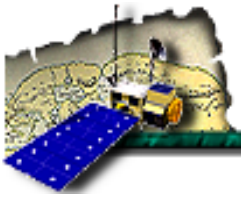


Ocean Wave Characteristics

Ocean waves come in many shapes and sizes. They range in length from a fraction of a centimeter for the smallest ripples to half the circumference of Earth for the tides. They are formed by wind, gravitation, earthquakes, and submarine landslides disturbing the water surface. Once formed, and regardless of origin, ocean waves can travel great distances before reaching the coast. The ocean waves arriving at the shore today may have had their beginnings many hours or even days earlier a hemisphere away.

Objectives:

After completing this activity, you should be able to:

- Describe the major characteristics of ocean waves.
- Identify the three factors that generate most ocean waves.

Investigations:

1. Ocean waves have characteristics that can be measured and used to describe each wave. Among the most useful of these are wave height and wavelength. Wave height is the vertical distance between wave crest (the highest point of each wave) and wave trough (the lowest point of each wave). Wavelength is the horizontal distance between any two successive wave crests (or wave troughs). Refer to the Wave Characteristics Diagram and circle the letter below which indicates each of the following wave characteristics:

   wavelength *(A) (B) (C) (D)*
   wave height *(A) (B) (C) (D)*
   wave crest *(A) (B) (C) (D)*
   wave trough *(A) (B) (C) (D)*

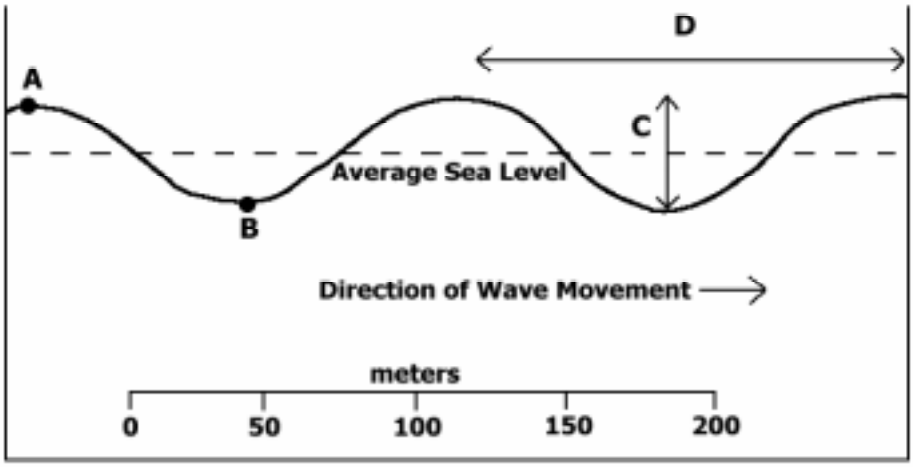
2. Using the scale at the base of the diagram, measure the wavelength of the wind-generated wave in the diagram and record it in the Wave Characteristics Table in the column labeled “Wind.”
3. Ocean waves are also described in terms of wave period. This is the time required for two successive crests (one wavelength) to pass a fixed point. On the ocean, it may be easier and more accurate to record how long it takes ten waves to pass and then divide by ten to obtain the average period. If it takes 100 seconds for 10 of the above wind-generated waves to pass, determine the period and record it in the table.
4. An ocean wave is also characterized by wave speed, or the distance it travels divided by the time it takes to travel that distance. Having already determined the time it takes the above wind-generated wave to travel a distance of one wavelength (the wave period), determine the wave speed by dividing the wavelength by the wave period. Record the wave speed and circle the generating factor in the table.
5. Tides can be thought of as global-scale ocean waves generated by gravitational attraction of the Moon and Sun. High tide is the crest of the wave and low tide the trough. Where two high tides occur each day, the wave period is about 12.5 hours. If the wavelength is about 20,000 km (half the circumference of Earth), determine the wave speed as above and record all three wave characteristics and circle the generating factor in the table.

6. Tsunamis, sometimes erroneously called tidal waves, are ocean waves generated by earthquakes and submarine landslides. They have a period of about 0.5 hour and a wavelength of about 200 km. Again, determine the wave speed as above and record all three characteristics and circle the generating factor in the table.
7. Although the speed of a tsunami is influenced by its interaction with the ocean bottom, using the speed you calculated, it would take about (one hour) (ten hours) (1 day) for a tsunami triggered by a coastal earthquake in Alaska to travel to Hawaii (a distance of 4,000 km).
8. From what you have learned about the factors that generate ocean waves, why is the term "tidal wave" not an accurate term when referring to a tsunami?

SOURCE

The Maury Project, American Meteorological Society

Wave Characteristics Diagram



Wave Characteristics Table

Wave Type	Wind	Tide	Tsunami
Wavelength	(m)	(km)	(km)
Wave Period	(sec)	(hr)	(hr)
Wave Speed	(m/sec)	(km/hr)	(km/hr)
Generated by (circle one)	wind earthquake gravitation	wind earthquake gravitation	wind earthquake gravitation