SPH4U Name: Date: .

Diffraction Grating Drills

1 Monochromatic yellow light of wavelength 574 nm is passed through a diffraction grating with 6647 slits per cm and creates a first-order bright fringe 1.30 m from the central maximum. How far away from the diffraction grating is the screen?

2 Monochromatic red light of wavelength 715 nm is passed through a diffraction grating with 9586 slits per cm onto a screen 9.62 m away. What angle does the first-order minimum make with the central maximum?

3 Monochromatic red light of wavelength 657 nm is passed through a diffraction grating with 9658 slits per cm onto a screen 10.02 m away. How far away from the central maximum is the second-order nodal line?

4 Monochromatic orange light of wavelength 592 nm is passed through a diffraction grating onto a screen 6.7 m away, creating a first-order nodal line 1.78 m from the central maximum. How many slits per cm does the grating have?

5 Monochromatic red light of wavelength 655 nm is passed through a diffraction grating with 4909 slits per cm onto a screen 7.62 m away. What order minimum is 11.0 m from the central maximum?

6 Monochromatic light is passed through a diffraction grating with 9080 slits per cm onto a screen 1.54 m away, creating a fifth-order minimum 2.98 m from the central maximum. What colour is the light?

7 Monochromatic blue light of wavelength 460 nm is passed through a diffraction grating with 7249 slits per cm onto a screen 6.14 m away. What order minimum is 1.02 m from the central maximum?

8 Monochromatic yellow light of wavelength 582 nm is passed through a diffraction grating onto a screen 1.96 m away, creating a second-order nodal line 2.30E-1 m from the central maximum. How many slits per cm does the grating have?

9 Monochromatic yellow light of wavelength 577 nm is passed through a diffraction grating onto a screen 9.19 m away, creating a second-order minimum 2.62 m from the central maximum. How many slits per cm does the grating have?

10 Monochromatic green light of wavelength 517 nm is passed through a diffraction grating with 1023 slits per cm onto a screen 5.92 m away. What is the spacing between the maxima?

Note: 3.4E4 = 3.4 x 10

Answers:

1. The screen is 3.4 m away. 2. The first-order minimum is 1.15E-2 degrees away from the central maximum. 3. The second-order nodal line is 9.54 m away from the central maximum. 4. The diffraction grating has 8993 slits per cm. 5. The fifth-order minimum is 11.0 m away from the central maximum. 6. The light is blue (474 nm). 7. The first-order minimum is 1.02 m away from the central maximum. 8. The diffraction grating has 1342 slits per cm. 9. The diffraction grating has 3296 slits per cm. 10. The maxima are 3.13E-1 m apart.