

Diffraction Grating Drills

- 1 Monochromatic yellow light of wavelength 586 nm is passed through a diffraction grating with 5695 slits per cm onto a screen 8.25 m away. What is the spacing between the nodal lines?
- 2 Monochromatic light is passed through a diffraction grating with 4033 slits per cm onto a screen 5.66 m away, creating a fifth-order bright fringe 8.74×10^{-2} degrees from the central maximum. What colour is the light?
- 3 Monochromatic orange light of wavelength 591 nm is passed through a diffraction grating onto a screen 4.33 m away, creating a fourth-order maximum 7.97 m from the central maximum. How many slits per cm does the grating have?
- 4 Monochromatic violet light of wavelength 404 nm is passed through a diffraction grating with 3400 slits per cm and creates a third-order minimum 1.59 m from the central maximum. How far away from the diffraction grating is the screen?
- 5 Monochromatic violet light of wavelength 409 nm is passed through a diffraction grating with 1920 slits per cm onto a screen 5.97 m away. What is the spacing between the bright fringes?
- 6 Monochromatic violet light of wavelength 415 nm is passed through a diffraction grating with 2440 slits per cm onto a screen 3.65 m away. What angle does the second-order bright fringe make with the central maximum?
- 7 Monochromatic blue light of wavelength 483 nm is passed through a diffraction grating with 8608 slits per cm and creates a pattern with maxima spaced 4.32×10^{-1} m apart. How far away from the diffraction grating is the screen?
- 8 Monochromatic blue light of wavelength 452 nm is passed through a diffraction grating with 8668 slits per cm onto a screen 10.37 m away. How far away from the central maximum is the third-order minimum?
- 9 Monochromatic light is passed through a diffraction grating with 2228 slits per cm onto a screen 7.42 m away, creating a fifth-order bright fringe 3.65 m from the central maximum. What colour is the light?
- 10 Monochromatic violet light of wavelength 438 nm is passed through a diffraction grating with 1319 slits per cm onto a screen 4.4 m away. How far away from the central maximum is the fifth-order minimum?

Note: $3.4 \times 10^4 = 3.4 \times 10^4$

Answers:

1. The nodal lines are 2.75 m apart. 2. The light is blue (467 nm). 3. The diffraction grating has 7782 slits per cm. 4. The screen is 4.64 m away. 5. The bright fringes are 4.69×10^{-1} m apart. 6. The second-order bright fringe is 3.49×10^{-2} degrees away from the central maximum. 7. The screen is 1.04 m away. 8. The third-order minimum is 10.2 m away from the central maximum. 9. The light is violet (441 nm). 10. The fifth-order minimum is 1.14 m away from the central maximum.