$\lambda_{Bl} = 400 \text{ nm} = 400 \times 10^{-9} \text{ m}$
$\lambda_{Red} = 700 \text{ nm} = 700 \times 10^{-4} \text{ m}$

$\Delta x_2 = 1.75 \text{ cm} = .0175 \text{ m}$

$d = \dfrac{1}{2750 \text{ lines/cm}} = 3.\overline{63} \times 10^{-4} \text{ cm} = 3.\overline{63} \times 10^{-6} \text{ m}$

Avoid small θ approx!

$m = 2$ for 2nd order

$m \cdot \lambda = d \cdot \sin\theta$

$(2)(700 \times 10^{-9} \text{ m}) = (3.63 \times 10^{-6} \text{ m}) \cdot \sin\theta_R$
$\theta_{Red} = 22.6°$

$(2)(400 \times 10^{-9} \text{ m}) = (3.63 \times 10^{-6} \text{ m}) \cdot \sin\theta_{Bl}$
$\theta_{Blue} = 12.7°$

Find L:

$\tan\theta = \dfrac{\Delta x}{L}$

$\tan(22.6° - 12.7°) = \dfrac{(.0175 \text{ m})}{L}$

$\boxed{L = .10 \text{ m}}$