Problems

17.1 Understanding Diffraction and Interference 9.

What is the distance between two slits that produce a diffraction pattern with the first minimum at an angle of 45.0° when 410-nm violet light passes through the slits?

a. 2,030 nm
b. 1,450 nm
c. 410 nm
d. 290 nm

10.

A breakwater at the entrance to a harbor consists of a rock barrier with a 50.0 − m -wide opening. Ocean waves with a 20.0-m wavelength approach the opening straight on. At what angle to the incident direction are the boats inside the harbor most protected against wave action?

a. 11.5°
b. 7.46°
c. 5.74°
d. 23.6°

17.2 Applications of Diffraction, Interference, and Coherence 11.

A 500-nm beam of light passing through a diffraction grating creates its second band of constructive interference at an angle of 1.50°. How far apart are the slits in the grating?

a. 38,200 nm
b. 19,100 nm
c. 667 nm
d. 333 nm

12.

The range of the visible-light spectrum is 380 nm to 780 nm. What is the maximum number of lines per centimeter a diffraction grating can have and produce a complete first-order spectrum for visible light?

a. 26,300 lines/cm
b. 13,200 lines/cm
c. 6,410 lines/cm
d. 12,820 lines/cm