

Safety



Materials

water tank
water source
block of wood
permanent marker
ruler/meter stick
lamp
towels
stopwatch
colored paper

A tsunami, also known as a tidal wave or seismic sea wave, is a series of waves caused by any large, abrupt displacement of the sea surface. The word tsunami is a Japanese word where *tsu* means harbor and *nami* means wave. While normal ocean waves are generated by wind or tides, tsunamis are most commonly generated by earthquakes in marine and coastal regions. When an earthquake moves a portion of Earth's crust, the water above it is displaced. When gravity pulls this water back towards its equilibrium state, it generates a wave with a very long wavelength that can travel great distances. Since 1946, a tsunami warning system has been monitoring earthquake activity in the hopes of predicting tsunamis. This system gives a good estimate for potential tsunami generation, but it does not give any definitive information about the actual tsunami once it is generated. Tsunamis typically only affect coastal areas, but their impact can be extremely destructive. In this activity, you will plan and conduct an investigation to determine the effect that water depth has on wave velocity.

Question

How does wave velocity depend on water depth?

Objectives

- **Plan and conduct** investigations to determine the effect water depth has on wave velocity.
- **Collect and organize data** on the velocity of water waves in various depths of water.
- **Infer** the impact wave velocity has on the destructive force of the tsunami.

Plan Your Investigation

1. Read the safety information and complete the lab form.
2. List the materials you will need for your investigation.
3. How do you think the velocity of the wave will change depending on the depth of the water? How will you test your hypotheses?
4. Plan out your investigation and write a formal procedure. You should *only test one variable at a time*. Be sure to consider safety hazards, both for equipment and chemicals used in the investigation.
5. Obtain your teacher's written consent for all aspects of your procedures and materials.

DESIGN
YOUR OWN **Investigate Tsunamis** *Continued*

Record the Plan

In the space below, write your experimental procedure and make a sketch of your experimental design.

Data and Observations

Use the space below to record your data and observations. A table is a useful way to organize this information. Illustrations are also a valuable method of recording observations.

Analyze and Conclude

1. How were you able to keep the creation of the wave consistent throughout your various trials?

2. Compare and contrast how you created waves in your investigation and how a tsunami is generated.

3. How did you determine the velocity of the waves during the experiment?

4. Does the wave velocity increase or decrease with increasing water depth?

5. How does the velocity of the tsunami wave influence the impact it will have on a coastal area?

DESIGN
YOUR OWN **Investigate Tsunamis** *Continued*

Extension

1. The ocean floor is not flat and smooth. Use materials to create a more accurate representation of the sea floor to determine the effect an uneven surface has on the wave velocity. Are lower or higher water depths more affected by an uneven surface?
