

Plumbing Wall Activity

Age level: K – 3rd grade

Time required: 1/2 hour

Adult supervision required: Yes, basic carpentry and plumbing skills

Introduction

This activity is designed to introduce children to some fundamental activities involved in assembling a drain system for a sink. It is essential that the participants understand the hazards of working with plumbing and leave the activity knowing that they should not manipulate their plumbing at home without adult supervision. Spend time at the beginning and end of the activity reminding the children that if they disconnect plumbing, they could make a big mess.

The sponsor will prefabricate a small, wood-framed wall and attach and brace a small shelf for installing a sink. They will provide precut 1-1/2" PVC pipe, 1-1/2" PVC fittings, 1-1/2" Plastic sink tailpiece, and a P-trap kit to attach to the sink. Children will select the appropriate components and assemble them according to the pictures and drawings provided. Nothing will be glued to allow the components to be reused. Water will be run through the drain system to test it. Pushing the fitting together should allow this test without significant dripping. Figure 1 shows the completed project. Note that the same wall is used for the Electrical Activity. The junction boxes are not required.

One possible idea for the sink component is presented. Supervisors of this activity may improvise using items already on hand.



Figure 1. Completed Plumbing Wall

Material List

Prefabricated framed wall w/shelf

2x4 x 8' studs	4 ea.
3" screws or 12d nails	40 ea.
16" x 24" x 3/4" plywood	1 ea.
2" screws or 8d nail	4 ea.

Plumbing components

Bowl/sink	1 ea.
1-1/2" plastic sink tailpiece	1 ea.
P-trap w/solvent weld connector kit	1 ea.
1-1/2" 90° Elbows	2 ea.
1-1/2" PVC DWV sanitary tee	1 ea.
1-1/2" PVC pipe, various lengths	5 ft.
Assorted misc. fittings and pipes	
Tie wire	6 ft.
Drain bucket	1 ea.
Plumber's putty	
Marbles	30 ea.
Cotton balls	6 ea.

Tools

1-1/2" hole saw
2" hole saw
Drill
2" packing tape

Preassembly Wall Fabrication

The wall should be prefabricated and carried to the activity location. Construct a 4' x 4', 2x4 framed wall with 16" stud spacing. Attach stabilizers to the bottom to hold the wall upright. Figure 2 is a sketch of the side view. The connections may be nailed or screwed. It will be easier to disassemble for storage if the stabilizers are screwed on. Install the 16"x24" plywood counter top with two 19-1/2" horizontal 2x4s supported by two 22-5/8" knee braces. Drill a 2" hole through the middle of the top plate to run the vent pipe. Drill a 1-1/2" hole through the center of the counter top, as shown in Fig. 3.

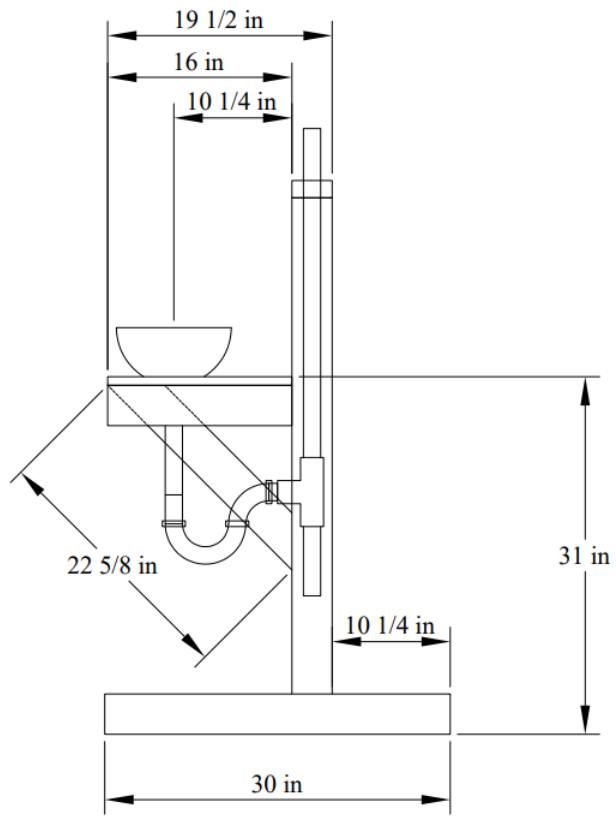


Figure 2. Side view of plumbing wall



Figure 3. Holes for vent pipe and sink tail piece

Preassembly Plumbing Preparation

Before engaging the children, drill a 1-1/2" hole through the bottom of the bowl to be used as the sink. Cut pieces of 1-1/2" PVC to the following lengths:

- 3" – 2 ea.
- 2" – 2 ea.
- 30"

Consider cutting other pieces of PVC to various lengths and provide extra fittings for the children to sort through while looking for the proper parts.

Drain Assembly

The parts needed for the drain assembly are shown in Figure 4. The P-trap is shown assembled. Show this picture to the children and have them find the required parts.



Figure 4. Piping components

Two views of the disassembled P-trap kit are shown in Figure 5. Have the children take the P-trap apart and study the components. Then have them reassemble it with the tailpiece, sanitary tee and 2" long pipe as shown in Figure 6. A roll of tape is shown where the joint will be taped later to minimize leakage during the final assembly – don't tape it yet.

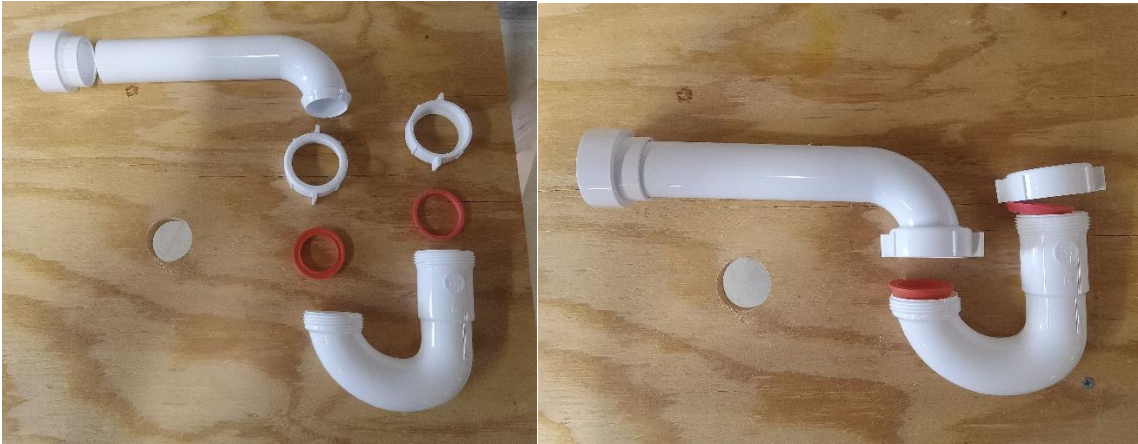


Figure 5. P-trap components

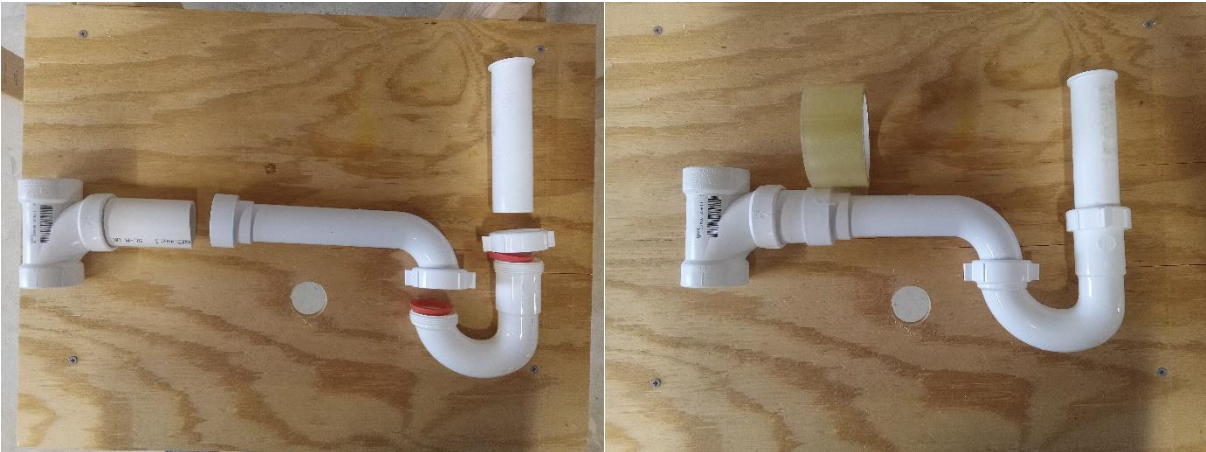


Figure 6. P-trap assembly

Show Figure 7 to the children and have them assemble the remaining PVC pieces accordingly.



Figure 7. Complete piping assembly

Insert the tailpiece through the hole in the sink. Take care around the sharp metal edge of the hole. Place a $\frac{1}{4}$ " bead of plumber's putty around the hole in the plywood and insert the tailpiece with the sink through the hole in the plywood countertop (Figure 8). Press down firmly. This should provide an adequate seal for the sink.



Figure 8. Install the sink w/tailpiece

Disconnect the nut and seal from the P-trap and place on the tailpiece as shown in Figure 9. Install the entire piping assembly inserting the vent pipe through the hole in the top plate on the wall and screwing the tailpiece to the P-trap. The fittings should be pressed tightly in place. The supervisor may need to apply some additional force to each fitting after the assembly is installed. The joint where the end of the P-trap is slid into the fitting should be taped to seal. Use wire or some other method to support the plumbing (Figure 10).



Figure 9. Place seal on tailpiece



Figure 10. Tape the slip joint to minimize leakage

Place a bucket under the sink to capture water that may drip from the sink or P-trap. The drain line will also be routed into this bucket. See Figure 1.

Plumbing Drain Demonstration

Pour a small amount of water into the sink. When no water comes out of the drain, quiz the children to see if they can determine why.

Add more water to fill the trap and start to drain additional water into the bucket. This is a functioning sink.

Pour 30 marbles into the sink. They will collect in the trap. Insert 6 cotton balls, one at a time, down the drain. Use a rod to force the cotton balls down the drain. These should cause a clog and water will back up into the sink. Ensuring that the bucket is under the trap, have the children disassemble the trap and clear the clog. Replace the trap and demonstrate that the sink is again working properly.

Alternate Plumbing Activity

Introduction

For a simple activity that may be more appropriate of younger children, bring an assortment of small plumbing fittings and short pieces of pipe. Discuss the names and functions of the different parts. The children can then use the pieces to assemble various figures. The parts to make a stick man (Figure 11) are described below.



Figure 11. CPVC Stick Man

Material List

Parts are made from $\frac{1}{2}$ " CPVC pipe and fittings unless otherwise noted.

Pipe lengths	
1-1/2"	4 ea.
2"	4 ea.
3"	1 ea.
Street elbows	4 ea.
45° elbows	4 ea.
Tees	2 ea.
Union	1 ea.
Cap	4 ea.
$\frac{3}{4}$ " CPVC cap	1 ea.
Plumber's putty	

The parts are shown in Figure 12.



Figure 12. CPVC parts

Assemble the parts as shown in Figure 11. The example uses plumber's putty to attach the head to the Tee forming the shoulders. A Cross fitting with a 1" long neck would have been more appropriate but is not easily procured in ½" CPVC. Any pipe size/type can be used.