

Double & Single Slit & Diffraction Grating Drills

- 1 Monochromatic yellow light of wavelength 580 nm is passed through a single slit of width 0.66 mm onto a screen 5.67 m away. What angle does the fifth-order bright fringe make with the central maximum?
- 2 Monochromatic blue light of wavelength 467 nm is passed through a diffraction grating with 11488 slits per cm onto a screen 1.91 m away. What order nodal line is $5.12\text{E-}1$ m from the central maximum?
- 3 Monochromatic light is passed through a single slit of width 0.386 mm onto a screen 6.42 m away, creating a pattern with minima spaced $1.25\text{E-}2$ m apart. What colour is the light?
- 4 Monochromatic blue light of wavelength 494 nm is passed through a single slit of width 0.507 mm onto a screen 3.12 m away. What is the spacing between the bright fringes?
- 5 Monochromatic light is passed through a single slit of width 0.106 mm onto a screen 9.92 m away, creating a pattern with minima spaced $4.37\text{E-}2$ m apart. What colour is the light?
- 6 Monochromatic violet light of wavelength 414 nm is passed through a diffraction grating onto a screen 7.98 m away, creating a pattern with minima spaced 3.69 m apart. How many slits per cm does the grating have?
- 7 Monochromatic light is passed through a double slit of separation 1.666 mm onto a screen 8.79 m away, creating a second-order bright fringe $5.11\text{E-}3$ m from the central maximum. What colour is the light?
- 8 Monochromatic blue light of wavelength 480 nm is passed through a diffraction grating onto a screen 8.5 m away, creating a pattern with nodal lines spaced 2.74 m apart. How many slits per cm does the grating have?
- 9 Monochromatic violet light of wavelength 439 nm is passed through a double slit of separation 1.99 mm and creates a fifth-order nodal line $8.74\text{E-}2$ degrees from the central maximum. What is the slit separation?
- 10 Monochromatic violet light of wavelength 403 nm is passed through a single slit of width 0.575 mm onto a screen 5.09 m away. What angle does the first-order minimum make with the central maximum?

Note: $3.4\text{E}4 = 3.4 \times 10^4$

Answers:

1. The fifth-order bright fringe is $8.74\text{E-}2$ degrees away from the central maximum. 2. The first-order nodal line is $5.12\text{E-}1$ m away from the central maximum. 3. The light is red (749 nm). 4. The bright fringes are $3.04\text{E-}3$ m apart. 5. The light is blue (467 nm). 6. The diffraction grating has 11167 slits per cm. 7. The light is blue (484 nm). 8. The diffraction grating has 6712 slits per cm. 9. The slits are 1.99 mm apart. 10. The first-order minimum is $1.75\text{E-}2$ degrees away from the central maximum.