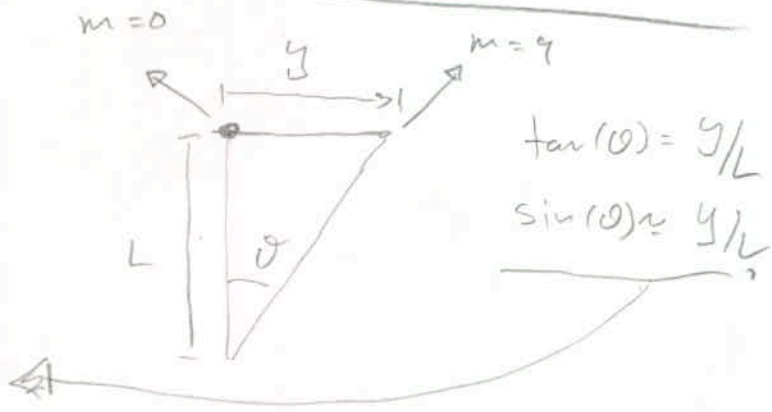
Ch. 27

#1 $y = \frac{\lambda L}{d} m = 515\ nm$

$m = 1$

#5 $d \sin(\theta) = (m + \frac{1}{2})\lambda$;

$\sin(\theta) = \frac{\lambda}{d}(q + \frac{1}{2})\Big|_{m=q}$



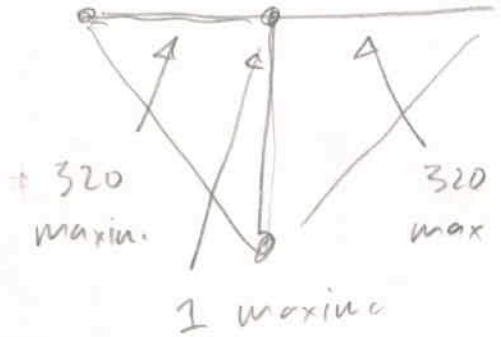
$\tan(\theta) = y/L$

$\sin(\theta) \approx y/L$,

$d = \frac{9.5\lambda}{\sin(\theta)} = 1.59\ mm$

#7 @ 30°; $d \sin(\theta) = m\lambda \Rightarrow$ $m = 320$ to the right & to the left.

641 total



#12 (A) $I/I_{max} = \cos^2(\phi/2) \Rightarrow \phi = 1.3\ rad$

(B) $\delta = \frac{\lambda\phi}{2\pi} = 99.6\ nm$

#18 

$2t = \frac{\lambda}{n} \Rightarrow t = 238\ nm$; (B) $\lambda \uparrow$

(C) $2nt = 2\lambda \Rightarrow \lambda = 328\ nm$

#23 $\left[\sin(\theta) = \frac{m\lambda}{a} \Downarrow \theta = 8°\right]$ & $d/L = \tan(\theta) \Rightarrow \boxed{d = 91.2\text{ cm}}$ w/ $\theta = 8°$

#26 $\sin(\theta) = \frac{\lambda}{a} = \boxed{10^{-3}\text{ rad}}$

#31 $1.22\frac{\lambda}{D} = \frac{d}{L}$ & $\lambda = c/f$ giving $D = 2.10\text{ m}$, $L = 9\text{ m}$

thus, $\boxed{d = 105\text{ m}}$

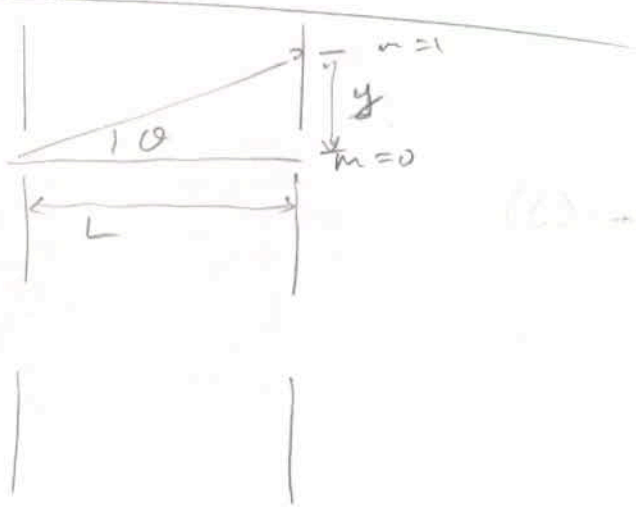
#36 $\sin(\theta) = \frac{m\lambda}{d}$; $\lambda_V = 400\text{nm}$ & $\lambda_R = 750\text{nm}$

$\sin(\theta_{2r}) = \frac{2\lambda}{d} = \frac{1500\text{ nm}}{d}$ & $\sin(\theta_{3V}) = \frac{3\lambda_V}{d} = \frac{1200\text{ nm}}{d}$

$\boxed{\theta_{2r} > \theta_{3V}}$ & $\boxed{\text{orders overlap}}$

regardless of d.

#41 $d\sin(\theta) = \lambda$ (1)



(A) $y = L\tan(\theta)$

$\theta = 0.0005\text{ rad}$

$y = \boxed{0.74\text{ mm}}$

(B) $\sin(\theta) = 0.0009$

$\boxed{y = L\tan(\theta) = 1.2\text{ mm}}$