Short Answer

17.1 Understanding Diffraction and Interference 21.

Light passing through double slits creates a diffraction pattern. How would the spacing of the bands in the pattern change if the slits were closer together?

a. The bands would be closer together.
b. The bands would spread farther apart.
c. The bands would remain stationary.
d. The bands would fade and eventually disappear.

22.

A beam of light passes through a single slit to create a diffraction pattern. How will the spacing of the bands in the pattern change if the width of the slit is increased?

a. The width of the spaces between the bands will remain the same.
b. The width of the spaces between the bands will increase.
c. The width of the spaces between the bands will decrease.
d. The width of the spaces between the bands will first decrease and then increase.

23.

What is the wavelength of light falling on double slits separated by 2.00\,\mu\text{m} if the third-order maximum is at an angle of 60.0^{\circ}?

a. 667\,\text{nm}
b. 471\,\text{nm}
c. 333\,\text{nm}
d. 577\,\text{nm}

24.

What is the longest wavelength of light passing through a single slit of width 1.20 m for which there is a first-order minimum?

a. 1.04 µm
b. 0.849 µm
c. 0.600 µm
d. 2.40 µm

17.2 Applications of Diffraction, Interference, and Coherence 25.

Describe a diffraction grating and the interference pattern it produces.

a. A diffraction grating is a large collection of evenly spaced parallel lines that produces an interference pattern that is similar to but sharper and better dispersed than that of a double slit.

b. A diffraction grating is a large collection of randomly spaced parallel lines that produces an interference pattern that is similar to but less sharp or well-dispersed as that of a double slit.
c. A diffraction grating is a large collection of randomly spaced intersecting lines that produces an interference pattern that is similar to but sharper and better dispersed than that of a double slit.
d. A diffraction grating is a large collection of evenly spaced intersecting lines that produces an interference pattern that is similar to but less sharp or well-dispersed as that of a double slit.

26.

Suppose pure-wavelength light falls on a diffraction grating. What happens to the interference pattern if the same light falls on a grating that has more lines per centimeter?

a. The bands will spread farther from the central maximum.
b. The bands will come closer to the central maximum.
c. The bands will not spread farther from the first maximum.
d. The bands will come closer to the first maximum.

27.

How many lines per centimeter are there on a diffraction grating that gives a first-order maximum for 473 nm blue light at an angle of 25.0°?

a. 529,000 lines/cm
b. 50,000 lines/cm
c. 851 lines/cm
d. 8,934 lines/cm

28.

What is the distance between lines on a diffraction grating that produces a second-order maximum for 760-nm red light at an angle of 60.0°?

a. 2.28×10^4 nm
b. 3.29×10^2 nm
c. 2.53×10^1 nm
d. 1.76×10^3 nm