

Read the General Rules in the manuals and on www.soinc.org as they apply to every event.

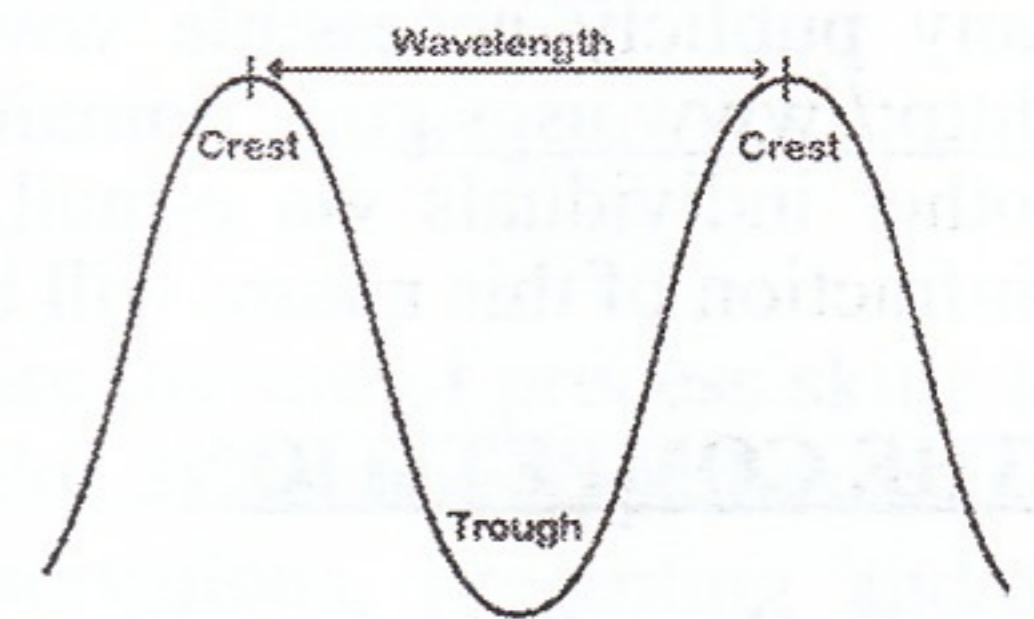
1. **DESCRIPTION:** Students will solve problems and answer questions regarding waves and wave motion.

A TEAM OF UP TO: 2

APPROXIMATE TIME: 50 minutes

2. **EVENT PARAMETERS:** Teams may bring only the following resources. Each team may bring one 3-ring binder (any size) containing information in any form from any source. The materials must be 3-hole punched and inserted into the rings (sheet protectors are allowed). Each participant may bring one non-graphing, non-programmable scientific calculator.

3. **THE COMPETITION:** Students will be presented with questions and hands-on tasks at stations that may require them to: draw and label diagrams, demonstrate knowledge of introductory concepts, record observations, make predictions, interpret data, generate inferences, solve problems, formulate and evaluate hypotheses. Tests will include all topics. Topics will include questions or activities from the following areas:



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|---------------------------------|---|
| a. General Wave Characteristics | Wavelength, amplitude, frequency, and period. |
| b. Wave Types | Transverse, longitudinal, surface, torsional waves. |
| c. Wave Phenomenon | Sound & Light: reflection, standing waves, constructive and destructive interference, refraction, effect of media, diffraction, Doppler Effect. |
| d. Electromagnetic Waves | Electromagnetic spectrum, relationship between frequency and wavelength, wave energy, standard wavelength bands, their uses and dangers, and how waves are used in communication. |
| e. Spectroscopy | The Physics of primary colors of light, reflection, refraction and use with filters. Absorption and emission spectra and their use in astronomy. The Physics of primary colors of pigments. |
| f. Earthquake/Seismic Waves | P/S-waves, Rayleigh waves, Love waves, surface waves. |
| g. Boundary Effects | Breaking ocean waves, Tsunamis. |

4. **SAMPLE ACTIVITIES:**

- a. Label the parts of a wave, determine frequency, amplitude, period or wavelength of a wave.
- b. Determine the angle of refraction of a prism.
- c. Measure and label the angle of incidence, the angle of reflection and the normal on a mirror.
- d. Listen to a recording and determine whether a vehicle is moving towards or away from you.
- e. Given pictures of items or places identify the type of light used to take these pictures.
- f. Given papers with colored circles and a flashlight hidden inside a black box, determine the color of the filter over the flashlight.
- g. Using a recording of two vehicles determine which one is moving faster.
- h. Given graphs of two waves draw the resulting wave (interference).
- i. Given p-wave and s-wave diagrams determine the distance to the epicenter; label and describe the action of a breaking wave and the environmental impact when these waves increase during storm surges.

5. **SCORING:** Points will be awarded for the accuracy and quality of the responses. Ties will be broken using pre-selected questions.