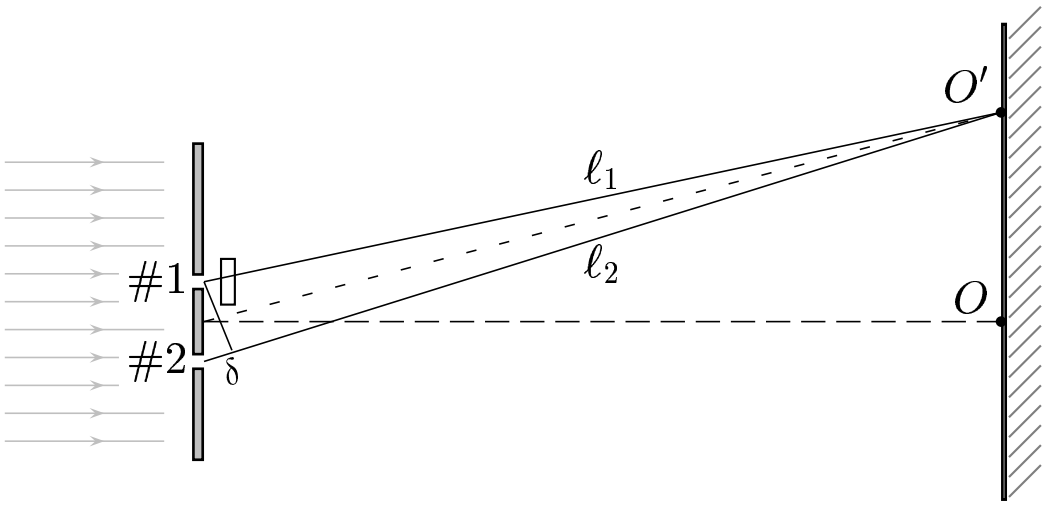
Consider the double slit experiment, where slit #1 is covered by a plastic with thickness t and index of refraction n. O' is where the phase difference of two rays shown is zero.



Given the extra phase due to the passage of the plastic

$$\phi_{med} = k\,t\,(n-1) = 4.8\,\pi.$$

Determine δ.

A) $\delta = 1.2\,\lambda$
B) $\delta = 2.4\,\lambda$
C) $\delta = 4.8\,\lambda$

$$k = \frac{2\,\pi}{\lambda} \quad \Rightarrow \quad \phi = k\,\ell_2 - (k\,\ell_1 + \phi_{med}) = k\,\delta - \phi_{med}.$$

From the given, $\phi = k\,\delta - \phi_{med} = 0$. This allows us to solve for δ, which leads to

$$\delta = \frac{\phi_{med}\,\lambda}{2\,\pi} = 2.4\,\lambda.$$

Answer **B**.

37.03-02˙Double˙Slits˙and˙Plastic˙sheet 2005-12-14