

**Physics 106 Exam 3 Sec. 1, 2**  
 Hess (2-2108), Magleby (2-7056) Winter 09

CID# \_\_\_\_\_

You are allowed a pencil and a non-graphing calculator. No scratch paper is allowed.

Make your calculations on the exam itself. When you are confident you have found the correct answer, fill in the appropriate bubble on the scantron sheet.

If English is your second language, you may use a dictionary.

$$v = f \lambda$$

$$n_1 \sin \theta_1 = n_2 \sin \theta_2$$

$$\sin \theta_c = \frac{n_2}{n_1} \text{ for } n_1 > n_2$$

$$M = \frac{h'}{h} = -\frac{q}{p}$$

$$\frac{1}{p} + \frac{1}{q} = \frac{2}{R}$$

$$\frac{1}{p} + \frac{1}{q} = \frac{1}{f}$$

$$f = \frac{pq}{p+q}$$

$$p = \frac{qf}{q-f}$$

$$q = \frac{pf}{p-f}$$

$$\frac{1}{f} = (n-1) \left( \frac{1}{R_1} - \frac{1}{R_2} \right)$$

$$p = \frac{1}{f}$$

$$\frac{n_1}{p} + \frac{n_2}{q} = \frac{n_2 - n_1}{R}$$

$$m_{\text{angular}} \equiv \frac{\theta}{\theta_0}$$

$$m_{\text{max}} = 1 + \frac{25\text{cm}}{f}$$

$$m_{\text{microscope}} = -\frac{L}{f_{\text{Objective}}} \left( \frac{25\text{cm}}{f_{\text{eyepiece}}} \right)$$

$$m_{\text{telescope}} = \frac{\theta}{\theta_0} = \frac{f_{\text{Objective}}}{f_{\text{eyepiece}}}$$

$$\sin \theta_{\text{bright}} = \frac{m\lambda}{d}$$

$$\sin \theta_{\text{dark}} = \frac{\left(m + \frac{1}{2}\right)\lambda}{d}$$

$$y_{\text{bright}} \approx \frac{m\lambda L}{d}$$

$$y_{\text{dark}} \approx \frac{\left(m + \frac{1}{2}\right)\lambda L}{d}$$

$$\sin \theta_{\text{dark}} = \frac{m\lambda}{a}$$

$$y_{\text{dark}} \approx \frac{m\lambda L}{a}$$

$$2nt = \left(m + \frac{1}{2}\right)\lambda \quad m = 0, 1, 2, \dots$$

$$2nt = m\lambda \quad m = 0, 1, 2, \dots$$

$$n = \tan \theta_p$$

$$I = I_o \cos^2 \theta$$
  

**TABLE 23.1**  
**Sign Conventions for Mirrors**

Quantity	Symbol	In Front	In Back	Upright Image	Inverted Image
Object location	$p$	+	-		
Image location	$q$	+	-		
Focal Length	$f$	+	-		
Image height	$h'$			+	-
Magnification	$M$			+	-

  

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**TABLE 23.3**  
**Sign Conventions for Thin Lenses**

Quantity	Symbol	In Front	In Back	Convergent	Divergent
Object location	$p$	+	-		
Image location	$q$	-	+		
Lens Radii	$R_1, R_2$	-	+		
Focal Length	$f$			+	-

  

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**Conversions, constants**  
 $c = 3.00 \times 10^8 \text{ m/s}$