

Making a Ripple Tank to Demonstrate Wave Properties

Estimated Time: 60 minutes

SUMMARY

In this activity, kids make a ripple tank, a model that uses water and light to demonstrate waves. This simple, interactive model can be used to make wave properties visible for kids. These properties are shown with water waves, but the properties are similar for light waves as well.

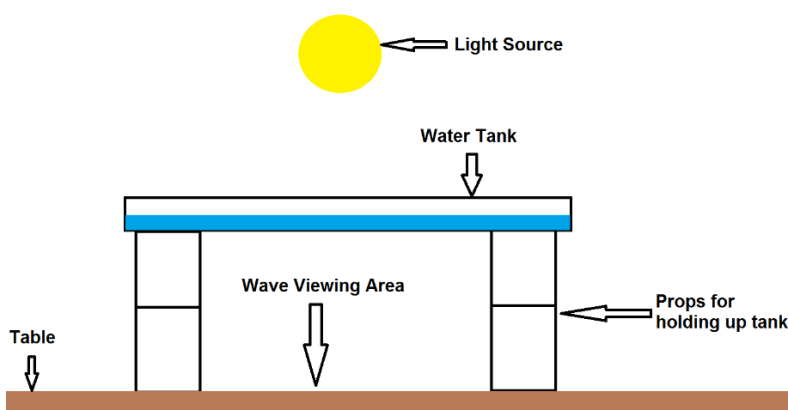
WHAT YOU'LL LEARN

- How to make a model wave medium
- Wave properties including reflection, diffraction, and interference

Materials Used	Resources Used
<ul style="list-style-type: none"> • A clear, flat container (thin plastic container or lid works best, but a glass casserole dish can work) • Books or cans to prop up container • Water • Dish soap (like Dawn) • A desk lamp or other strong light • A plastic ruler 	<ul style="list-style-type: none"> • Open University Wave Properties playlist: https://www.youtube.com/playlist?list=PLFE829A78F461BD20

MAKING THE RIPPLE TANK

1. Prop up your container on both sides with either cans or books. The container needs to be flat, so standardized sizes work well, as with cans. The container should be about a foot off the table, but lower than the lamp.
2. Add water to the container until it's about half a centimeter deep. Add 2-3 drops of dish soap and mix it in the water slowly, avoiding making bubbles.
3. Turn on the lamp above the water. Centering the light above the water works best to keep the waves centered below the tank without distortion.
4. Your final setup should look something like this:



USING THE RIPPLE TANK

- You use the ripple tank by tapping the water with your finger or ruler to make waves.
- Dark parts are where the water is thicker, or the peak or crest of waves.
- Light parts are where the water is thinner, or the trough of waves.
- Properties to demonstrate:
 - Reflection: A wave bouncing off a wall or object.
 - Any wave you make will reflect off of the walls of the tank.
 - Try placing other objects in the tank to see how waves bounce off of them.
 - Interference: Multiple waves interacting.
 - Tapping the water several times creates multiple wave pulses that will interact with each other when they reflect off the sides of the tank.
 - Try tapping the water with the ruler to make a wave with a “long” source. This will have the effect of making the waves closer to 1-dimensional (flat waves instead of arcs), which makes the interference easier to see.
 - Notice when two dark parts of waves hit each other they add together and become darker. This is called *constructive interference*.
 - Notice when a dark part hits a light part how they add together to look like they cancel out. This is called *destructive interference*.
 - Try tapping in two different locations at once to create multiple waves. These waves will interfere in predictable ways.
 - Diffraction: The bending of waves around corners and through openings.
 - Place a hard object with a corner in the tank. Tap the water with the ruler or your finger and see what the wave looks like as it passes by the corner. It will bend around the corner and the wave will travel in a new direction.
 - Try placing two hard objects in the water about a centimeter apart to create an opening for the wave to travel through. As it passes through, it will look like the wave’s source was that opening instead of where you tapped.

TIPS

- The video playlist in the Resources section demonstrates these properties with a ripple tank to help guide your exploration.
- Light waves have these same properties. The ripple tank helps make the properties interactive, whereas light waves are harder to work with outside of labs.