

# Ocean Commotion Activity: Wave Machine

**Lesson Objective:** Students will construct a model to study wave motion.

**Grade Level:** Grades 1-8, group activity OR make one yourself for use as a demonstration tool.

## Materials per group:

89 craft sticks (4.5" long)  
White glue  
Ruler  
Strong sewing thread  
Tape

## Procedure:

1. Line up 89 craft sticks on a flat, level surface. Sticks should be touching one another. Total length is equal to about 35 inches.
2. On the first and last sticks draw a pencil line 1.75" from each end.
3. Cut two pieces of sewing thread about 54" long.
4. Place one piece of string perpendicular to the line of sticks, crossing over the pencil line of the first and last stick. The string should stretch about 8" beyond each end of the first and last stick. Repeat this procedure for the other piece of string.
5. Tape the string at each end of the row of sticks so that the string is taut across all the sticks.
6. Place a large drop of white glue where the string touches the first stick. The drop should be about  $\frac{1}{4}$ " in diameter and not spill over the sides of the stick. Repeat this procedure for the 2<sup>nd</sup> string on the other side of the first stick.
7. Repeat the procedure in Step 6 for every other stick in the line. The sticks that you are not gluing are "spacer" sticks.
8. Allow the glue to dry for 24 hours. Glue drops will shrink as they dry.
9. Remove the tape from each end of the row of sticks. Tie the two ends of the string that extend beyond the end of stick #1 together. Pick up the row of sticks by holding the tied strings. Every other stick should lift up from the surface, leaving the "spacer" sticks on the table.
10. Hang the wave machine from the ceiling so that it can be easily touched at the top or bottom. Gently tap the top stick and watch the wave travel down the system. Tap a stick near the center of the system and watch the wave travel to both ends.

**Assessment:** Have students draw and label the parts of a wave: trough, crest, height, wavelength, and frequency.

## Notes:

- Students could initiate a wave by touching a stick with different levels of force and observe the varying amounts of time for the wave to travel down the system.
- Sticks could be painted before starting assembly to make a more colorful and attractive display.
- There are several ways to vary the system, such as changing the number of sticks and changing the distance between the parallel sticks (using two spacer sticks instead of one, for instance). Different student groups could decide on what they like best. Have students notice changes in wave movement in these various systems.
- To personalize this project, the students can each write their name on a stick to represent that what happens to one student affects the entire class.



## **Louisiana Student Standards for Science Alignment:**

Waves and their applications:

Grades 1-5:

1-PS4-1 1-PS-4 3-PS2-1 3-PS2-2 4-PS3-1

Students can use the wave machine to investigate how waves travel and how the relationship of energy applied to the system determines characteristics of waves.

Waves and their applications in technologies for information transfer:

Grades 6-8:

6-MS-PS4-1 6-MS-PS4-2 8-MS-PS3-5

Students can use the wave machine to demonstrate simple waves. Wave amplitude can be shown to be related to the energy of a wave.

Waves and their applications:

High school:

HS-PS4-1

Students can use the wave machine to describe the relationships among frequency, wavelength, energy, amplitude, and speed of waves in different materials.

