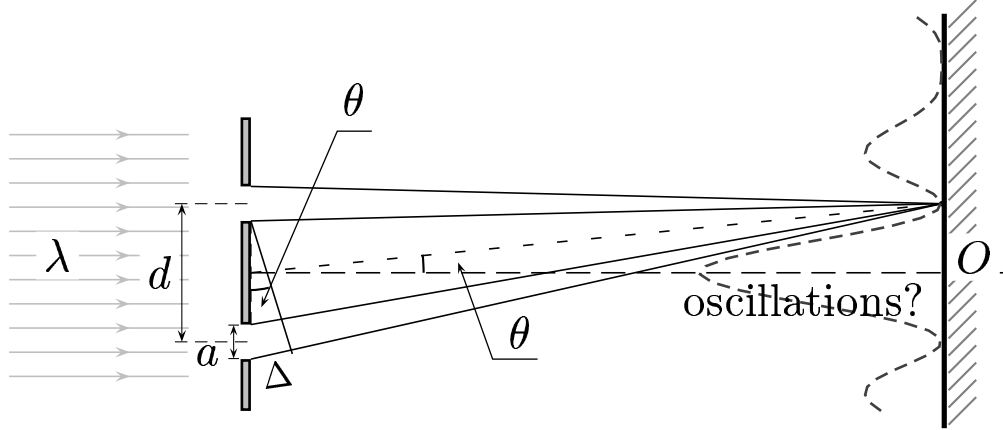


For the double-slits-finite-width setup: “ d ” is slit-distance, “ a ” slit-width. Incident light has a wavelength λ . Denote $\phi = k \Delta = k d \theta$ and

$\beta = k a \theta$. The intensity is given by: $\frac{I(\phi, \beta)}{I(0, 0)} = \cos^2 \frac{\phi}{2} \left[\frac{\sin \frac{\beta}{2}}{\frac{\beta}{2}} \right]^2$. Here the

“double-slit ϕ -pattern” oscillates within the “single-slit β -pattern”, while the latter serves as an envelope (dotted distribution above).



If the $d = 6 a$, number of zeros within the dotted central peak is:

- A) 6
- C) 10

- B) 8
- D) 12

First minimum of single-slit is at $\beta = 2\pi$, or $\theta_1^s = \frac{2\pi}{ka} = \frac{\lambda}{a}$, that of

double-slit is at $\phi = \pi$, or $\theta_1^d = \frac{\pi}{kd} = \frac{\lambda}{2d}$. For $d = 6a$, $\theta_1^d = \frac{1}{12a} = \frac{\theta_1^s}{12}$. For

double slits, zeros are at: $\phi = [1, 3, \dots, 11]\pi$, or $\theta = \pm[\frac{1}{12}, \dots, \frac{11}{12}]\theta_1^s$. There

are 12(= 2×6) zeros within central peak.

Answer D.

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