

5. Applying the law of refraction, we obtain  $\sin \theta / \sin 30^\circ = v_s / v_d$ . Consequently,

$$\theta = \sin^{-1} \left( \frac{v_s \sin 30^\circ}{v_d} \right) = \sin^{-1} \left[ \frac{(3.0 \text{ m/s}) \sin 30^\circ}{4.0 \text{ m/s}} \right] = 22^\circ .$$

The angle of incidence is gradually reduced due to refraction, such as shown in the calculation above (from  $30^\circ$  to  $22^\circ$ ). Eventually after many refractions,  $\theta$  will be virtually zero. This is why most waves come in normal to a shore.