

69. (a) From $R = \lambda/\Delta\lambda = Nm$ we find

$$N = \frac{\lambda}{m\Delta\lambda} = \frac{(415.496 \text{ nm} + 415.487 \text{ nm})/2}{2(415.96 \text{ nm} - 415.487 \text{ nm})} = 23100 .$$

(b) We note that $d = (4.0 \times 10^7 \text{ nm})/23100 = 1732 \text{ nm}$. The maxima are found at

$$\theta = \sin^{-1} \left(\frac{m\lambda}{d} \right) = \sin^{-1} \left[\frac{(2)(415.5 \text{ nm})}{1732 \text{ nm}} \right] = 28.7^\circ .$$