Q 05

Two stars are 10 light years away from the earth. They are seen through a telescope of objective diameter 30 cm. The wavelength of light is 600 nm. To see the stars just resolved by the telescope, the minimum distance between them should be (1 light year = 9.46×10^{15} m) of the order of :

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(a) 10^8 km (b) 10^{10} km (c) 10^{11} km (d) 10^6 km

ANS

(a) We know that $\Delta\theta = \frac{0.61\lambda}{4} = \frac{l}{R}$

The minimum distance between them

$$l = \frac{R}{9} 0.61 \times \lambda = \frac{9.46 \times 10^{15} \times 10 \times 0.61 \times 600 \times 10^{-9}}{0.3}$$

$\therefore 1.15 \times 10^{11}$ m

$\Rightarrow 1.115 \times 10^8$ km.