Name: _____

Class Period: _____

Date: _____

INTRODUCTION TO OCEAN WAVES: TRANSFER OF ENERGY FROM WIND TO WAVES

OBJECTIVE

The objective of this activity is to introduce students to basic terminology used in reference to periodic waves and to give students an understanding of how wind energy is transferred into wave energy. This activity also introduces the effects of water depth on waves.

PROCEDURE

1. Fill a Pyrex pan, large cookie sheet, aquarium, or other container with water until the water comes about halfway up the sides of the container.
2. Create waves by one of the following processes: (a) blow across the surface of the water; (b) use a hair dryer set at a low setting (harder to vary the velocity) to blow across the surface of the water; (c) use a block of wood tied to a piece of string, and raise it up and down in the water; or (d) insert a thin board into the water and move it back and forth like a paddle. If you are using a hair dryer: BE CAREFUL NOT TO GET THE HAIRDRYER WET OR RISK ELECTRIC SHOCK!!
3. Place a float (cork) in the middle of the pan. Observe how the float responds to the waves you are creating. Try to keep the wave period consistent.
4. Using a stopwatch, measure the wave period. Make a mark on the side of the pan with the marker or a piece of tape. As the crest of a wave passes your point, count that as zero and start your stopwatch. The next wave is wave number one. When the 10^{th} wave passes your point, stop the watch. Divide the number of seconds by 10 to get the wave period. Because these are waves with small wavelengths, this task may be difficult to do.

   Wave period _____

5. Take a piece of construction paper. Dip it into the water along the side of the pan and remove immediately. You have created a snapshot of the wavefield. Lay the paper on the desk and with a marker trace the contact between the wet and dry paper. Either now or once the paper dries measure wave height and wavelength.

   Wave height _____

   Wavelength _____

6. Vary the speed of your "wind." Again measure wave height, wavelength, and wave period.

   Wave height _____

   Wavelength _____

   Wave period _____

7. Remove the water from the pan. Now mold some clay to represent depth changes in the ocean floor. Try something simple like a wedge to represent the continental margin. Place the clay into one end of the pan. If you have access to sand, dirt, or gravel, you may want to use that instead. Create a beach face at one end of the pan. Repeat steps 3–5.

   Wave height _____

   Wavelength _____

   Wave period _____

QUESTIONS

1. Were the waves shorter or taller as the wind speed increased?

2. Were your waves shallow- or deep-water waves before you added the wedge/margin?

3. What effect did the wedge/margin have on the waves' height and wavelength?

4. What effect do tropical storms and hurricanes have on waves? Imagine that a hurricane is making landfall on the Texas coast. Would the effect of the wind be different on one side of the storm's eye versus the other? You may have to do additional research on hurricanes.