What is Light?

1. Something made of rays that travel on straight lines
   - So-called geometric optics
   - Subjects of Chapters 33/34

2. Wave
   - So-called wave optics
   - Subjects of Chapters 35 and 36

3. Electromagnetic wave

4. Made of photons
   - So-called quantum optics
   - Needed to understand the laser and interactions between light and matter

More approximation

Wave-particle duality
CHECKPOINT

Light travels from a medium whose index of refraction is $n_1$ into another medium whose index of refraction $n_2$. In which of the two cases is $n_2$ larger than $n_1$?

Case a
Prisms have double reflections and limited resolution. To study a light spectrum, *diffraction gratings* (see Chapter 36) are used instead of prisms. See a demo in the lobby.
For a total reflection to occur, \( n_1 \) has to be larger than \( n_2 \).
A point source of light is located 3 m below the body of water. Find the diameter of the circle at the surface through which light emerges from the water.

\[ \theta = 48.8^\circ \quad 2r = 6.84 \text{ m} \]
All reflected rays extrapolate to point $I$, as if they all originated there. The viewer perceives a virtual image located at $I$.

Convention: use negative sign for virtual image. Turns out to be very useful.
A six-foot-tall gator stands in front of a mirror on a wall. In order for him to see his reflection in the mirror from top to toe, what is the minimum height required of the mirror? 3 ft.