17/4/21
Suleta Sinha

$$T = \frac{2Dc}{c^2 - v^2}$$

The total distance traveled by the light in this time T is

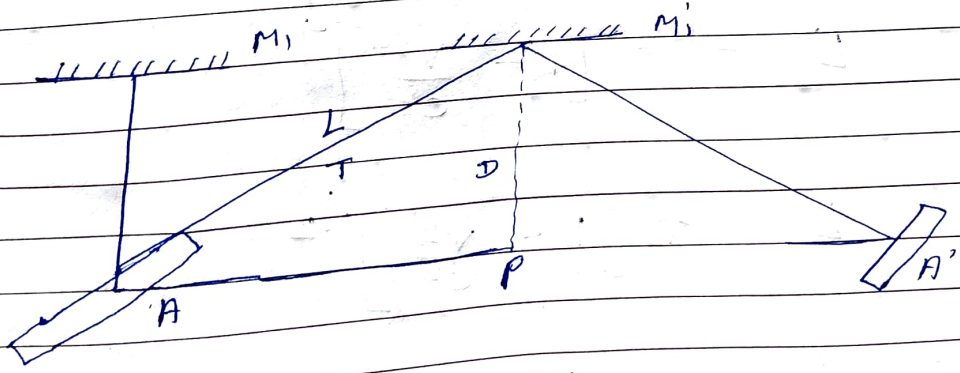
$$x_1 = Tc = \frac{2Dc^2}{c^2 - v^2}$$

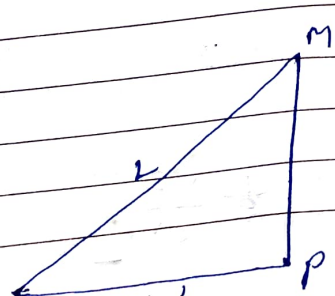
$$x_1 = 2D\left[1 - \frac{v^2}{c^2}\right]^{-1}$$

Semplifying we get

$$x_1 = 2D\left[1 + \frac{v^2}{c^2}\right]$$

For B, part of the light the geometrical arrangement of the moving plate A and mirror M_1 is shown below in fig. Here mirror M_1 is shifted to M_1' and the plate A is shifted to P in time





Here

$$AP = VT'$$

But $T' = \frac{L}{c}$

so $AP = V\left(\frac{L}{c}\right)$

From $\Delta APM_1'$ we have $(AM_1')^2 = (M_1'P)^2 + (AP)^2$

$$L^2 = D^2 + \left(\frac{VL}{c}\right)^2$$

$$L^2 - \frac{V^2L^2}{c^2} = D^2$$

$$L^2\left[1 - \frac{V^2}{c^2}\right] = D^2$$

$$L^2 = \frac{D^2}{\left[1 - \frac{V^2}{c^2}\right]}$$

$$L^2 = D^2\left[1 - \frac{V^2}{c^2}\right]^{-1}$$

$$L = D\left[1 - \frac{V^2}{c^2}\right]^{-1/2}$$

Simplifying we get

$$L = D\left[1 + \frac{1}{2}\frac{V^2}{c^2}\right]$$