STEM Sims™

Surf's Up

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Do you need an idea for a scientific study?
Try out one of our ideas or make one of your own.

Ocean waves can be used for fun or can destroy things, such as the houses along a shoreline. Take the following brief quiz to see how much you already know about ocean waves. See the bottom of page 4 to check your answers.

1. What is the height of the tallest ocean waves ever recorded?
   a. 20 feet
   b. 40 feet
   c. 80 feet
   d. 100 feet

2. What is the height of the tallest ocean wave ever successfully surfed by a person?
   a. 18 feet
   b. 58 feet
   c. 87 feet
   d. 99 feet

3. What is the speed of the fastest ocean wave ever recorded?
   a. 100 mph
   b. 250 mph
   c. 420 mph
   d. 500 mph

4. If a wave with an amplitude of 2.0 meters has energy of 4 joules, how much energy would a similar wave with the same wavelength have with an amplitude of 4.0 meters?
   a. 4 joules
   b. 8 joules
   c. 16 joules
   d. 56 joules

5. In which location was the world's first wave farm that uses water wave energy and converts that energy into electrical energy?
   a. United States
   b. Portugal
   c. Ireland
   d. Spain

Wave Making

During storms and hurricanes large waves are produced that can damage beach areas. But what is the cause of these waves? Get started now with this investigation of water waves.

Materials Required
1- large flat baking pan
1- 3-speed electric fan
water

Procedure

1. Make sure to get permission before completing this activity.
2. Make sure that the electric fan or cord does not come in contact with any water.
3. Place the large flat baking pan on a stable surface like a countertop.
4. Add water to the baking pan until the pan is about 3/4 filled.
5. Place the fan about 1 foot away from the baking pan so the fan blows air over the top of the pan.
6. Plug in the fan and turn the fan on to the *lowest* speed setting.
7. Observe and record in Table 1 the waves in the pan.
8. Turn the fan up to the *middle* speed setting.
9. Observe and record in Table 1 the waves in the pan.
10. Turn the fan up to the *highest* speed setting.
11. Observe and record in Table 1 the waves in the pan.
12. Turn off and unplug the fan.
13. Carefully move the water in the pan to the sink and dump the water in the sink.
14. Clean up any spilled water.

Table 1. Observations of the Waves

Fan Setting	Observations of Waves
Lowest	
Middle	
Highest	

Questions

1. What was the electric fan providing in this experiment?

2. What wave property or properties changed with the different fan speeds?

3. Explain how your answer to the previous question would affect the energy of the waves.

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Do the Wave!

If you ever attended a sports or concert event in a large stadium you might have seen the people in the stadium get together to create a wave that moves around the stadium as people in each section stand up briefly and throw their arms up above their heads. As the people in the next section stand and cheer, the wave is passed around the stadium and eventually returns to the original section that first stood and cheered. This wave cheer provides a terrific way to study the nature of waves.

First, for the wave to get started something must happen. The section of people that first stand up and cheer are known as the disturbance to the medium. The medium in this case is all the people sitting in the stadium. As the first of people sit down and the adjoining section of people stand up and cheer, the wave is passed through the medium. If there are no people in a section of the stadium, there is no medium to help transfer the wave to the next section and the wave quickly dies.

Another big idea illustrated by a stadium wave is that the particles of the medium (the people sitting in the stadium) are not moved along the same line as the wave is moving. The people move up and down, yet the wave moves horizontally around the stadium. The disturbance is moved through the stadium without the people moving from seat to seat. This is like how a water wave moves the water particles up and down, but not along the same line as the wave is moving. So, the next time you're at an event in a stadium and the wave starts moving around, think about the connection between water waves and stadium waves.

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Answers: Page 2 Answers: 1) d, 2) c, 3) d, 4) c, 5) b. **Page 3 Answers:** Wave Making 1) A disturbance to the water (medium). 2) The wave speed increased with increasing wind speed from the fan. 3) The energy of the waves should also increase because they have more kinetic energy due to their increased speed.