

## Refraction and Critical Angle Practice Key

1)  $n_r = 2.42$   $\theta_r = ?$   $n_i = 1.33$   $\theta_i = 60.0^\circ$   
 $n_i \sin \theta_i = n_r \sin \theta_r$   $(1.33) \sin(60.0) = (2.42) \sin \theta_r$   
 $\theta_r = 28.4^\circ$

2) a)  $n_i = 1.52$   $n_r = 1.0003$   $\theta_r = 90.0^\circ$  (definition of critical angle!)  
 $n_i \sin \theta_i = n_r \sin \theta_r$   $(1.52) \sin \theta_i = (1.0003) \sin(90.0)$   
 $\theta_i = 41.2^\circ$

b)  $n_i = 1.52$   $n_r = 1.33$   $\theta_r = 90.0^\circ$   $\theta_i = ?$   
 $n_i \sin \theta_i = n_r \sin \theta_r$   $(1.52) \sin \theta_i = (1.33) \sin(90.0)$   
 $\theta_i = 61.7^\circ$

3)  $n_r = 1.0003$   $\theta_r = 90.0^\circ$   $\theta_i = 40.0^\circ$   $n_i = ?$   
 $n_i \sin \theta_i = n_r \sin \theta_r$   $n_i \sin(40.0) = 1.0003 \sin(90.0)$   
 $n_i = 1.56$

4)  $\theta_i = ?$   $n_i = 1.65$   $n_r = 1.0003$   $\theta_r = 90.0^\circ$   
 $n_i \sin \theta_i = n_r \sin \theta_r$   $(1.65) \sin \theta_i = (1.0003) \sin(90.0)$   
 $\theta_i = 37.3^\circ$

5)  $\theta_i = ?$   $n_i = 1.33$   $n_r = 1.0003$   $\theta_r = 90.0^\circ$   
 $n_i \sin \theta_i = n_r \sin \theta_r$   $(1.33) \sin \theta_i = (1.0003) \sin(90.0)$   
 $\theta_i = 48.8^\circ$

6)  $\theta_i = 40.5^\circ$   $n_i = ?$   $n_r = 1.0003$   $\theta_r = 90.0^\circ$   
 $n_i \sin \theta_i = n_r \sin \theta_r$   $n_i \sin(40.5) = 1.0003 \sin(90.0)$   
 $n_i = 1.54$