

Surfing the Waves Activity Sheet

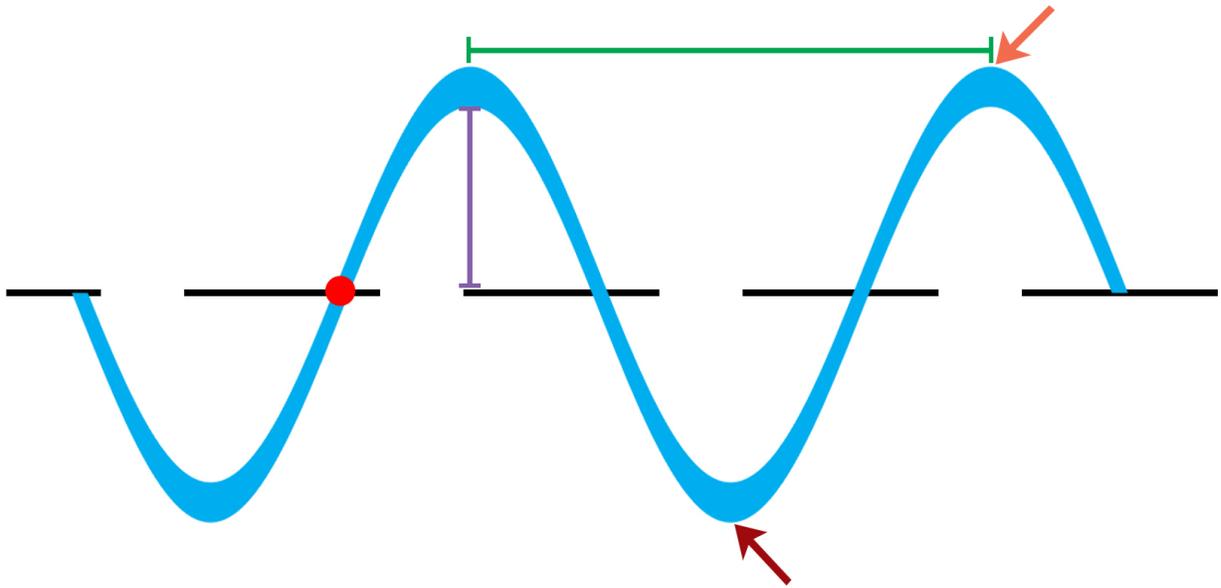
Name: _____

Date: _____

Part A: Make Rope Waves

1. Gather your materials to make rope waves!
 - a. Tape, long rope or extension cord (about 12 feet of each).
2. Tape a long straight line on the floor to represent the rope without movement. This tape line should be about the same length as your wave model rope (about 12 feet).
(Note: You can tape it as a dotted line to conserve tape.)
3. Line up your rope or extension cord on the taped line and have one person sit at each end.
4. Place a piece of tape around the rope (at about the half-way mark). The tape represents a single particle.
5. Have one person hold their end still, while the other person moves their hand side to side, **against the ground**, to make waves.
6. Practice making waves:
 - a. Take turns making waves from either side!
 - b. Try moving the rope faster. Then, try moving the rope slower.
 - c. Try moving your arm in wider strokes on the ground. Then, try moving the rope in narrower strokes on the ground.
7. Use your best practice technique to make a wave with your rope. Stop the motion so that the rope stays in its wave shape.
8. Describe the shape of the wave. Write or draw your observations.
9. Label your wave diagram on page 2.



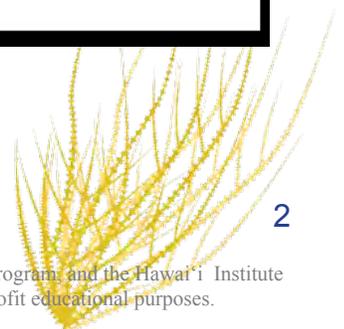


Label your wave diagram with the vocabulary below:

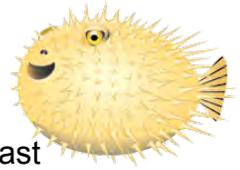
- Crest:** the top of the wave
- Trough:** the bottom of the wave
- Amplitude:** The distance from crest of the wave to the still-water level. Some people refer to amplitude as "from crest to rest."
- Wavelength:** the distance from one wave crest to the next.

Draw your own arrows to represent:

- Where the **disturbance** occurred to make waves (i.e. which side of your rope did you move).
- The direction of **energy flow** from that disturbance.
- The **direction of the motion of an object** (represented by the red dot).



Part B. Make Water Waves



1. Before building your wave tank model to explore ocean waves, think about the last time you were at the beach (or watch waves from an internet beach camera) and answer these questions:

a. What did the waves look like? Describe.

b. How big were the waves?

i. What is the term that scientists use to describe wave height?

c. Were the waves close together or were they far apart?

i. What is the term that scientists use to describe the distance between waves?

2. Now practice making waves in your wave tank!

3. Fill your wave tank about halfway with water. Make sure there isn't too much water that will spill over the sides!

4. Conduct your trials.

Trial #1: Blowing

a. Using a straw, blow across the water. If you don't have a straw, you can use your breath.

b. Describe what you see.

c. Play with making different waves by blowing in different directions or with varying strength.



Trial #2: Tilting



- a. Gently lift one side of the bucket up a few inches and lower it back down to the table.
- b. Describe what you see.

- c. Did your wave have a large or small amplitude compared to trial #1?

- d. Did your wave have a long or short wavelength compared to trial #1?

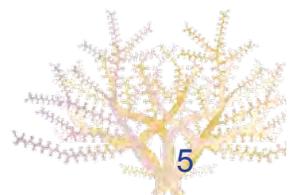
- e. Play around with making different waves and see if you can create repeating patterns in the wave energy. (*Hint: lift the bucket a little higher, or lift it twice in a row. Be careful not to spill water out of the bucket!*)

Trial #3: Add an object

- a. Add your floating object on one side of the bucket.
 - b. Make waves by blowing as you did in trial #1. Be sure not to blow directly on the object, but instead keep it directed at the water!
 - c. What happened to your object? How did it move?

 - d. Make waves by tilting, as you did in trial #2.
 - e. What happened to your object? How did it move?

 - f. See if you can get your object to move to the other side of the container.
5. Can you see the similarities in the waves you made with the rope with the waves in your wave tank?





Activity Questions

Name: _____

1. Describe the general motion of the waves you created.
2. How did the waves change in amplitude and wavelength when you:
 - a. Blew harder?
 - b. Tilted the bucket higher?
3. What would be different if you had a longer tank?



4. How were your waves similar to ocean waves breaking on the shore? How were they different?
5. What happened to the floating object when you made waves?
6. Did your object catch and move forward on every wave you made? If not, in what directions did the object move on the waves it did not ride?
7. How is the motion of your floating object similar and different from a surfer waiting to catch a wave in real life?

