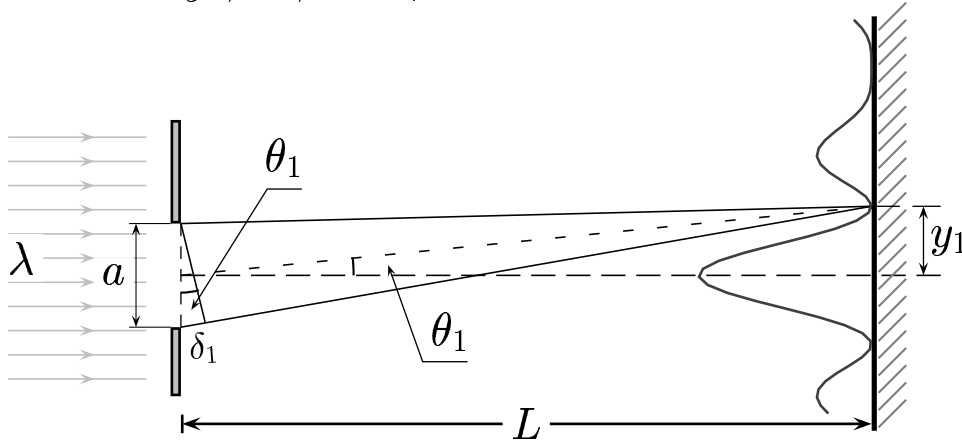


Consider a single slit experiment. At first minimum the quantities shown in the sketch are  $y_1$ ,  $\delta_1$ , and  $\beta_1 = k \delta_1$ .



Find  $\beta$  at  $y = \frac{y_1}{6}$ .

- A)  $\beta = \frac{\pi}{6}$ .
- B)  $\beta = \frac{\pi}{5}$ .
- C)  $\beta = \frac{\pi}{4}$ .
- D)  $\beta = \frac{\pi}{3}$ .

$\beta = k \delta$ . Assume small angle approximation:  $\theta \approx \frac{\delta}{a} \approx \frac{y}{L}$ .  $\beta = k \delta = k \frac{a y}{L} = \frac{k a y_1}{6 L}$ . At the first minimum:  $\beta_1 = 2 \pi = \frac{k a y_1}{L}$ . So  $\beta = \frac{\beta_1}{6} = \frac{\pi}{3}$ .

Answer **D**.