Start by building one of the example claws, then turn it into your own unique design.

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Below is the list of “ingredients” you’ll need to build a hydraulic claw. It includes some extra components to allow you to create your own unique design.

**4 - Connector Strips**
300mm (12in)

**3 - Dowels**
76mm (3in)

**1 - Slide Stop**
38cm (15in)

**1 - Tubing**
76mm (3in)

**4 - Blocks**

**4 - Zip Ties**

**8 - 25mm Screws**
#10 25mm (1in)

**2 - Cylinder Screws**
#6

**4 - Nuts**
#10

**2 - Cylinders**
4.5ml

**TEACHERGEEK TOOLS**

This isn’t a kit. You’re going to really build (cut, ream, screw) your claw. Here are tools you’ll need to get started.

- **Multi-Cutter**
  SKU 1823-81

- **Reamer**
  SKU 1823-87

- **Screwdriver**
  SKU 1823-90

- **Pliers**
  SKU 1823-86

**MATERIALS YOU SUPPLY**

What other materials will you need?

- **Recycled/Other Materials**
  Food packaging, cardboard, wood, etc. What materials can you put on your claw gripper to help it pickup things?

- **Materials to Grab**
  Balls, Marshmallows, etc.

- **Tape**

- **A Container**
  To put water in, for filling cylinders
**Build Guide for Hydraulic Claw**

**Cut**
- Multi-Cutters cut wood & plastic (like dowels and connector strips). They do not cut metal.

**Push, Wiggle, Tap**
- Push, wiggle or tap dowels into holes.
- Use a hammer and slider block to tap dowels farther through holes.

**Quick Tip!**
- Use a crayon, or soap on the end of a Dowel to make building easier.

**Ream**
- Most parts have holes with teeth. The teeth hold dowels (keep dowels from falling out).
- A reamer removes teeth from a hole. This allows a dowel to spin in the hole.
- Only ream holes where dowels should spin.

**Screws & Nuts**
- Screws (without nuts) can connect parts, and allow them to rotate.
- Screws (with a nut) can connect parts, and keep them from rotating.

**Stop Clip**
- Press a stop clip onto a dowel to keep it from sliding or use it as a hook for a string / rubber band. It takes little force to get it on.

**Slide Stop**
- Cut slide stop into sections. Use slide stop on dowels to stop dowels from sliding through reamed holes.

**Never ream pulleys, gears, wheels, or any hole a dowel stays stuck into.**

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Follow the steps below to create the hydraulic system for your claw. It will transfer power from one cylinder to another, through the water (fluid). **Try to keep air bubbles out of your hydraulic system.** It will not work as well if they are there.

1. Find, or **cut** a 38cm (15in) section of **tubing**.

2. Fill two **cylinders** with water: a) Push the piston (red part) all the way in. b) Put the tip under water. c) Pull the piston all the way back to fill the cylinder with water. Repeat if there are air bubbles in the cylinders.

   **Tip:** Use food coloring to make seeing the water easier.

3. **Attach** tubing to one of the filled cylinders.

4. Use the piston to push water from the cylinder into the tubing. The tubing should be filled completely with water. Keep the piston pushed in. You do not want air bubbles in the tubing.

   Connection Close-Up

5. **Attach** the second water-filled cylinder (from Step 2) to the water-filled tubing.

6. Turn a cylinder **screw** into the hole aside each cylinder's tip. It will prevent the tubing from pulling off easily.
This build will just get you started. Create your own unique claw design.

1. Cut two 5.5 cm (2.1") dowels. Push or tap them into the center holes of two blocks.

2. Cut two 11 cm (4⅜") dowels. Push or tap them into the holes of one of the blocks from Step 1.

3. Ream the holes marked with ✖️ in the second block from Step 1. Slide the reamed holes onto the dowels from Step 2 (as shown below). It should slide easily – if not, ream the holes more.

4. Push or tap a cylinder onto the dowels from Step 3.

5. Open and close your claw using the loose cylinder. Add parts to make it to hang straight or grab objects better.

A. Use a zip tie to attach the cylinder’s piston to the sliding block and dowel.
This build will just get you started. Create your own unique claw design.

**Example Claw *2**

1. Cut two connector strips in half.

2. Attach two half connector strips using one 25mm screw – making the strips pivot like scissors. The screw does not have to be in the same place as shown.

3. Add more connector strips with 25mm screws, making an accordion style mechanism. It should get longer and shorter as connector strips are moved.

4. Why is this called an accordion mechanism?

5. Open and close your claw using the loose cylinder. Add parts to allow it to hang straight or grab objects better.

Attach a cylinder to your accordion mechanism as shown.
**Example Claw #3**

1. Cut two connector strips in half.

2. Cut one of the half-strips in half.

3. Attach a cylinder to the center of a connector strip. Use zip ties or tape. Make sure the cylinder pin goes into a connector strip hole.

4. Attach two half-connector strips using a 25mm screw - making the strips pivot like scissors. The screw does not have to be in the same place as shown.

5. Attach the cylinder piston to the 1/4 connector strips with a screw. Move the piston in and out. The claw should open and close. Adjust the positions of the screws to make the claw open wide or close completely.

This build will just get you started. Create your own unique claw design.

Open and close your claw using the loose cylinder. Add parts to better grab objects.

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