

DIFFRACTION \angle

$$\sin \theta_{\text{OUT}} = m \frac{\lambda_2}{\lambda_1} (\sin \theta_{\text{obj}} + \sin \theta_{\text{ret}}) - \sin \theta_{\text{in}} \quad m = \text{order} = 1$$

$$\sin \theta_{\text{OUT}} = 1 \cdot \frac{496}{515} (\sin 45 + \sin 45) - \sin 45$$

$$\sin \theta = .9631(1.4142) - .7071$$

$$\sin \theta = .6549$$

$$\theta = 40.91^\circ$$

$$\sin \theta_{\text{OUT}} = 1 \cdot \frac{488}{515} (\sin 45 + \sin 45) - \sin 45$$

$$\sin \theta = .9476(1.4142) - .7071 = .6330$$

$$\theta = 39.26^\circ$$

$$\sin \theta_{\text{OUT}} = 1 \cdot \frac{476}{515} (\sin 45 + \sin 45) - \sin 45$$

$$\sin \theta_{\text{OUT}} = .9243(1.4142) - .7071 = .6000$$

$$\theta = 36.87^\circ$$

$$\sin \theta_{\text{OUT}} = 1 \cdot \frac{458}{515} (\sin 45 + \sin 45) - \sin 45$$

$$\sin \theta_{\text{OUT}} = .8893(1.4142) - .7071 = .5506$$

$$\theta = 33.41^\circ$$

$$\sin \theta_{\text{OUT}} = 1 \cdot \frac{633}{515} (\sin 45 + \sin 45) - \sin 45$$

$$\sin \theta_{\text{OUT}} = 1.2291(1.4142) - .7071 = 1.0311$$

THERE IS NO DIFFRACTED 633 nm WAVE AS THE SIN IS > 1 .

THE "LAST COLOR" THAT COULD BE DIFFRACTED OUT OF THE HOE IS ≈ 621 nm. SOLUTION IS LEFT TO THE READER.