

第 20 課： 反射和折射

1. (a) $x = 45^\circ$
(b) $x = 30^\circ$
(c) $x = 55^\circ$
(d) $x = 50^\circ$

2. (a) $n = \frac{\sin 60^\circ}{\sin 45^\circ}$
 $= 1.22$
(b) $n = \frac{\sin 55^\circ}{\sin 36^\circ}$
 $= 1.39$
(c) $n = \frac{\sin 78^\circ}{\sin 32^\circ}$
 $= 1.85$

3. (a) $1.5 = \frac{\sin 80^\circ}{\sin x}$
 $\frac{\sin 80^\circ}{1.5} = \sin x$
 $0.6565 = \sin x$
 $x = 41.0^\circ$
(b) $1.5 = \frac{\sin 60^\circ}{\sin x}$
 $\frac{\sin 60^\circ}{1.5} = \sin x$
 $0.5773 = \sin x$
 $x = 35.3^\circ$

$$\begin{aligned}
 4. \quad (a) \quad 1.33 &= \frac{\sin 65^\circ}{\sin x} \\
 \frac{\sin 65^\circ}{1.33} &= \sin x \\
 0.6814 &= \sin x \\
 x &= 43^\circ
 \end{aligned}$$

$$\begin{aligned}
 (b) \quad 1.33 &= \frac{\sin 76^\circ}{\sin(90^\circ - x)} \\
 \frac{\sin 76^\circ}{1.33} &= \sin(90^\circ - x) \\
 0.7295 &= \sin(90^\circ - x) \\
 90^\circ - x &= 46.8^\circ \\
 x &= 43.2^\circ
 \end{aligned}$$

$$\begin{aligned}
 5. \quad (a) \quad 2.4 &= \frac{\sin 80^\circ}{\sin(x)} \\
 \frac{\sin 80^\circ}{2.4} &= \sin(x) \\
 0.410 &= \sin(x) \\
 x &= 24.2^\circ
 \end{aligned}$$

$$\begin{aligned}
 (b) \quad 2.4 &= \frac{\sin(90^\circ - 20^\circ)}{\sin(90^\circ - x)} \\
 \frac{\sin 70^\circ}{2.4} &= \sin(90^\circ - x) \\
 0.3915 &= \sin(90^\circ - x) \\
 90^\circ - x &= 23.1^\circ \\
 x &= 66.9^\circ
 \end{aligned}$$