Critical Thinking Items

17.1 Understanding Diffraction and Interference 6.

Describe a situation in which bodies of water and a line of rocks could create a diffraction pattern similar to light passing through double slits. Include the arrangement of the rocks, the positions of the bodies of water, and the location of the diffraction pattern. Note the dimensions that are necessary for the production of the pattern.

a. When waves from a small body of water pass through two widely separated openings and enter a larger body of water, a diffraction pattern is produced that is similar tothe diffraction pattern formed by light passing through two slits. The width of each opening is larger than the size of the wavelength of the waves.
b. When waves from a large body of water pass through two narrow openings and enter a smaller body of water, a diffraction pattern is produced that is similar to the diffraction pattern formed by light passing through two slits. The widths and separation of the openings are similar to the size of the wavelength of the waves.
c. When waves from a small body of water pass through two wide openings and enter a larger body of water, a diffraction pattern is produced that is similar tothe diffraction pattern formed by light passing through two slits. The separation between the openings is similar to the size of the wavelength of the waves.
d. When waves from a large body of water pass through two wide openings and enter a smaller body of water, a diffraction pattern is produced that is similar to the diffraction pattern formed by light passing through two slits. The widths and separation of the openings are larger than the size of the wavelength of the waves.

17.2 Applications of Diffraction, Interference, and Coherence 7.

For what type of electromagnetic radiation would a grating with spacing greater than 800 nm be useful as a spectroscopic tool?

a. It can be used to analyze spectra only in the infrared portion of the spectrum.
b. It can be used to analyze spectra in the entire visible portion of the electromagnetic spectrum.
c. It can only be used to analyze spectra in the short-wavelength visible.
d. It can only be used to analyze spectra in the short-wavelength visible and ultraviolet.

8.

A beam of green light has a wavelength of 500\,\text{nm} in a vacuum and a wavelength of 331\,\text{nm} in Plexiglas. What is the refractive index of Plexiglas?

a. 1.12
b. 1.25
c. 1.51
d. 4.53