7.8

Consider a region of space divided by a plane. The potential energy of a particle in Region 01 is U_1 (caps) and in Region 02 it is U_2 (caps).

If a particle of mass "m" and with speed "v_1" in Region 01 passes from Region 01 → Region 02 such that its path in Region 01 makes an angle "θ_1" with the normal to the plane of separation and an angle "θ_2" with the normal when in Region 02,

- Show that... $\longrightarrow \dfrac{\sin(\theta_1)}{\sin(\theta_2)} = 1 + \left(\dfrac{U_1 - U_2}{T_1}\right)^{1/2}$

- where $T_1 = \frac{1}{2} m v_1^2$.

What is the optical analog of this problem?