

1. Coherent monochromatic light is incident on a slit whose width is 0.0211 mm. The diffraction pattern is viewed on a screen that is placed 3.12 m from the slit. The distance along the screen from the middle of the central maximum to the first dark fringe is 10.1 cm. What is the wavelength of the light?
2. A small circular pinhole of radius 0.125 mm is melted at the very top of an igloo. Sunlight (assume a wavelength of 5.50×10^{-7} m, which is approximately the central wavelength of visible light) streams down through the hole to the floor, which is 1.95 m below the pinhole. What is the diameter of the circular spot of sunlight on the floor? (That is, what is the diameter of the central maximum?)
3. A spy plane flies at a height of 21 km above Earth's surface. If you wanted to equip the plane with a camera that could resolve objects of width 1.0 cm, about enough to make out a license plate number, what diameter aperture would the camera need to have? Assume the light has a wavelength of 550 nm.