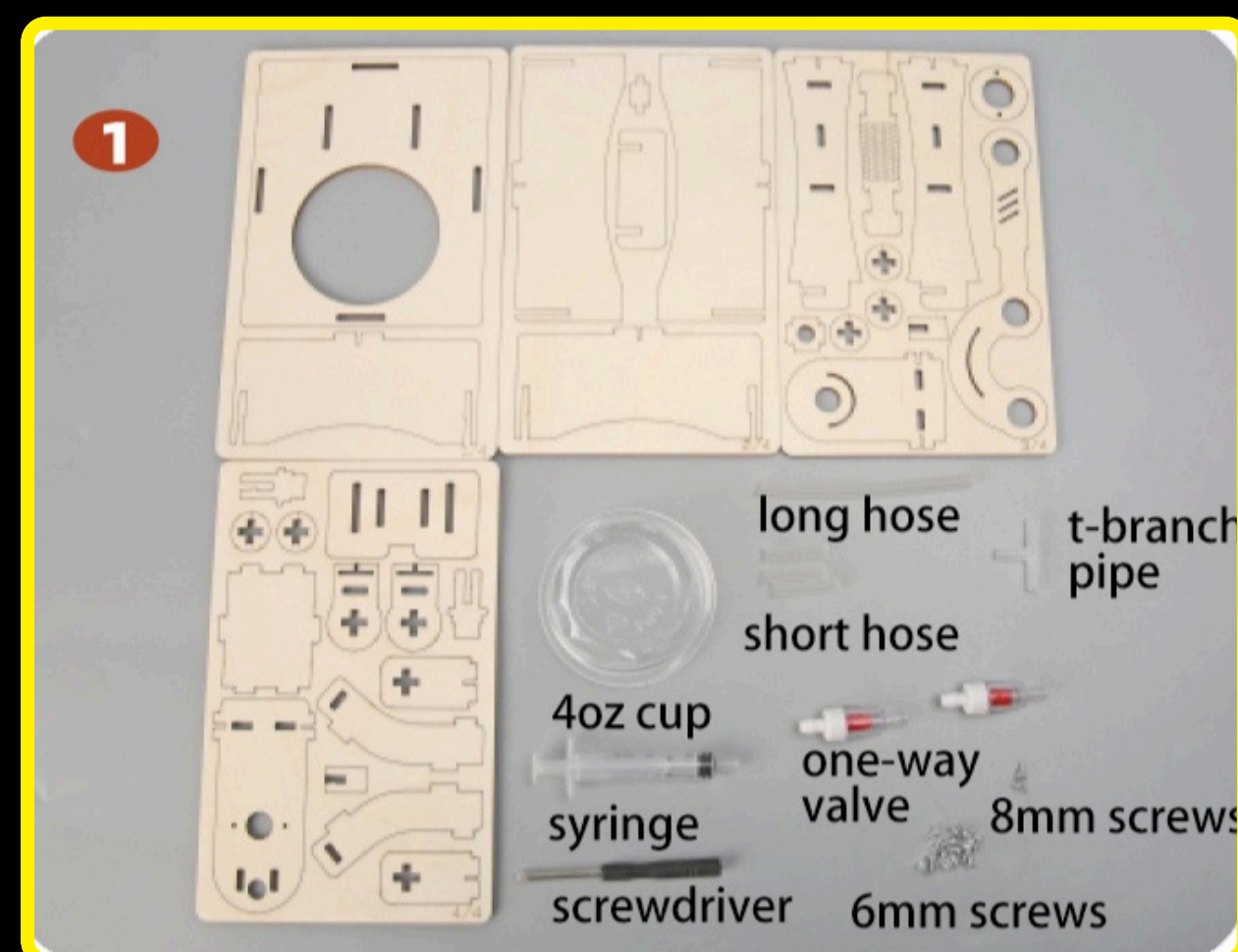
This DIY hand cranked Water Pump is a fun and educational toy designed to teach you about how real pumps work! Using wooden parts, hoses, and screws, you can build your very own mini water pump. Once built, this pump shows how air pressure can move water, just like in a real well.

Here's how it works: The pump has a piston, a one-way valve, and hoses. When you push the handle down, air is squeezed out, and when you pull it up, air moves water through the system. This simple but clever mechanism shows the magic of how air and water interact!

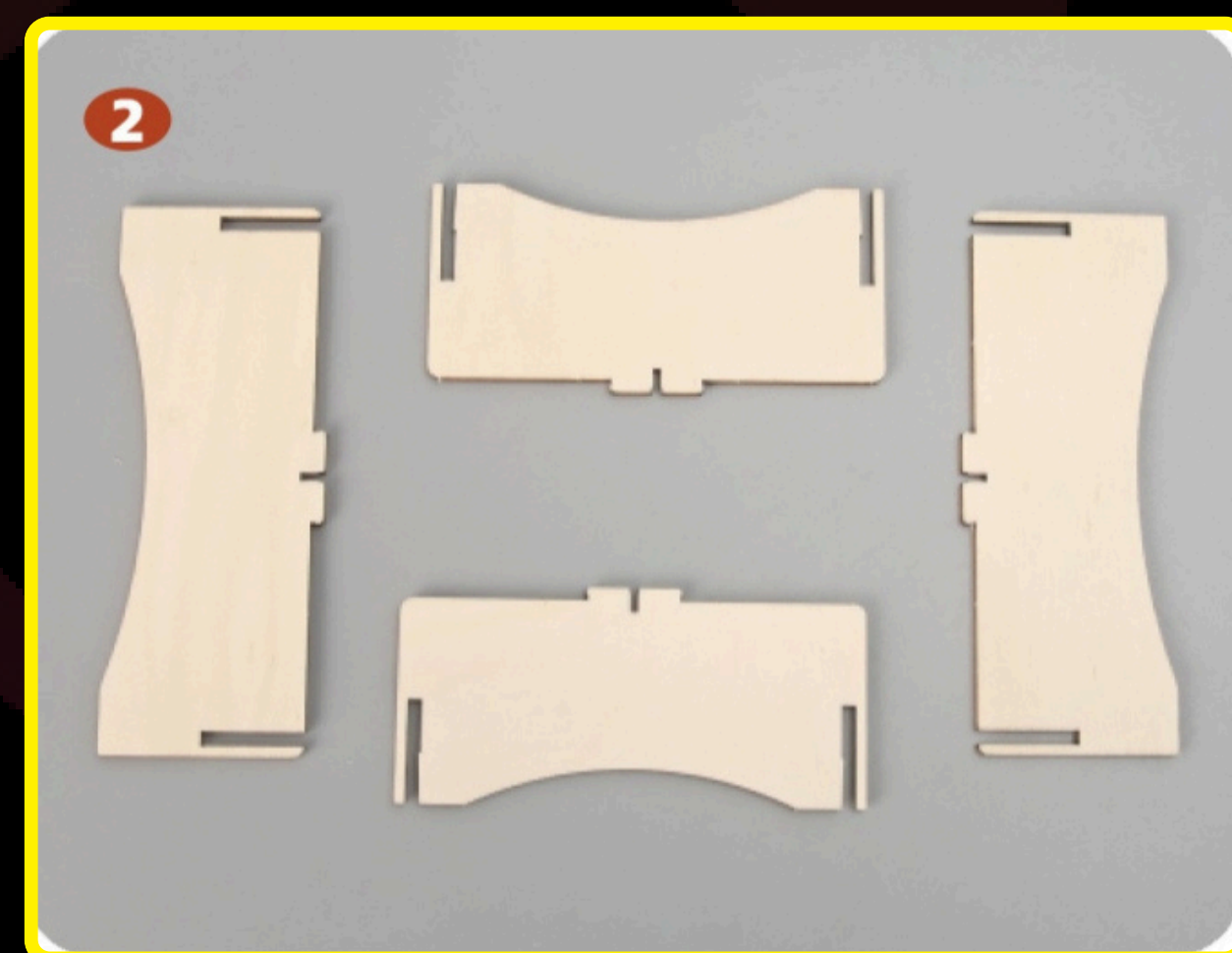
With the hand-cranked Water Pump, you'll learn science while having fun and develop great hands-on skills.

IMPORTANT! KEEP SAFE

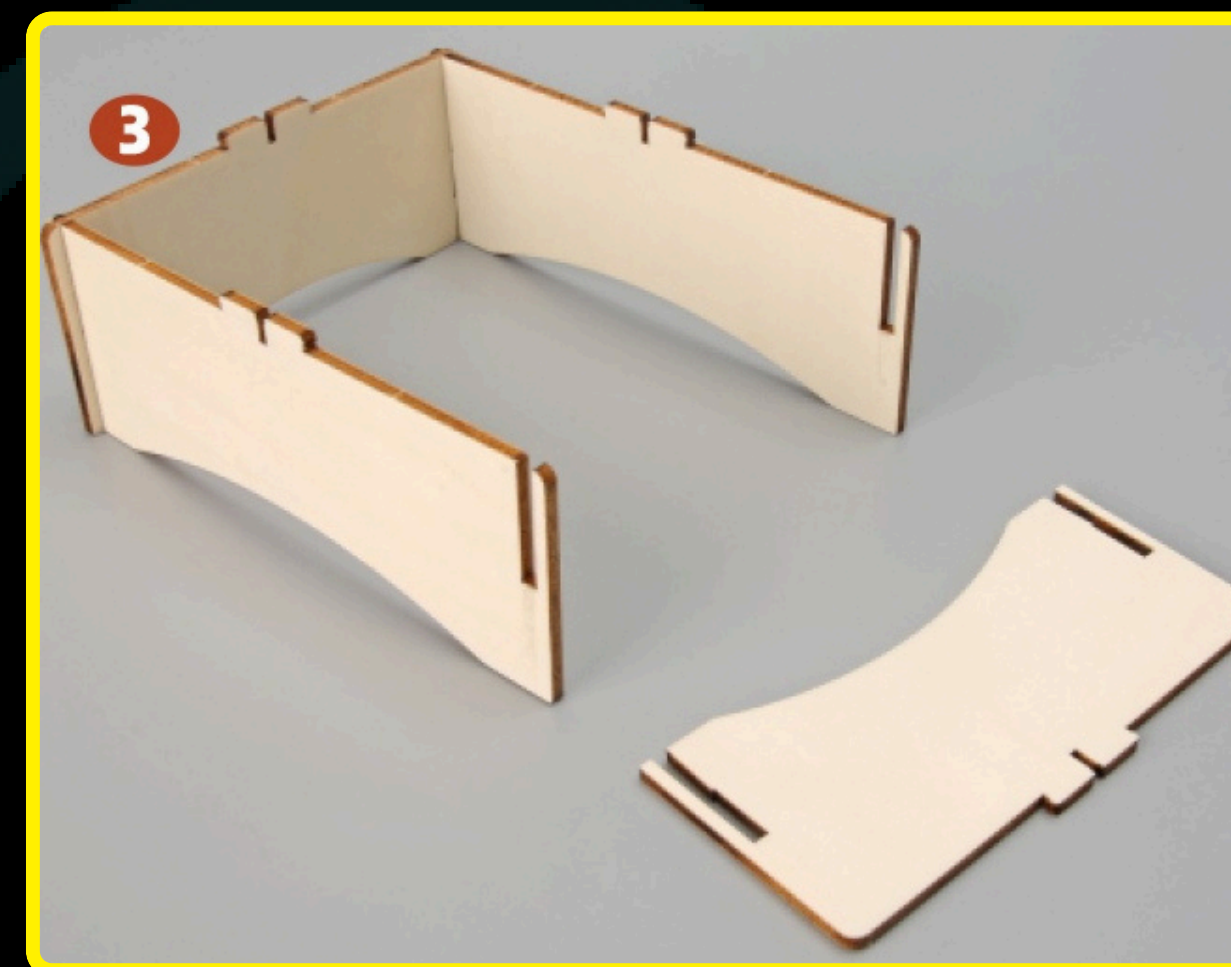
- Choking Hazard - This toy is not suitable for children under 3 years old. It contains small parts that could be a choking hazard.
- Be careful when opening the pack! Small bits can go missing quickly. Losing these bits might stop your model from working.
- Don't build this alone! It's not safe to do it by yourself. Ask a grown-up like your mum, dad, or teacher to help.
- Read the instructions carefully. This will help you make your model. If you don't understand something, ask for help. It's okay to ask - it's part of learning!



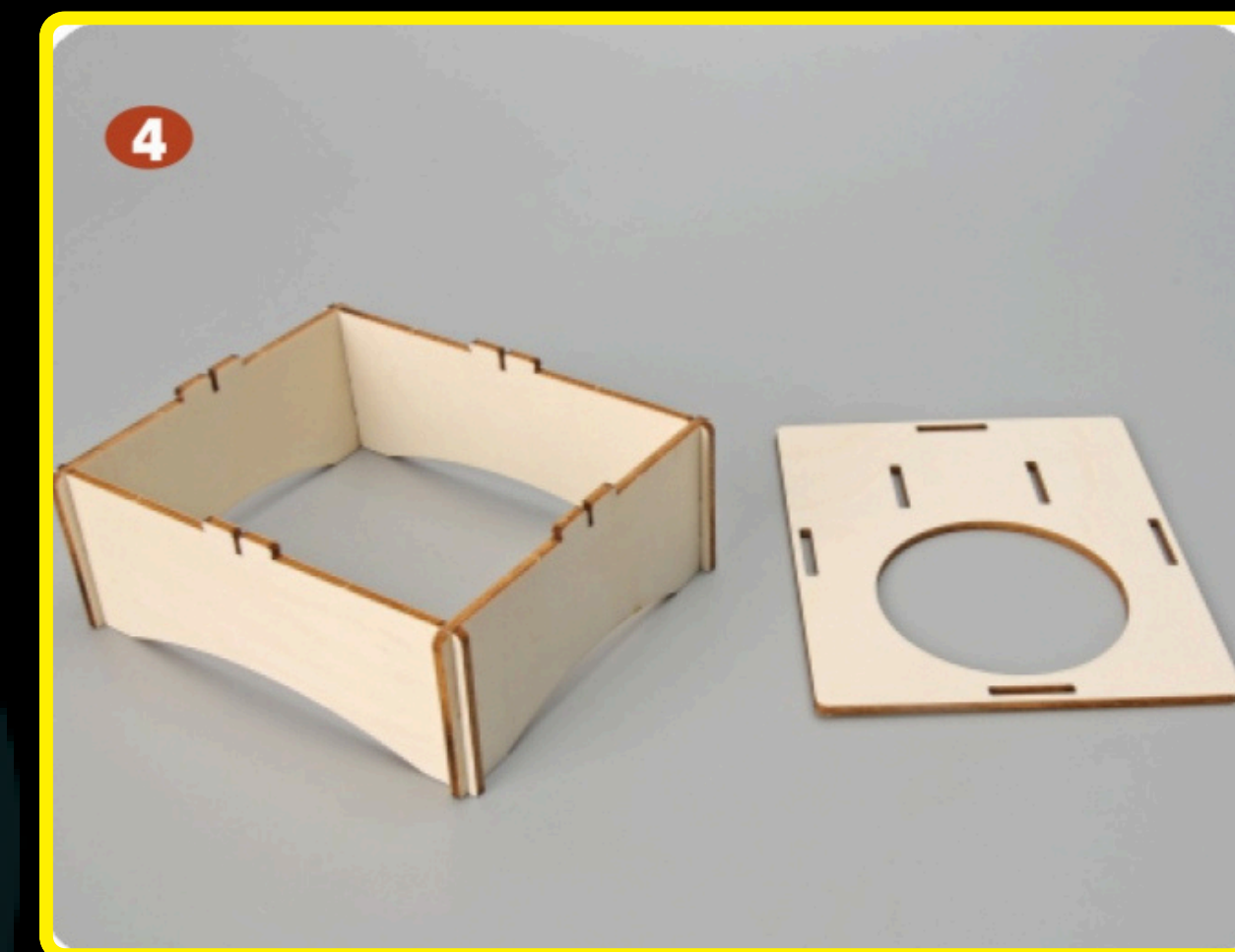
1. Familiarise yourself with the materials provided, such as the wooden parts, long hose, short hose, syringe, screws, and one-way valve.



2. Organise the wooden pieces according to the diagrams provided.



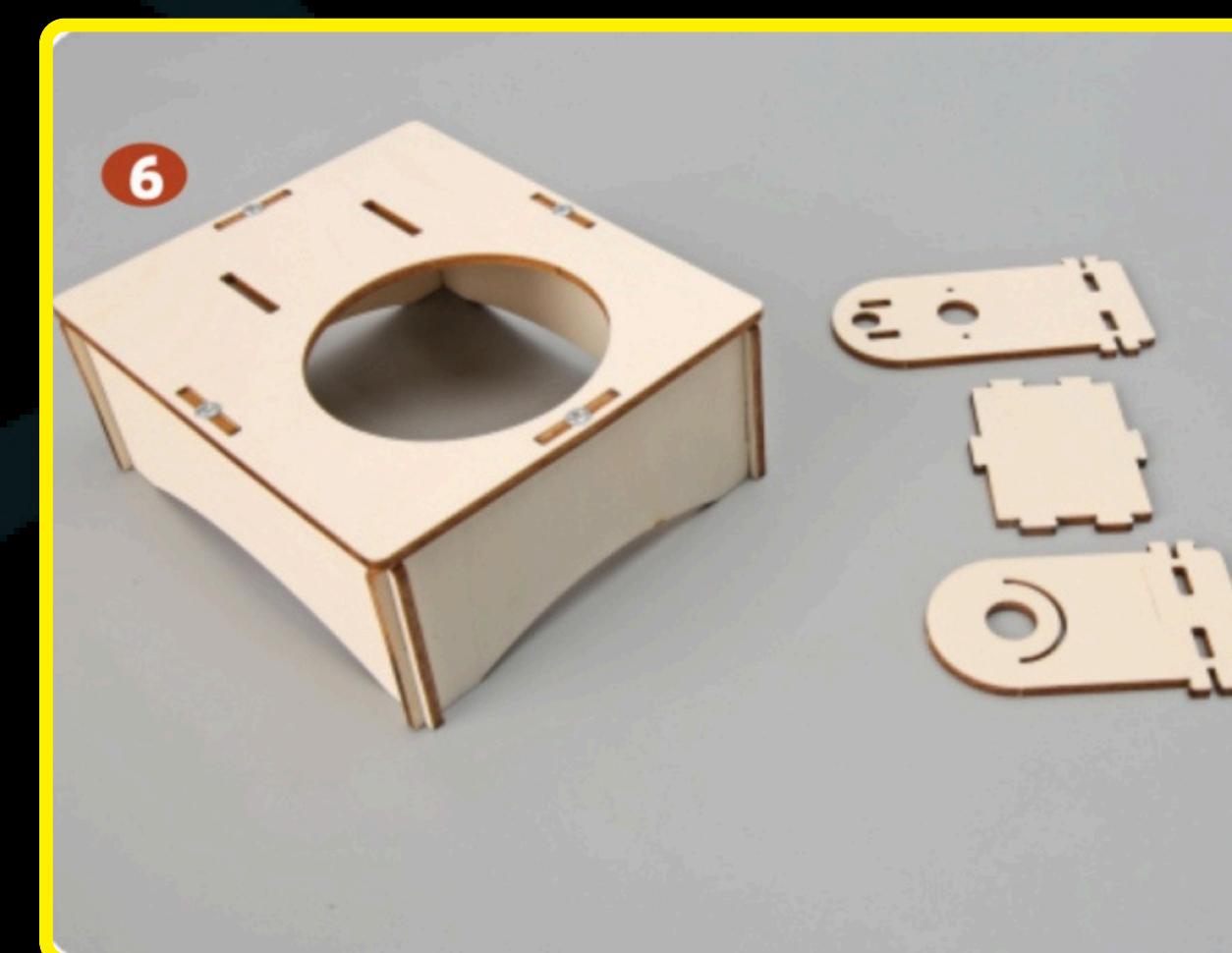
3. Connect the wooden parts as shown in the diagram to form the initial structure.



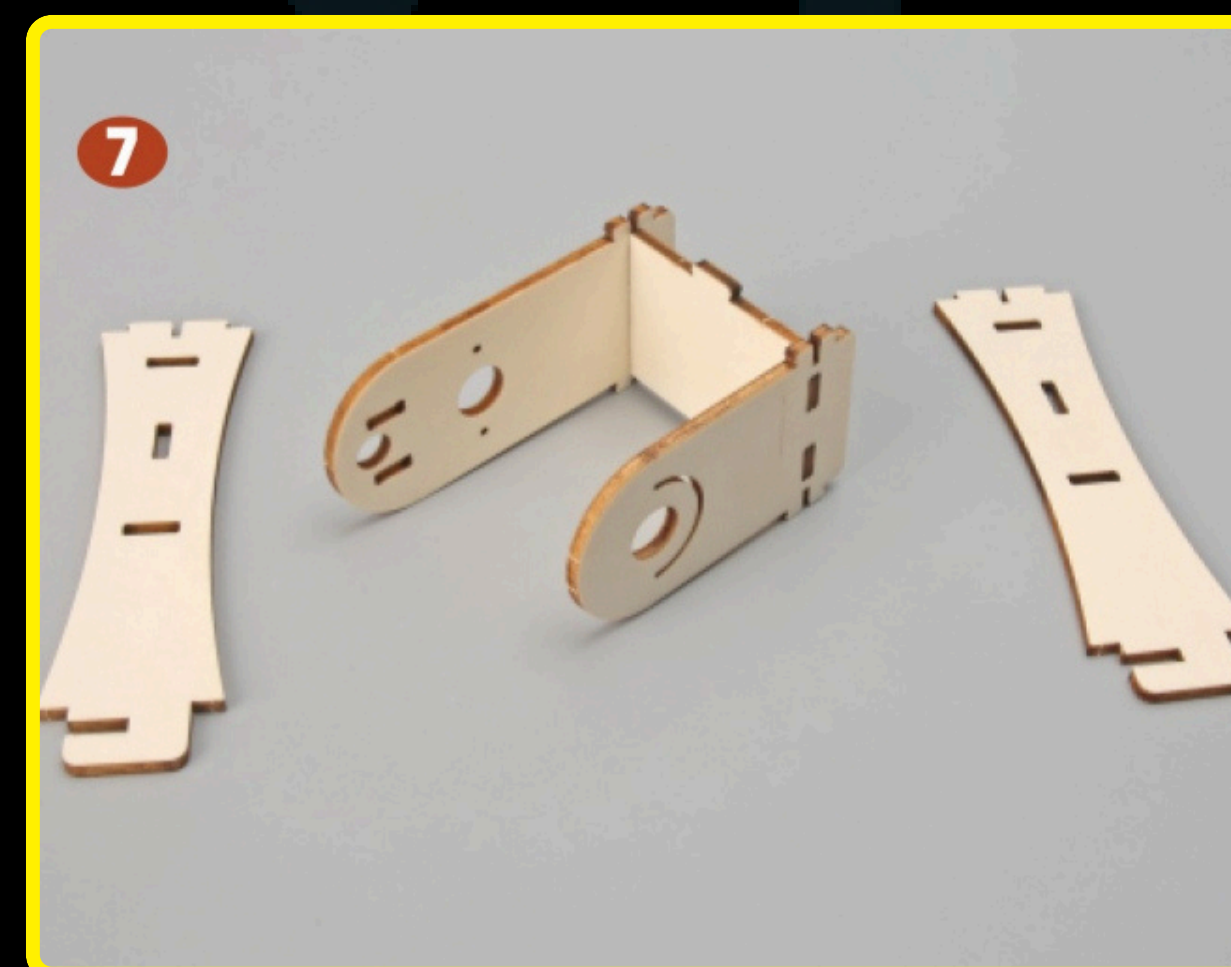
4. Assemble the additional wooden pieces to create the frame for the pump.



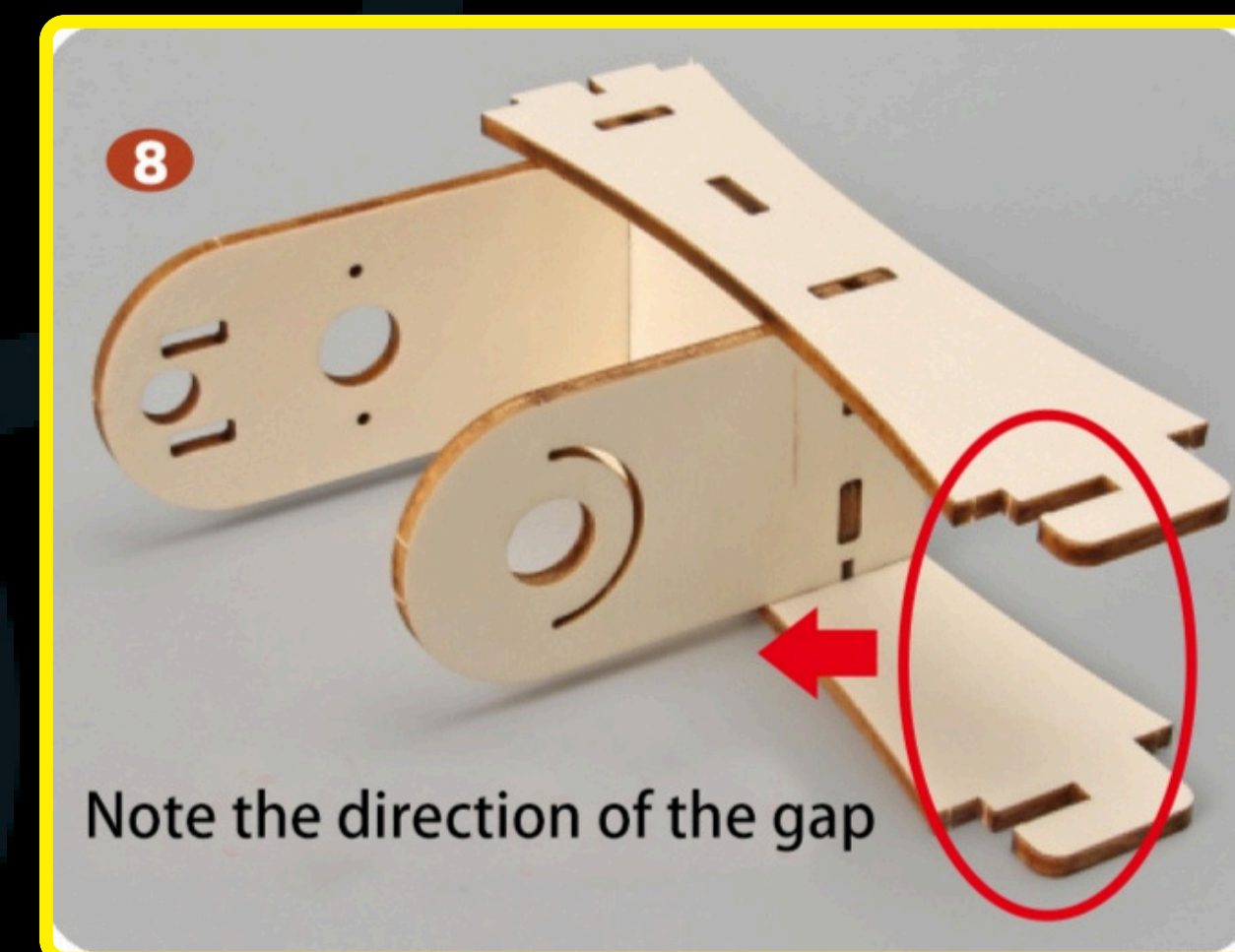
5. Use four 6mm screws to fix the assembled wooden structure firmly.



6. Prepare the wooden pieces for the pump mechanism as shown.



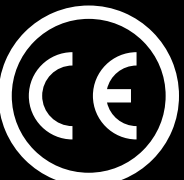
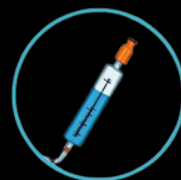
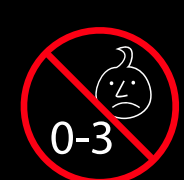
7. Follow the diagram to find and put together the parts shown.



8. Ensure the parts align correctly. Pay special attention to the slot direction, as shown in the picture to make sure the mechanism works properly.

"What I cannot create, I do not understand."

- Richard Feynman.



9. Take the assembled parts and screw them into the base to make it strong. Get ready with the next pieces.



10. As shown, fit the box shape into place. Prepare the next parts.



11. Push the part into the slot where they fit. Check the picture to make sure it is installed correctly.



12. Find the curved part and two other pieces shown in the picture.



13. Get the two small pieces and install them onto each other slots to fit firmly. Then insert that piece into the hole in the middle as shown.



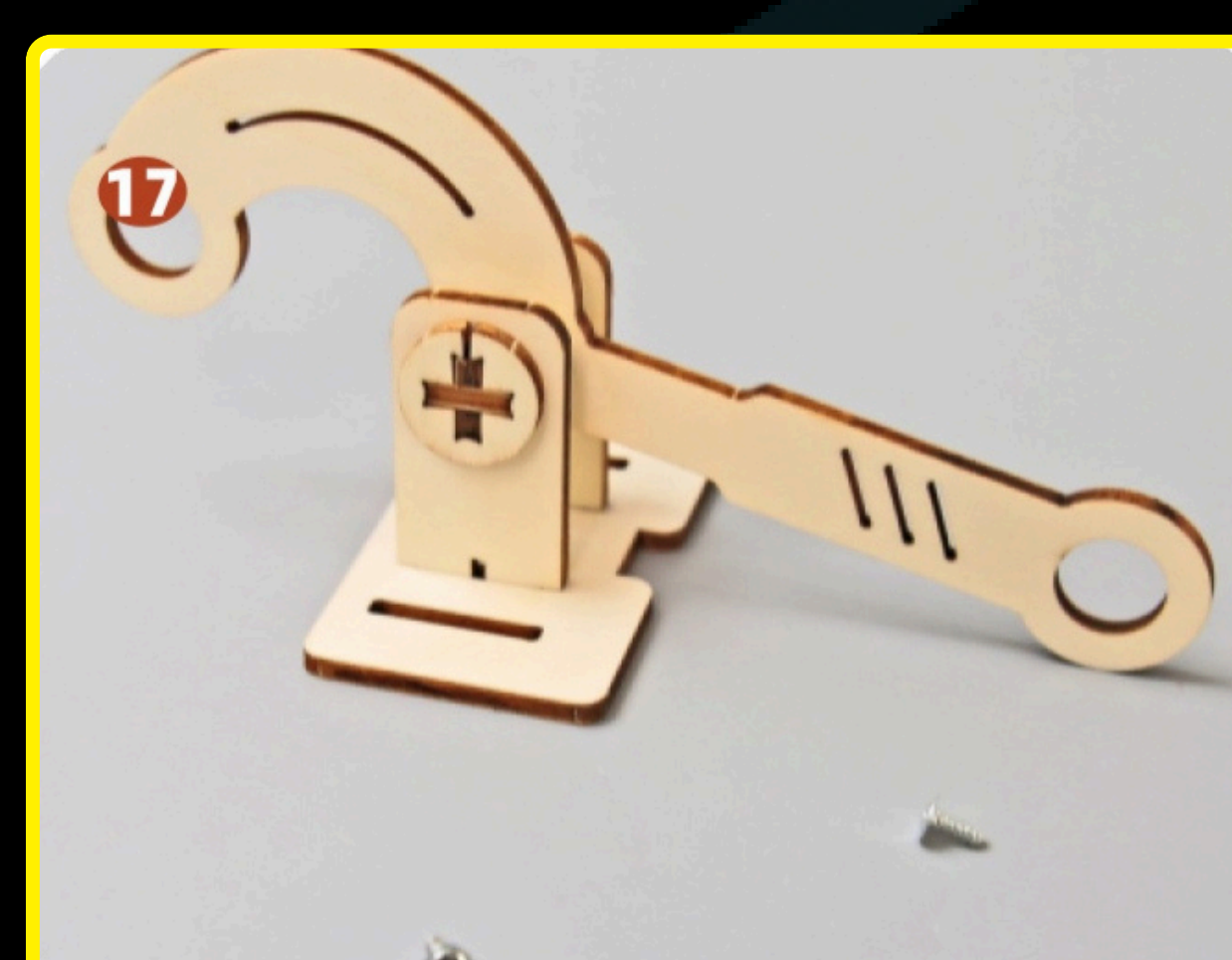
14. Find and prepare the other two parts shown for the next step.



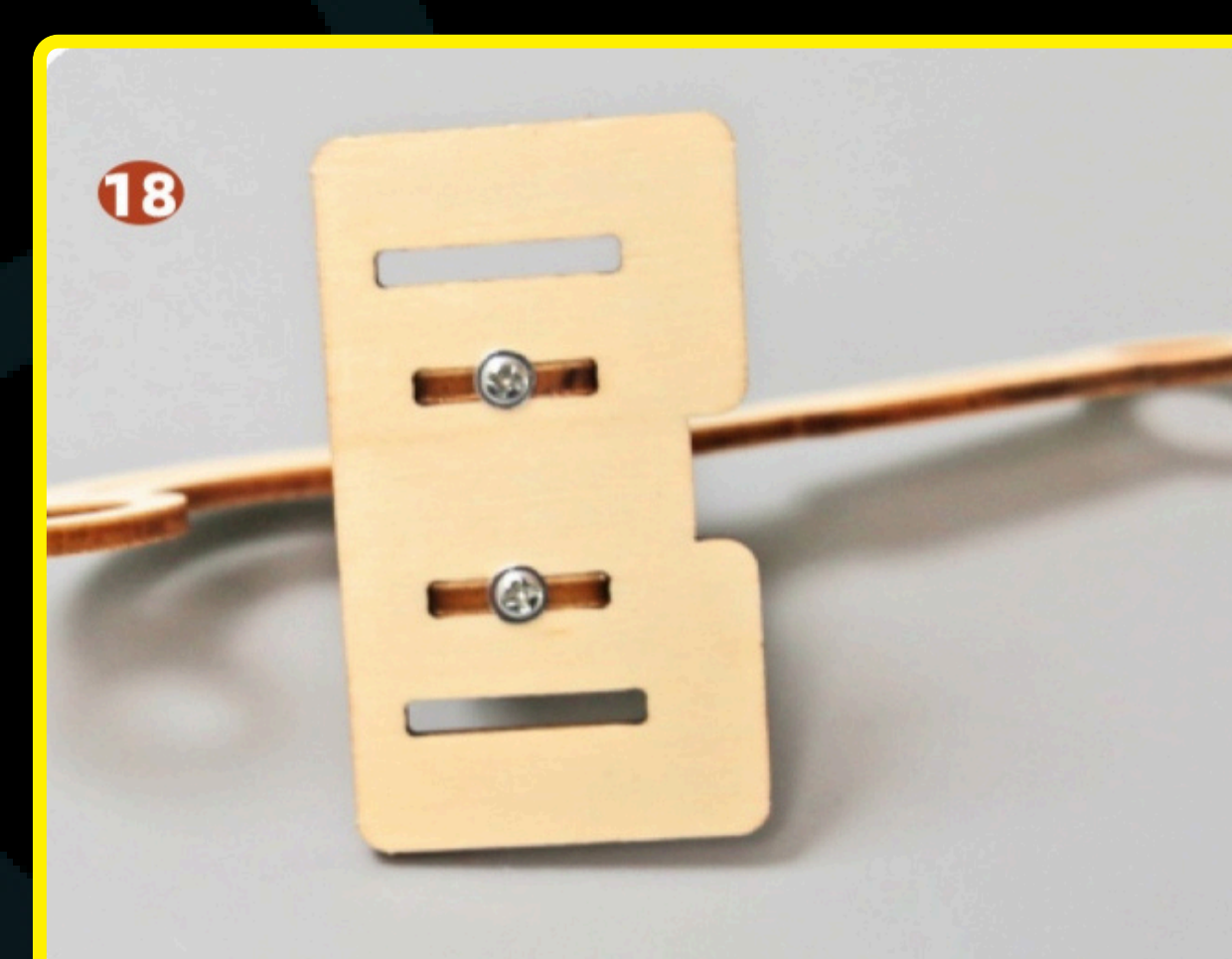
15. Attach the two parts to both sides of previously installed piece as shown. Also prepare the next piece.



16. as illustrated, install the prepared piece on to the couple of pieces you inserted in previous step. Then extract the two round disks and a pair of 6 mm screws for the next step.



17. Install the disks as shown to both sides to make the unit firmly attached.



18. Then fasten the bottom with the two 6 mm screws as illustrated.



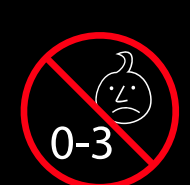
19. Now install the previously prepared unit on top of the structure you built in step (11) and fasten it with 2 screws.



20. Now prepare the syringe for installation.

"Play is the highest form of research."

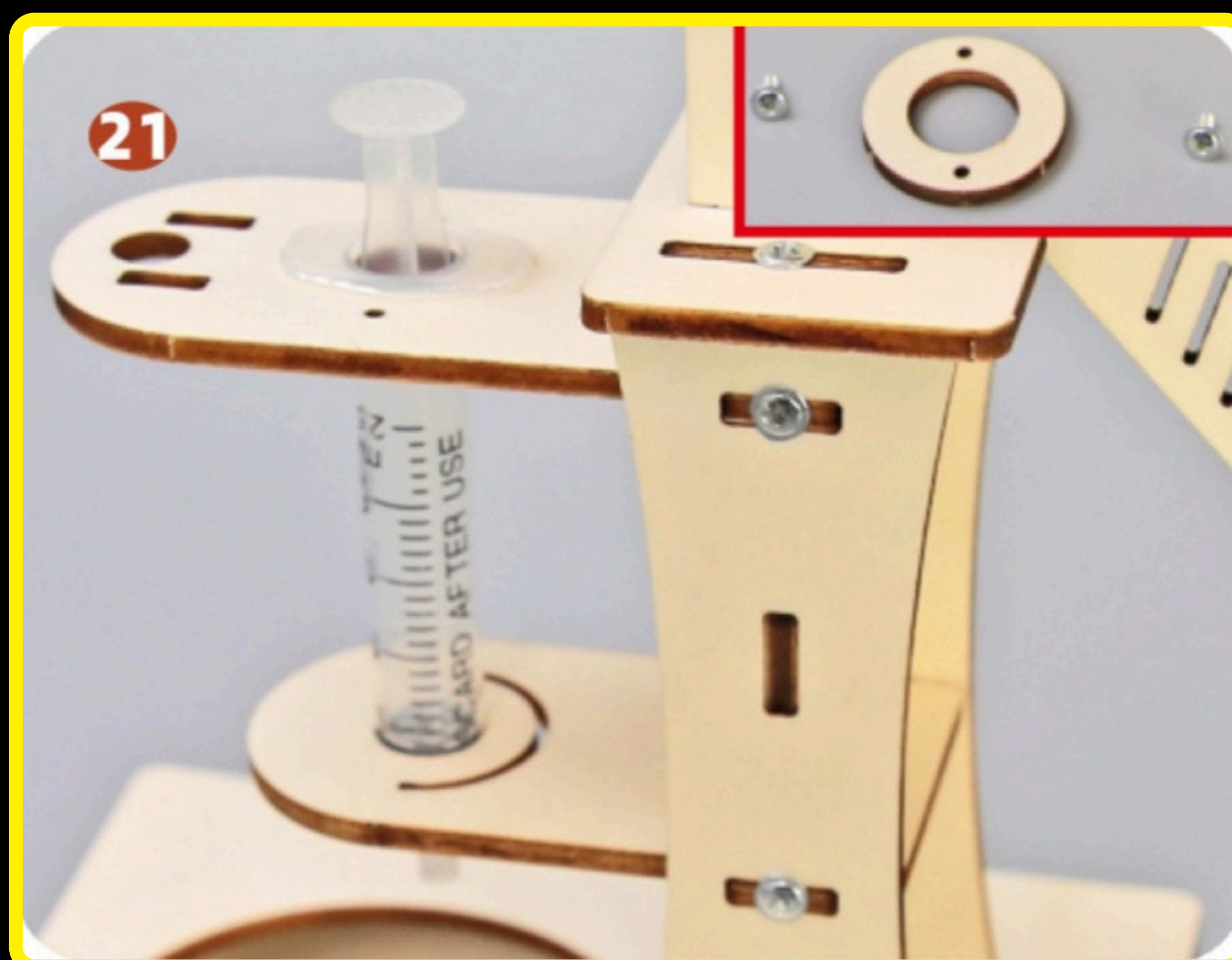
- Albert Einstein



7y+



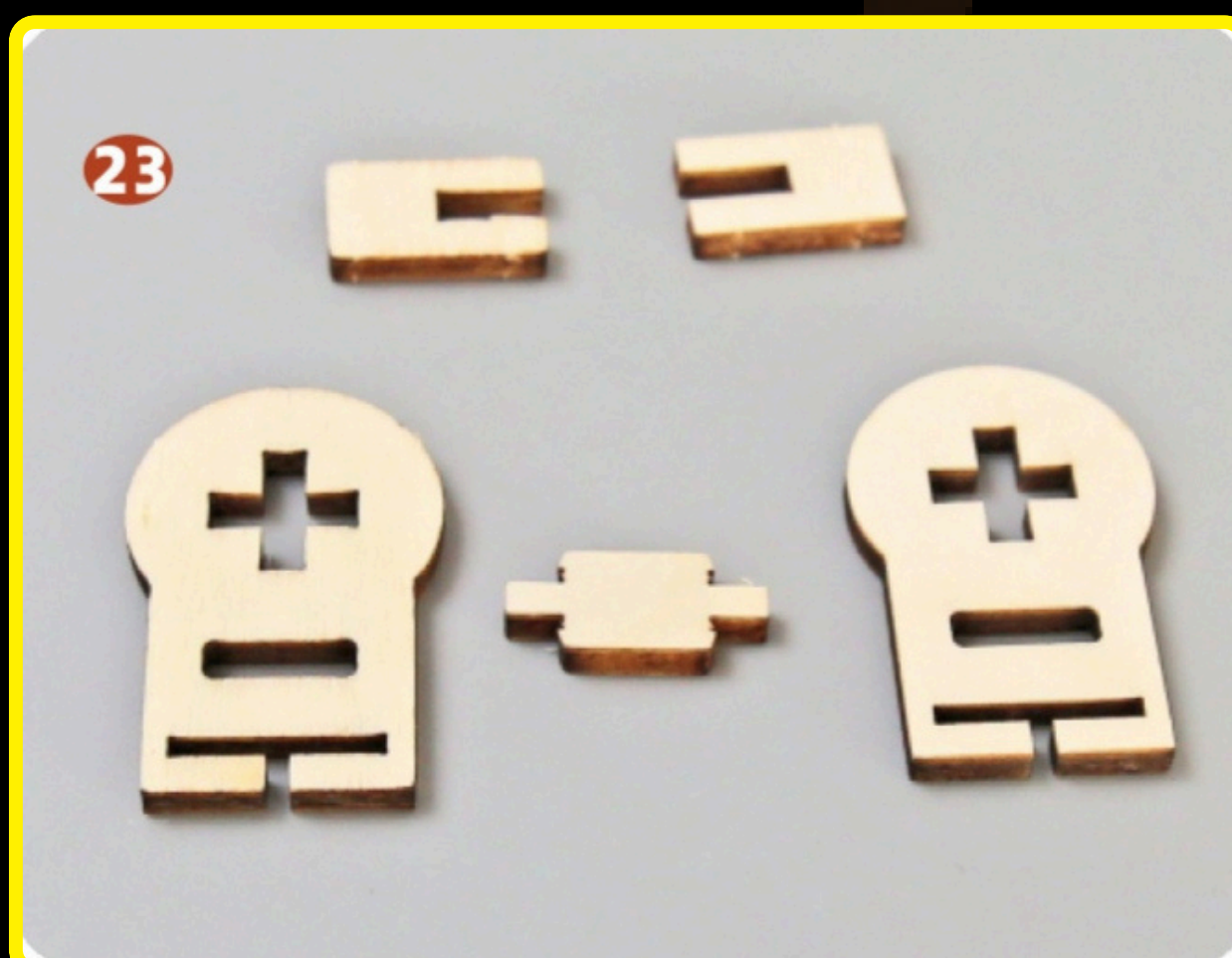
STEMAGINATION LABS



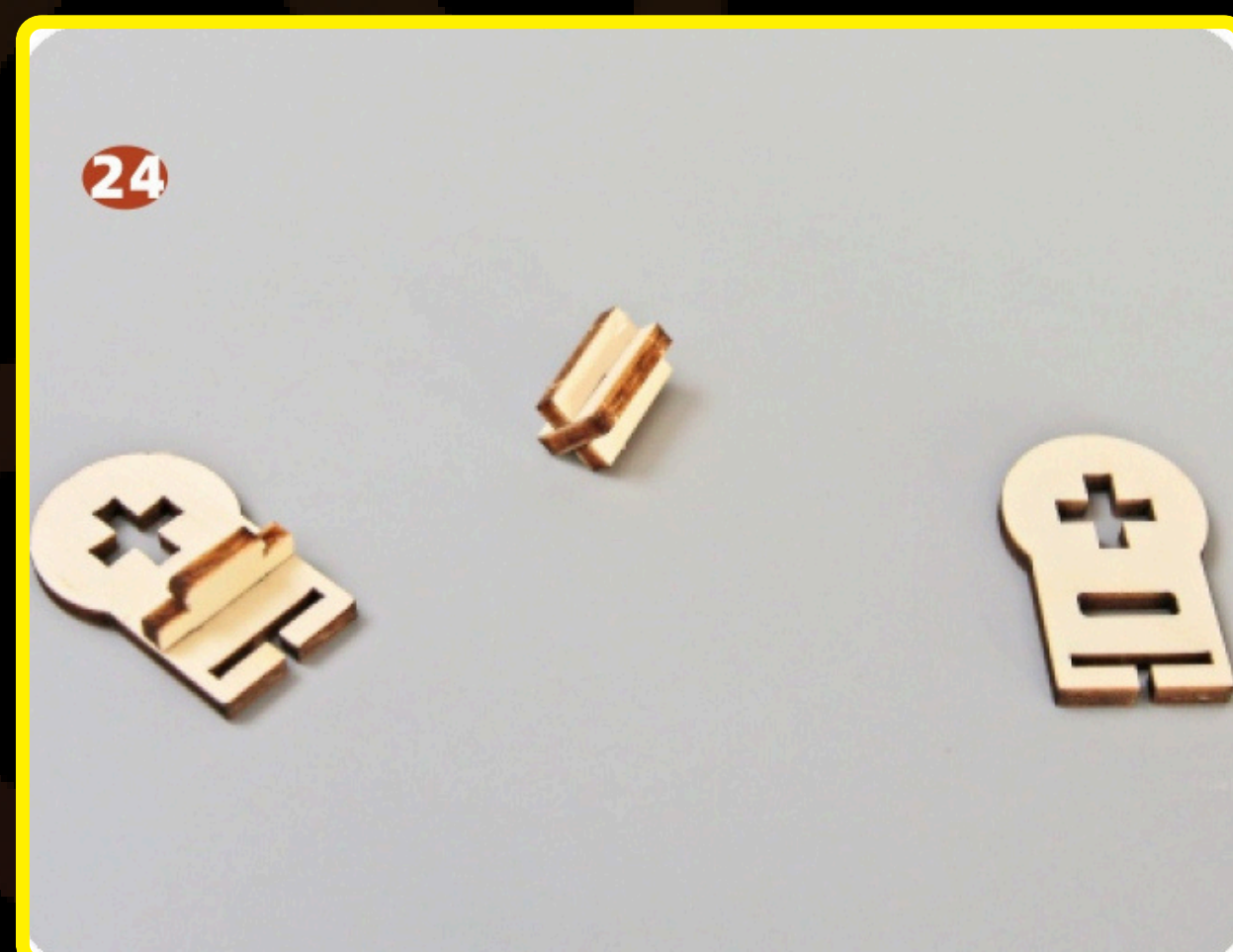
21. Install the syringe into the slots as shown. then extract the ring shaped piece and another two 6 mm screws for the next step.



22. Install the ring on top of the syringe and fasten it with the screws .Make sure the cylinder of the syringe doesn't move after fastened.



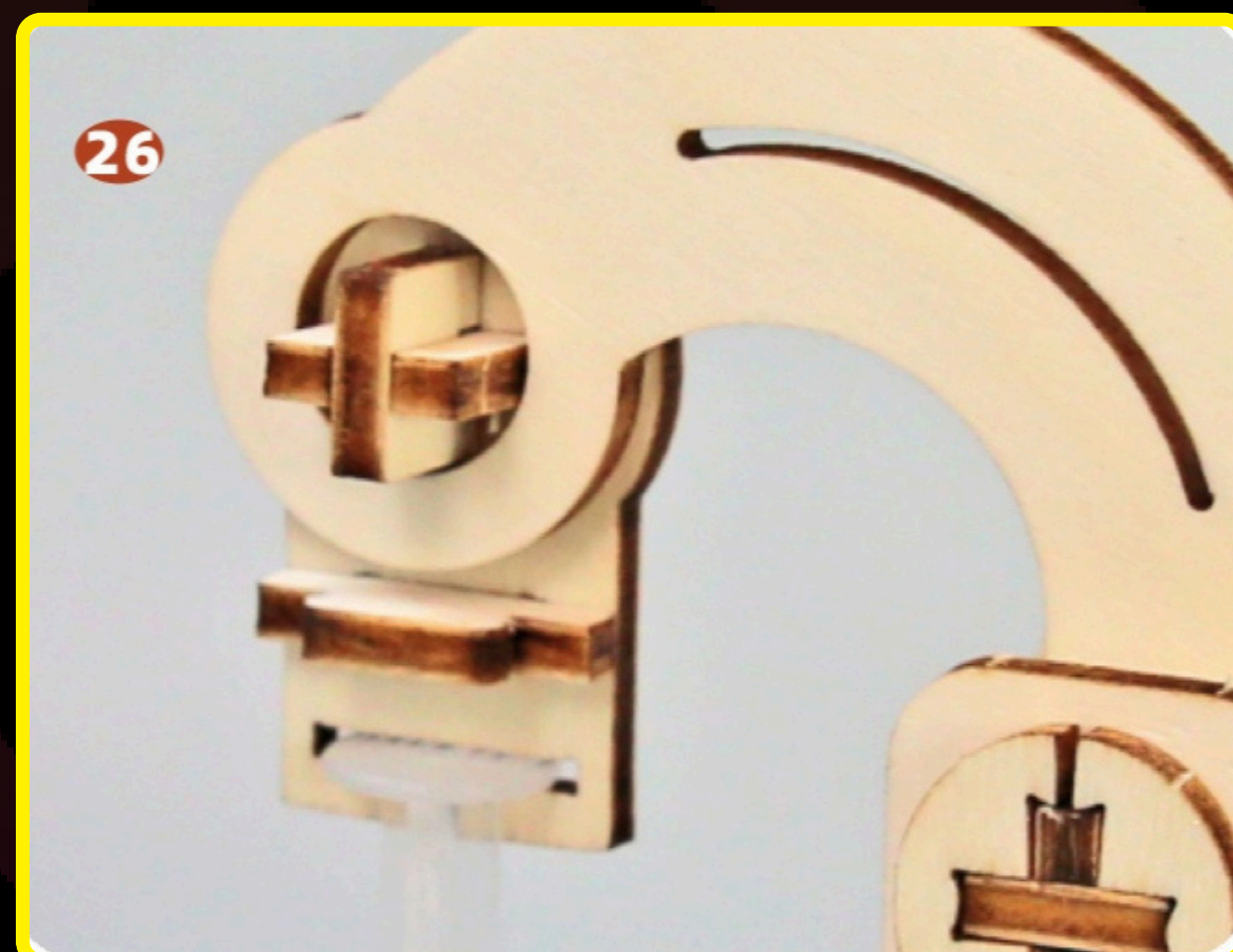
23. Extract the pieces illustrated above for the next step.



24. interlock the pieces as shown in the picture.



25. Now take the piece you prepared in previous step and attach it to the plunger as shown.



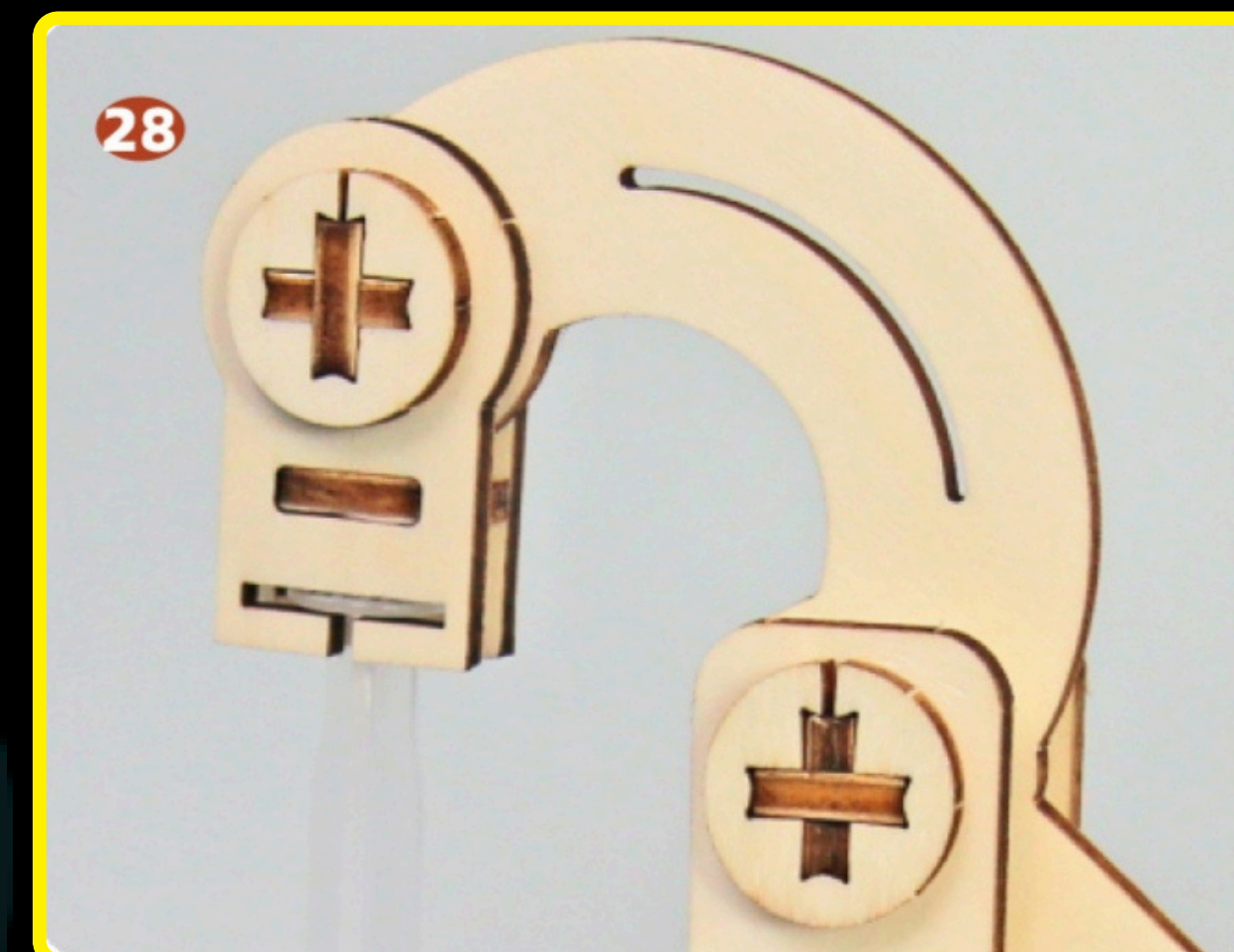
26. Now take the cross-shaped you prepared earlier and insert it through the hole as shown attaching the plunger on to the handle.



STEMAGINATION LABS



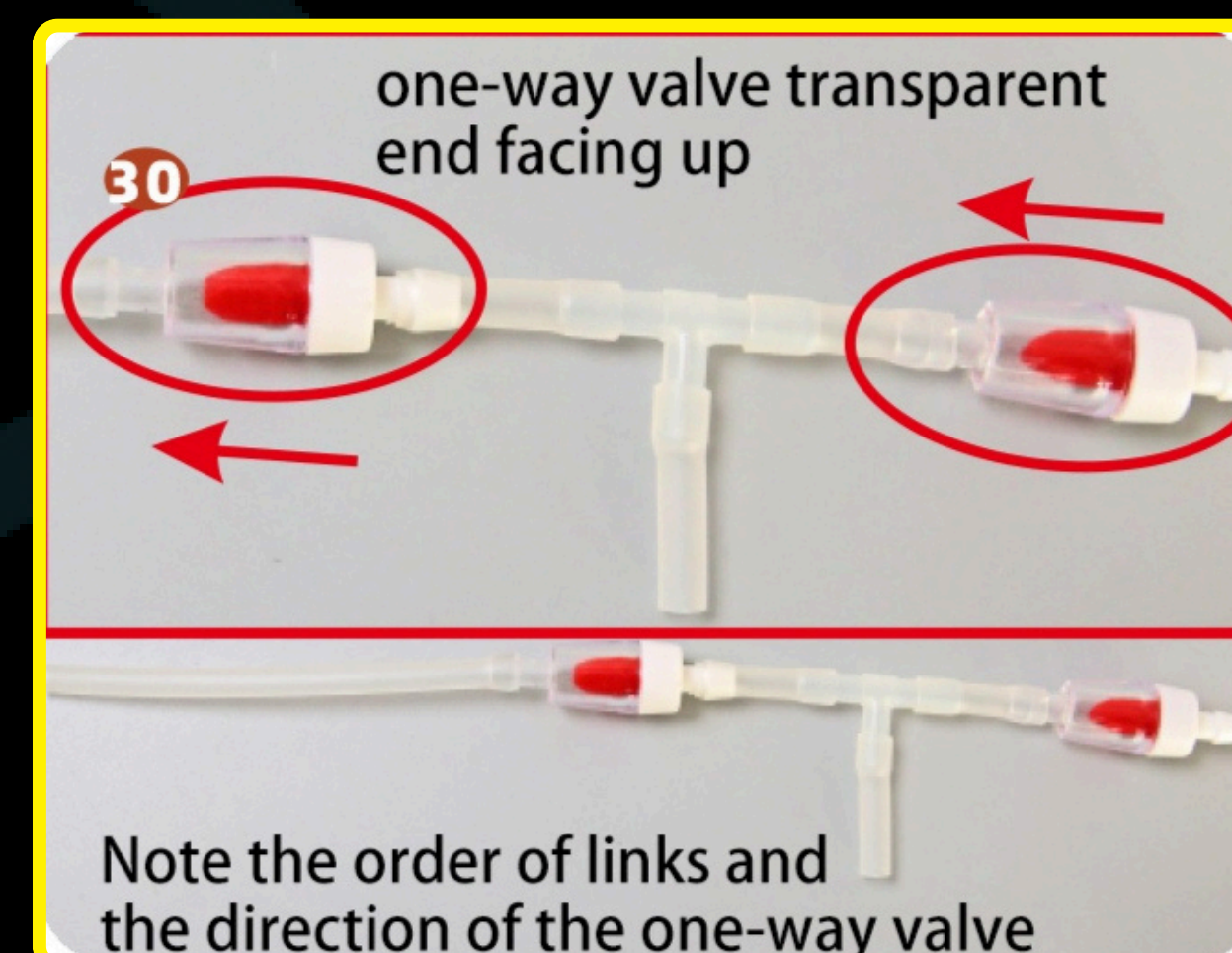
27. Get the identical piece you extracted in step (24) and interlock it to fasten the plunger onto the handle.



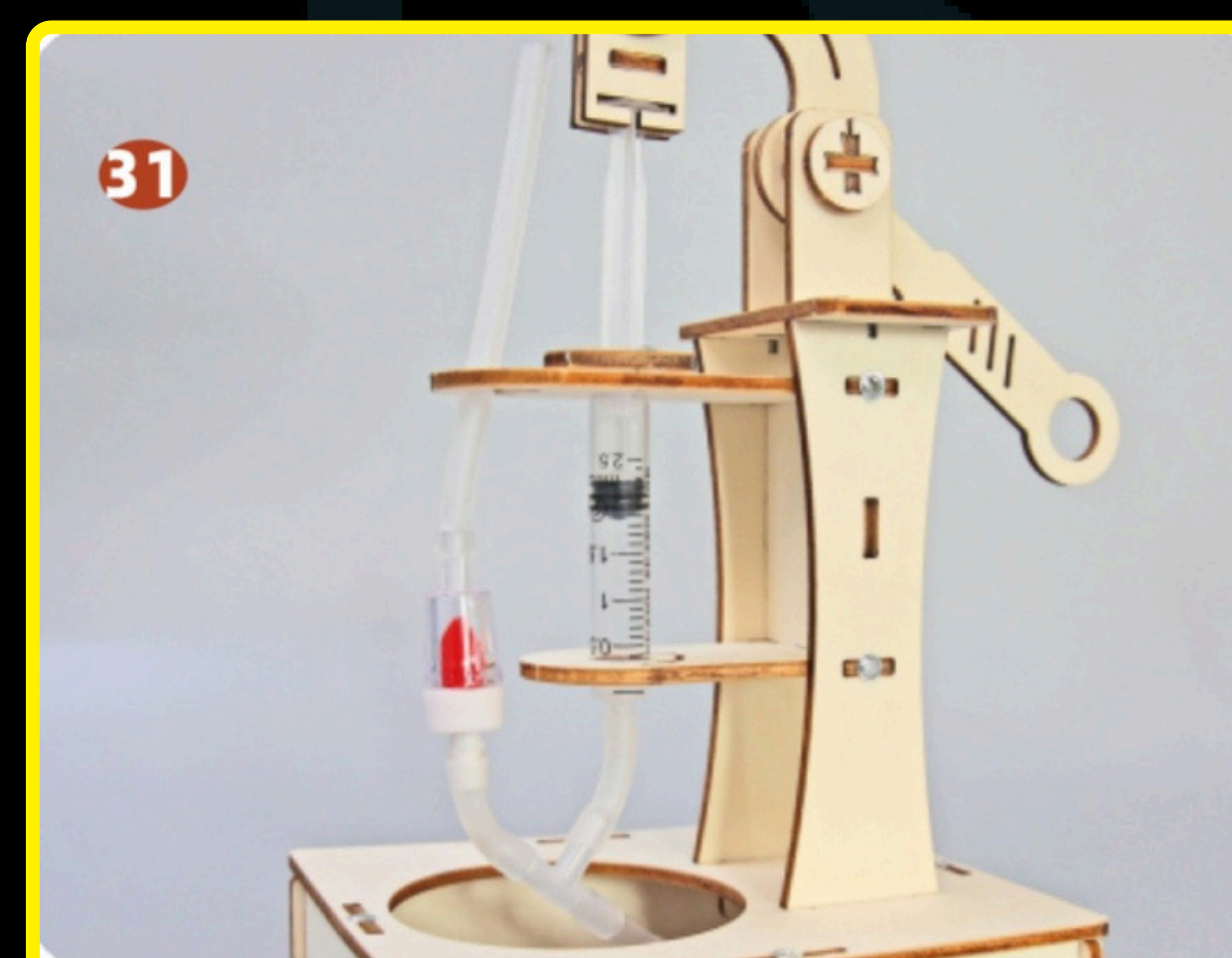
28. Then finalize the joint by installing two round disks to attach it firmly.



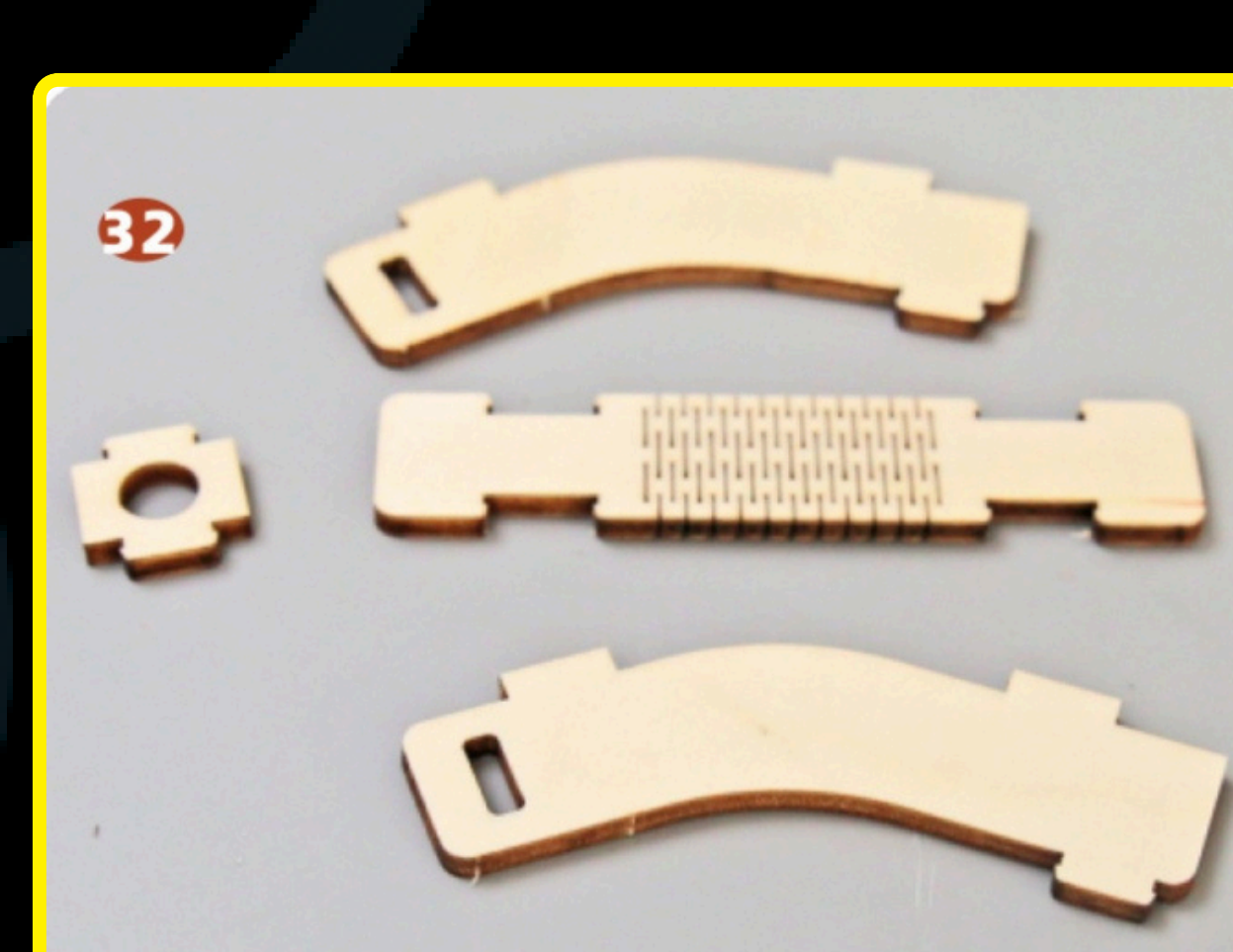
29. Now prepare the long, short, and T shaped hoses alongside the valves as illustrated.



30. Install the valves, hoses as illustrated. Keep in mind the orientation of the valves to ensure functionality.



31. Then install the unit you prepared in previous step as illustrated. the remainder of the T-shaped hose has to go through the tip of the syringe while the long hose should come out from the top as shown.



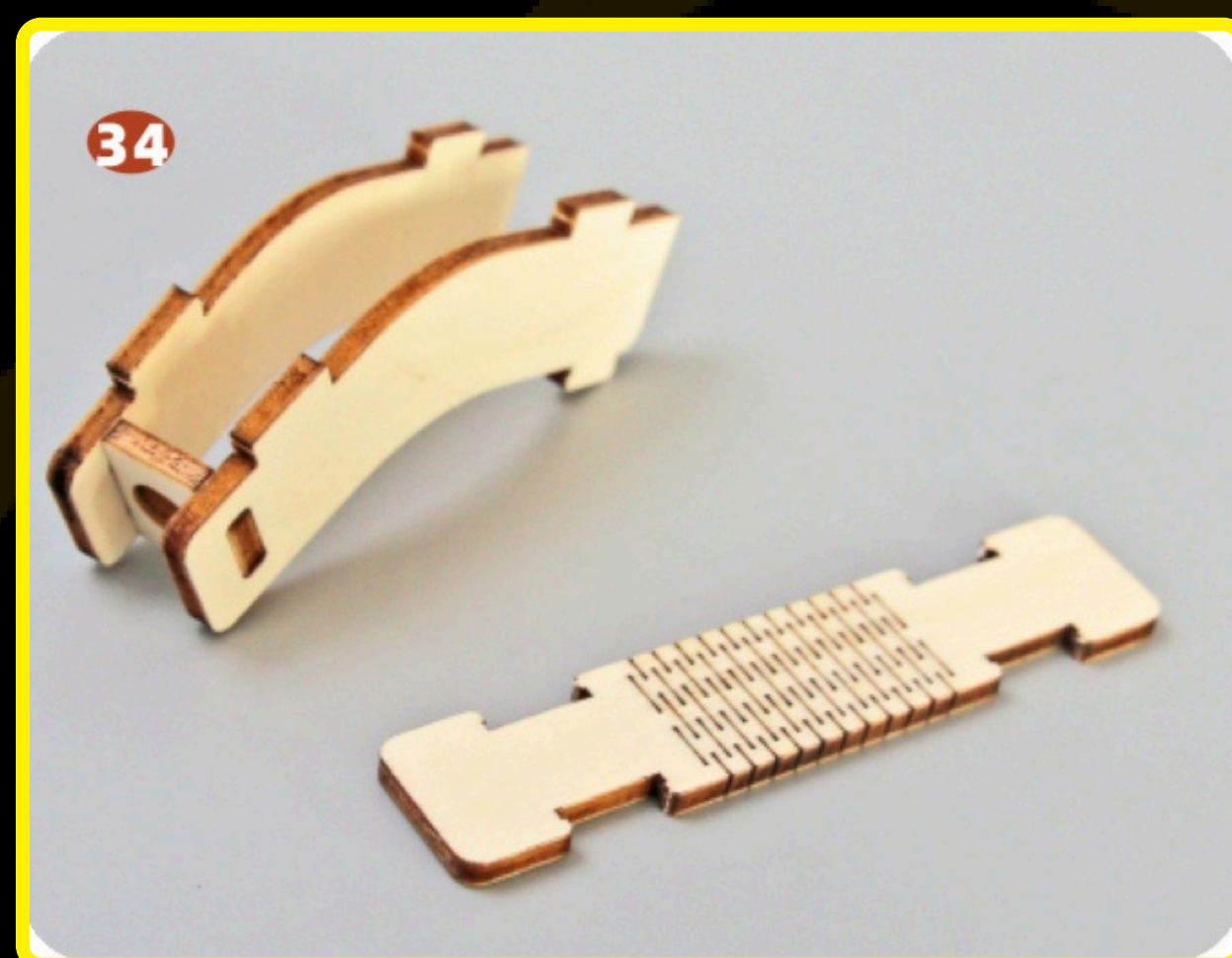
32. Now prepare these parts to design the pipe/hose holder.

"Play is the work of the child"

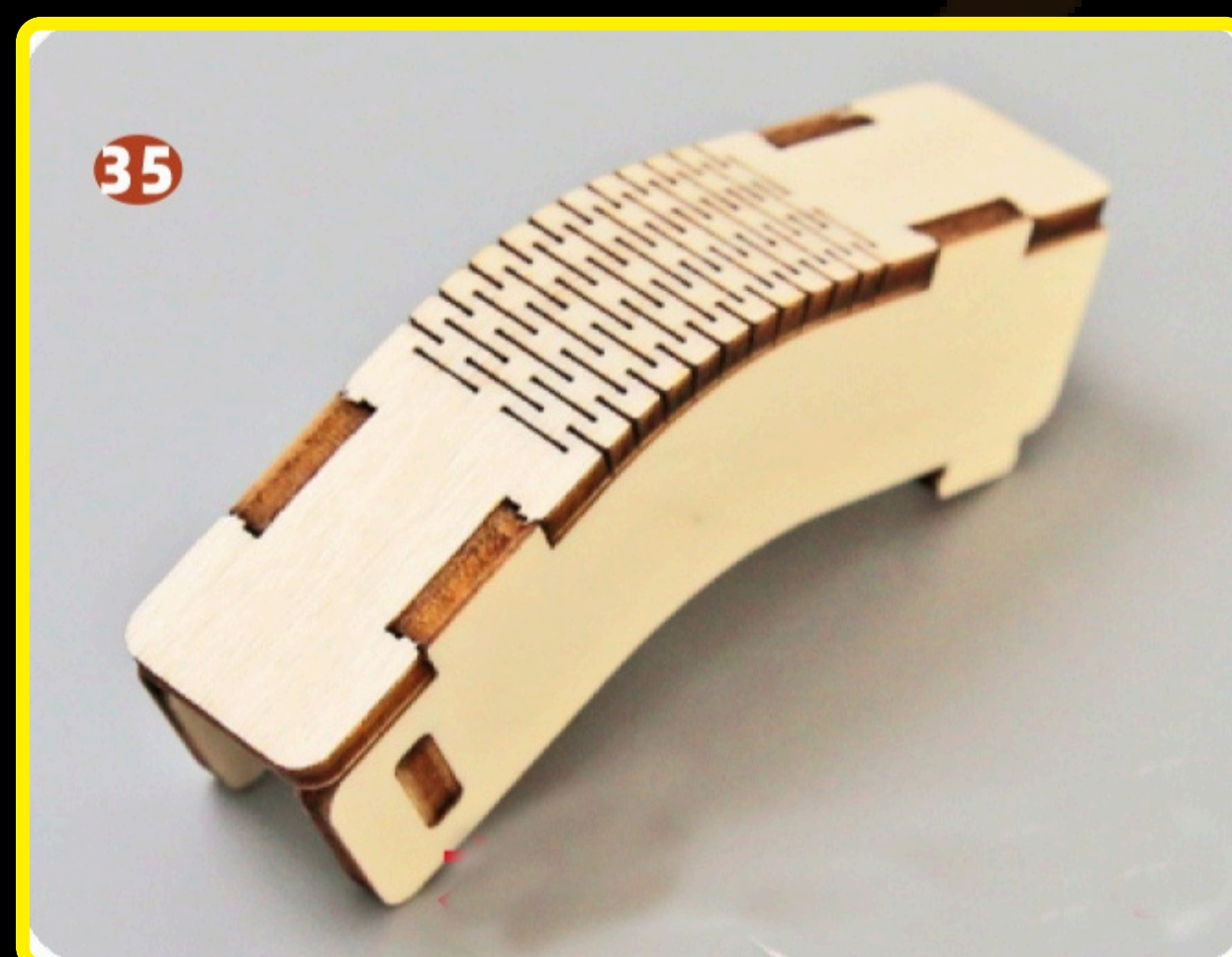
- Maria Montessori.



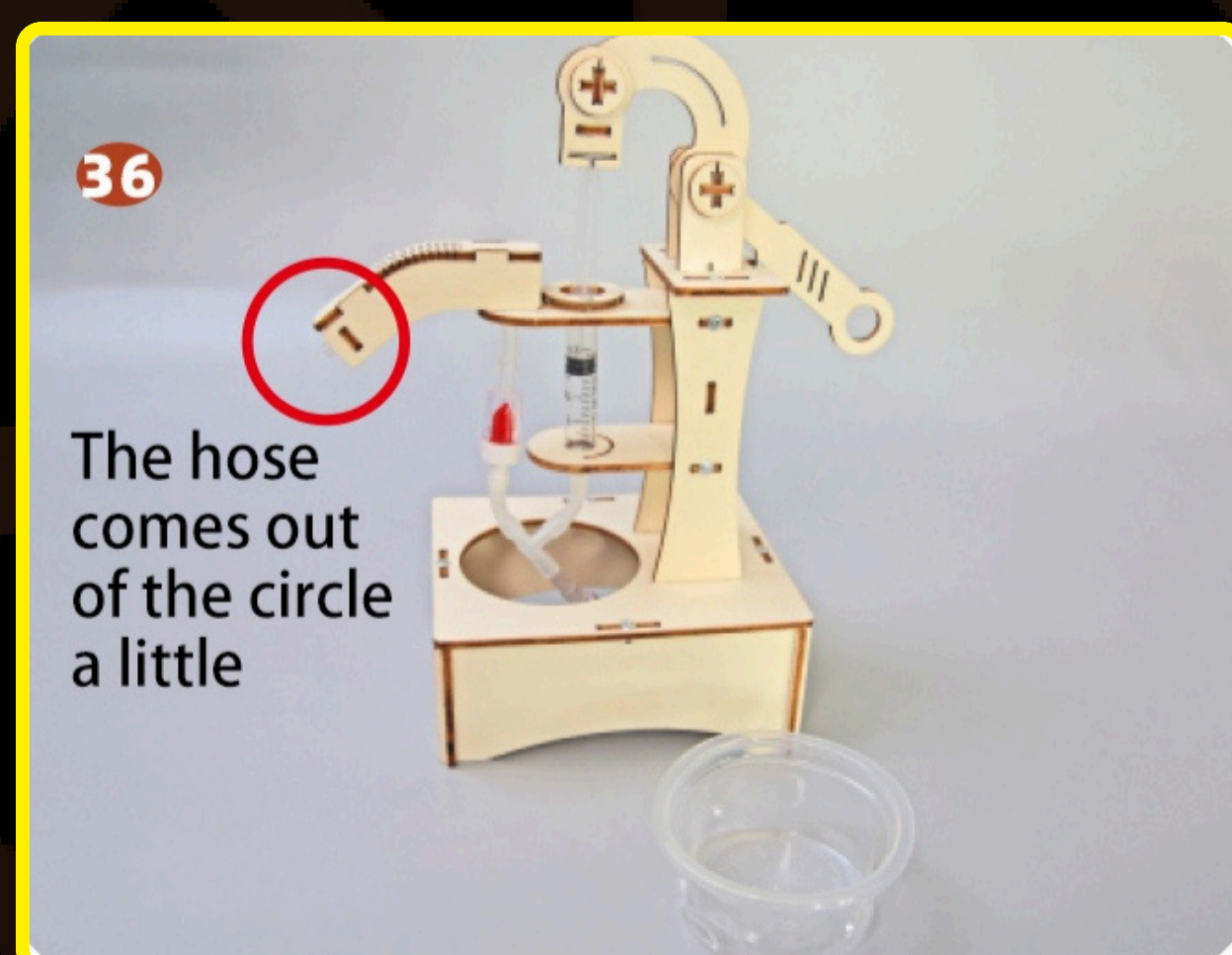
33. Install the small piece on one of the handles as shown.



34. Then use the other identical part and attach it to the other side. Extract the last wooden piece to complete the next step.



35. Install the prepared piece on top the unit prepared in step (34) to complete the pipe/hose holder.



36. Now install the pipe/hose holder onto the pump. then send the long hose through the ring of the pipe holder.

Ensure that the tip of the hose comes out of the pipe holder a bit so that the pumped water will not spoil the woodwork or fall back into the well (cup).



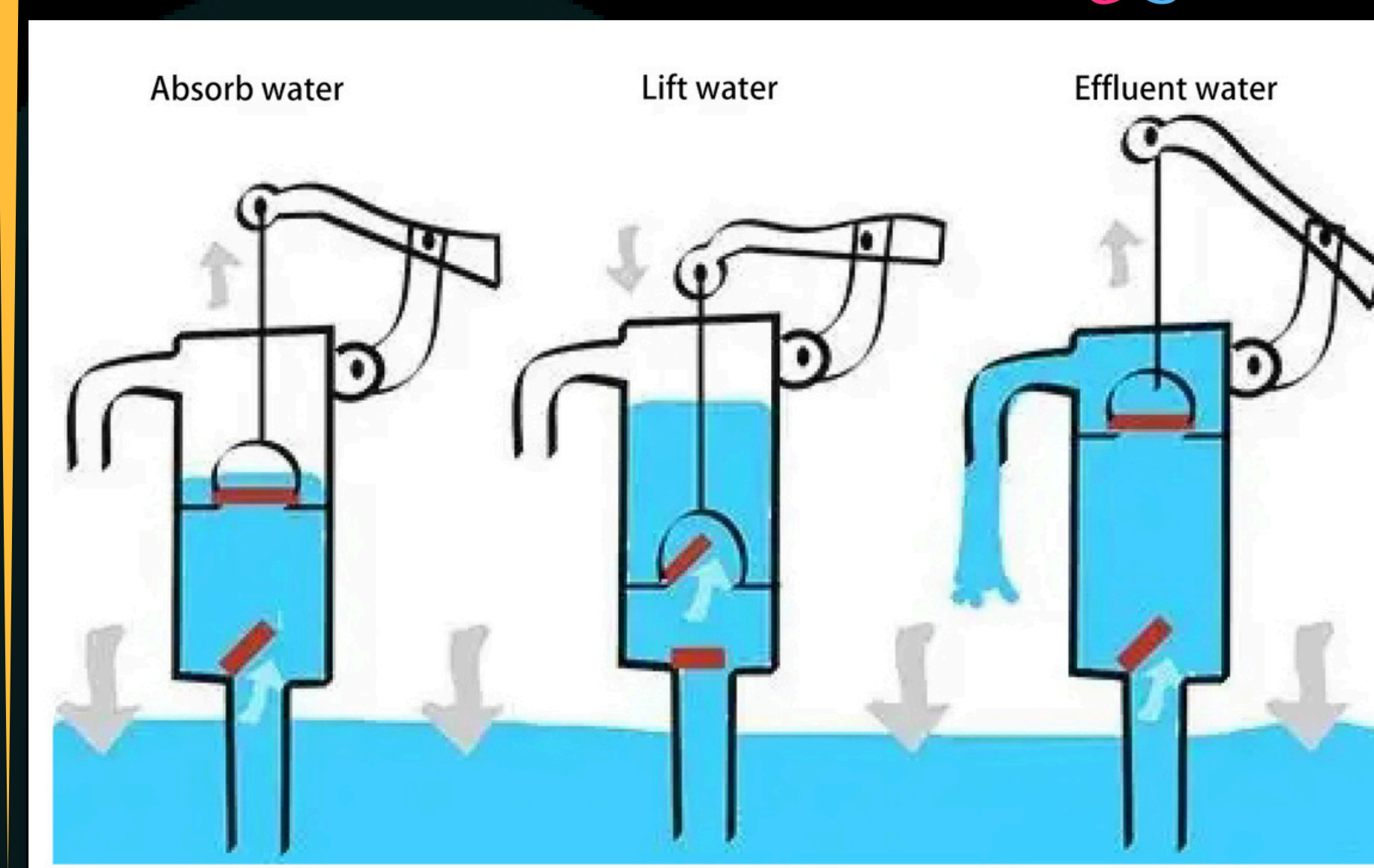
37. Now insert the cup into the opening as shown.

the bottom part of the valve should be in the cup which acts as a well.

Fill it up with water and start pumping with the handle!



Now assembly of your own Hydraulic hand-cranked water pump is complete! You can take it for a test run!



How the Hand Pressure Pump Works

The hand pressure pump helps draw water from the ground. Here's how it works:

1. Absorbing Water : When you push the handle down, the piston inside the pump moves up. This creates space for air to rise, and water from the bottom is sucked into the lower part of the pump.

2. Lifting Water : As you pull the handle up, the piston moves down, forcing the water higher into the pump.

3. Effluent Water : The water flows out through the spout once it's lifted high enough

The pump works because of air pressure and one-way valves that let water move in only one direction. The "piston" creates a vacuum to pull water up, while the valves keep the water from falling back down.

This pump also uses the lever principle, which means the handle makes it easier to move the piston with less effort.



TROUBLESHOOTING

The Water pump is not working? These troubleshooting steps should help ensure smooth operation of your toy!

Q: The wooden pieces don't fit : Check if they're the right pieces. Clean any wood dust or ask an adult to sand the edges.

Q: Parts keep falling out : Push them in firmly. If loose, ask an adult to glue them.

Q: Screws are too tight : Use the correct screws. Ask an adult to steady the parts while you turn the screwdriver.

Q: The syringe doesn't stay : Push it in firmly and tighten the screws slightly more.

Q: The hose comes off : Push it in fully or ask an adult to tape it.

Q: Water doesn't come out : Check the hose and valve connections. Make sure the valve is facing up (Step 30).

Q: The handle is wobbly : Tighten all handle screws and press wooden parts together.

Q: The pump doesn't lift water : Straighten the hose and check for air leaks.

Q: The wood cracked : Ask an adult to glue it back and let it dry.

Q: The pump leaks water : Tighten hose connections or seal them with tape/glue.

Q: The pump isn't strong : It's a model. Use less water and pump gently.