



CONSTRUCTING A WAVE MAKER

Materials

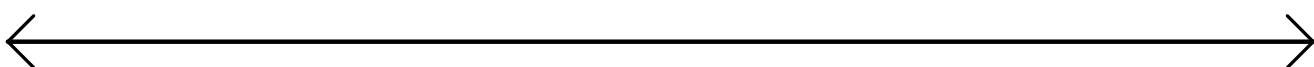
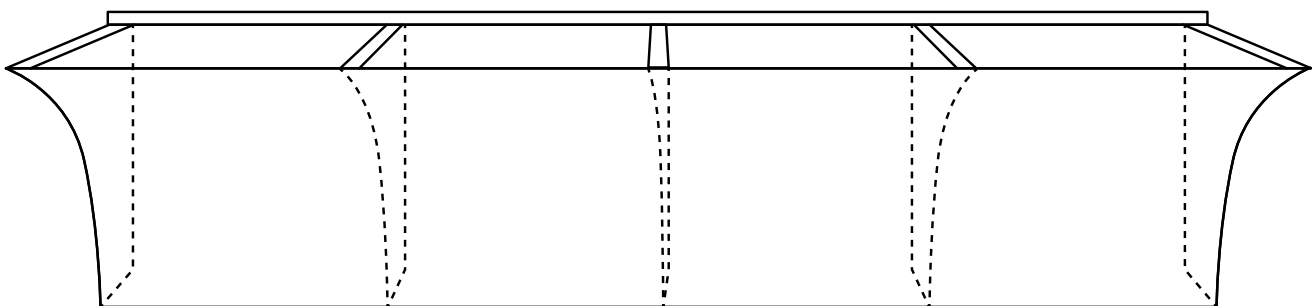
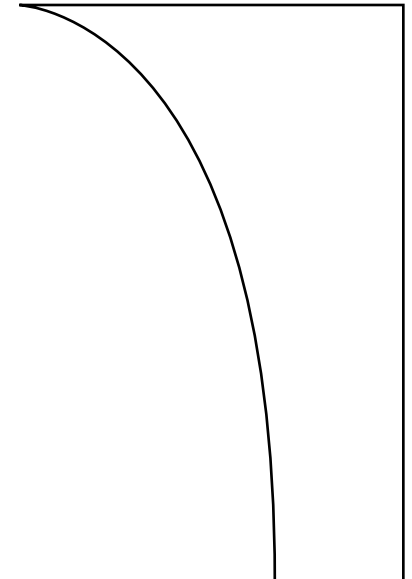
Our wave maker is constructed out of three basic materials: corrugated plastic (as is used in yard signs), balsa wood, and 1/4" thick fiber board. You can vary these materials as necessary to use what you have on hand.

- Drill and small drill bits
- Hot glue gun and glue sticks
- Long, thin pieces of strong material for supports and a "lever arm" attachment (balsa wood pieces, craft dowel rods, etc.), 1/2-inch and 1/4-inch wide pieces are useful
- Rigid material for building a base, such as 1/4" plywood or fiber board
- Ruler
- Screwdriver, pliers, and other tools as needed
- Sharp cutting tools (craft knife, sharp scissors, saws)
- Waterproof, flexible sheet of material (we used plastic canvas inside a page protector, sealed with a soldering iron)
- Waterproof, rigid material, such as corrugated plastic sign material (yard signs)

Assembly and Operation Instructions

1. Using the template, cut 5 pieces of rigid, waterproof material. These will be the "scoop" supports and help form the curved shape of the blade.
2. Cut one piece of flexible waterproof material that measures 11 inches long by 3 1/2 inches wide.
3. Using the hot glue gun, attach the flexible material to the curved sides of the support pieces. Place one support piece at each end of the material, one in the middle, and the other two halfway between the ends and middle.
4. From the rigid material for the base, cut two isosceles triangles 4 inches at the base and 6 inches high. Also cut a square that is 4 inches on a side.
5. In order to properly assemble the base, it will be helpful to create a spacer for the triangles so they are able to stand and be attached to the base with appropriate space between. This spacer will be removed. To make the spacer, place a 6-inch-long piece of 1/2-inch wide, rigid material between the two triangles from the top of the triangle to the middle of the base.
6. Continue assembling the base by securing the two triangles to the 4-inch square using wood glue, hot glue, or screws. (If utilizing screws, it may help to pre-drill holes.) Make sure the triangles are secured so that they are closer to one edge than the other (not in the middle), as demonstrated in the diagram. The extra space on the base will allow space for attaching a motor to power the base, as needed. Once the triangles are secure, remove the spacer.

Template for Scoop Supports (2"x3"):

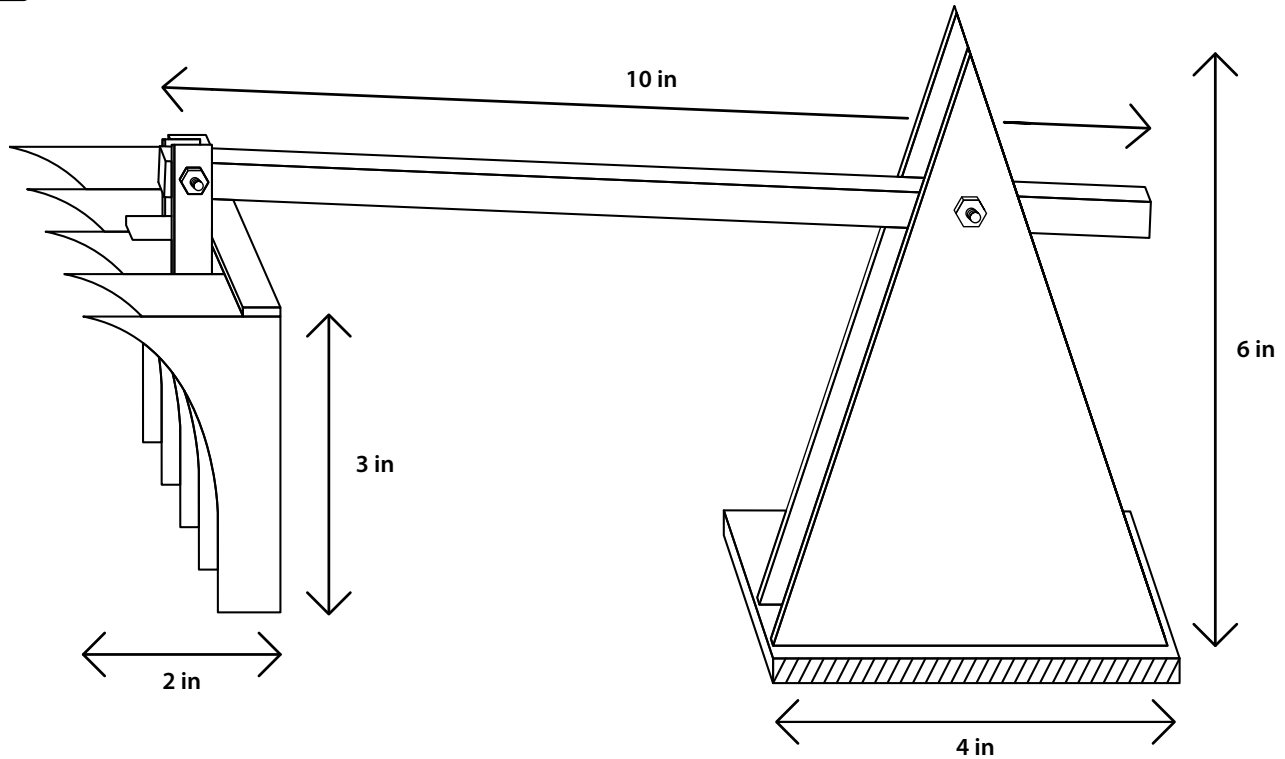


Support pieces with Flexible Material Attached

11 in



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Assembled Wave Maker with Dimensions

7. Cut a 10-inch long piece of half-inch square dowel rod / strong material to be the lever arm. This lever arm attaches the scoop to the triangular supports on the base.
8. Cut an 11-inch long piece of rigid waterproof material that is about a half-inch wide and flat. Attach this to the top of the scoop supports created in step 3. This will keep the scoops in place and provide an attachment point for the lever arm which connects the scoop to the base.
9. Cut a small, flat piece of material the same width as the lever arm. Glue it to the top of the scoop support so it is parallel to the support. This will be the attachment point for step 10.
10. Cut two small pieces of rigid, waterproof material that are the same width as the piece cut in step 8. Each piece should be about 2 inches long. These pieces will be attached to the piece from step 8, above the center scoop and provide a pivot point for the lever arm to attach.
11. Drill holes about a half-inch from the top of each piece from step 9, Drill a hole about a half-inch from the end of the lever arm. Use a nut-and-bolt combination to attach the lever arm to the upright supports on the scoop.
12. Drill a hole through the lever arm about 3 inches from the other end. Drill the same-sized hole through the triangle supports on the base, about an inch below the peaks of each triangle.
13. Using a nut-and-bolt combination, attach the lever arm to the triangle base through the holes you drilled.
14. You should be able to use one or two fingers to raise and lower the scoop. The scoop should also be able to swivel at the end of the scoop.
15. Fill a large shallow tub with water.
16. Position the base of the wave maker so that the base sits at or just below the water level in the tub. Use boxes, blocks, or books as needed to elevate it.
17. Allow the scoop to drop into the water. Using your fingers, press down on the short end of the lever arm to lift the scoop, and allow gravity to lower it.
18. Raise and lower the lever arm to create consistent waves in the tub. Practice this motion to ensure that your waves are consistent for students to be able to test their wave energy designs.
19. If you wish, you may use a combination of gears and a DC motor to power the lifting motion. A circular piece attached off-center that is turned by the motor will provide the raise-and-lower motion that you are providing with your fingers.