

33. (a) $d = 20.0 \text{ mm}/6000 = 0.00333 \text{ mm} = 3.33 \mu\text{m}$.

(b) Let $d \sin \theta = m\lambda$ ($m = 0, \pm 1, \pm 2, \dots$). We find $\theta = 0$ for $m = 0$, and

$$\theta = \sin^{-1}(\pm\lambda/d) = \sin^{-1}\left(\pm\frac{0.589 \mu\text{m}}{3.30 \mu\text{m}}\right) = \pm 10.2^\circ$$

for $m = \pm 1$. Similarly, we find $\pm 20.7^\circ$ for $m = \pm 2$, $\pm 32.2^\circ$ for $m = \pm 3$, $\pm 45^\circ$ for $m = \pm 4$, and $\pm 62.2^\circ$ for $m = \pm 5$. Since $|m|\lambda/d > 1$ for $|m| \geq 6$, these are all the maxima.