22.29. Model: Two closely spaced slits produce a double-slit interference pattern with the intensity graph looking like Fig. 22.3(b). The intensity pattern due to a single slit diffraction looks like Figure 22.14. Both the spectra consist of a central maximum flanked by a series of secondary maxima and dark fringes.

Solve: **(a)** The light intensity shown in Figure P22.29 corresponds to a single slit aperture. This is because the central maximum is twice the width and much brighter than the secondary maximum.

(b) From Figure P22.29, the separation between the central maximum and the first minimum is $y_1 = 1.0 \text{ cm} = 1.0 \times 10^{-2} \text{ m}$. Therefore, using the small-angle approximation, Equation 22.21 gives the condition for the dark minimum:

$$y_p = \frac{pL\lambda}{d} \Rightarrow a = \frac{L\lambda}{y_1} = \frac{(2.5 \text{ m})(600 \times 10^{-9} \text{ m})}{1.0 \times 10^{-2} \text{ m}} = 0.15 \text{ mm}$$