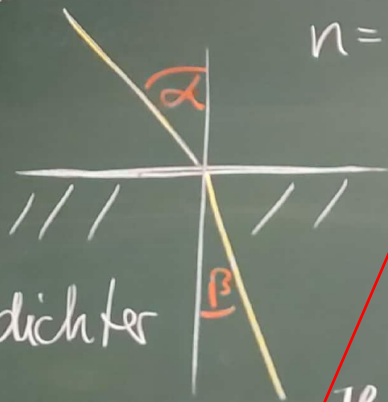


optisch dünner



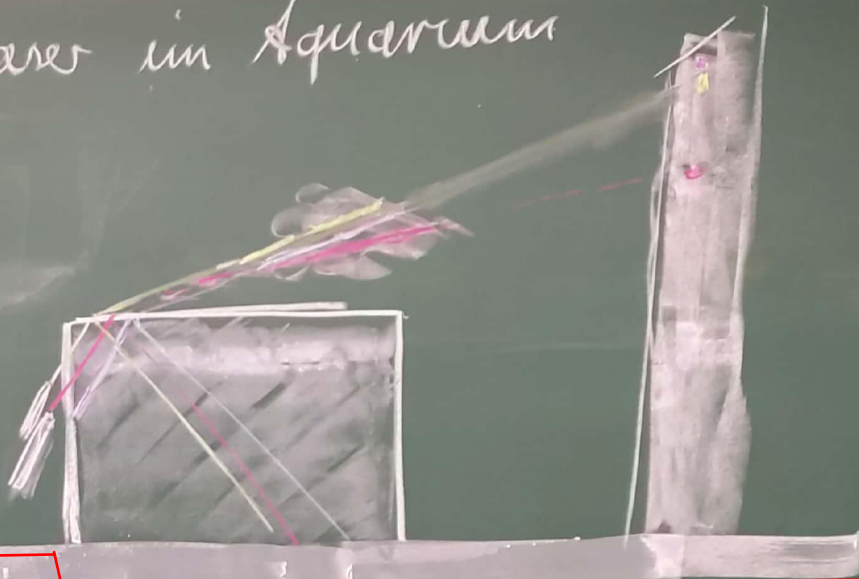
$$n = \frac{l}{l'} = \frac{\sin \alpha}{\sin \beta}$$

optisch dichter

$$\text{Wasser } n = \frac{4}{3}$$

Herleitung des  
Grenzwinkels der Totalreflexion

Laser in Aquarium



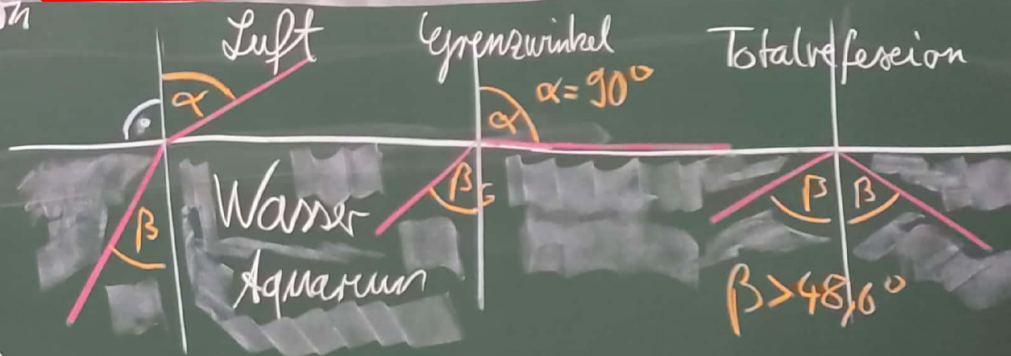
Brechungsgesetz  $n = \frac{4}{3} = \frac{\sin \alpha}{\sin \beta}$

Grenzwinkel der Totalreflexion  $\alpha = 90^\circ \quad \sin 90^\circ = 1$

$$\frac{4}{3} = \frac{1}{\sin \beta_G} \quad \frac{3}{4} = \frac{\sin \beta}{1} \quad \text{Kehrwert}$$

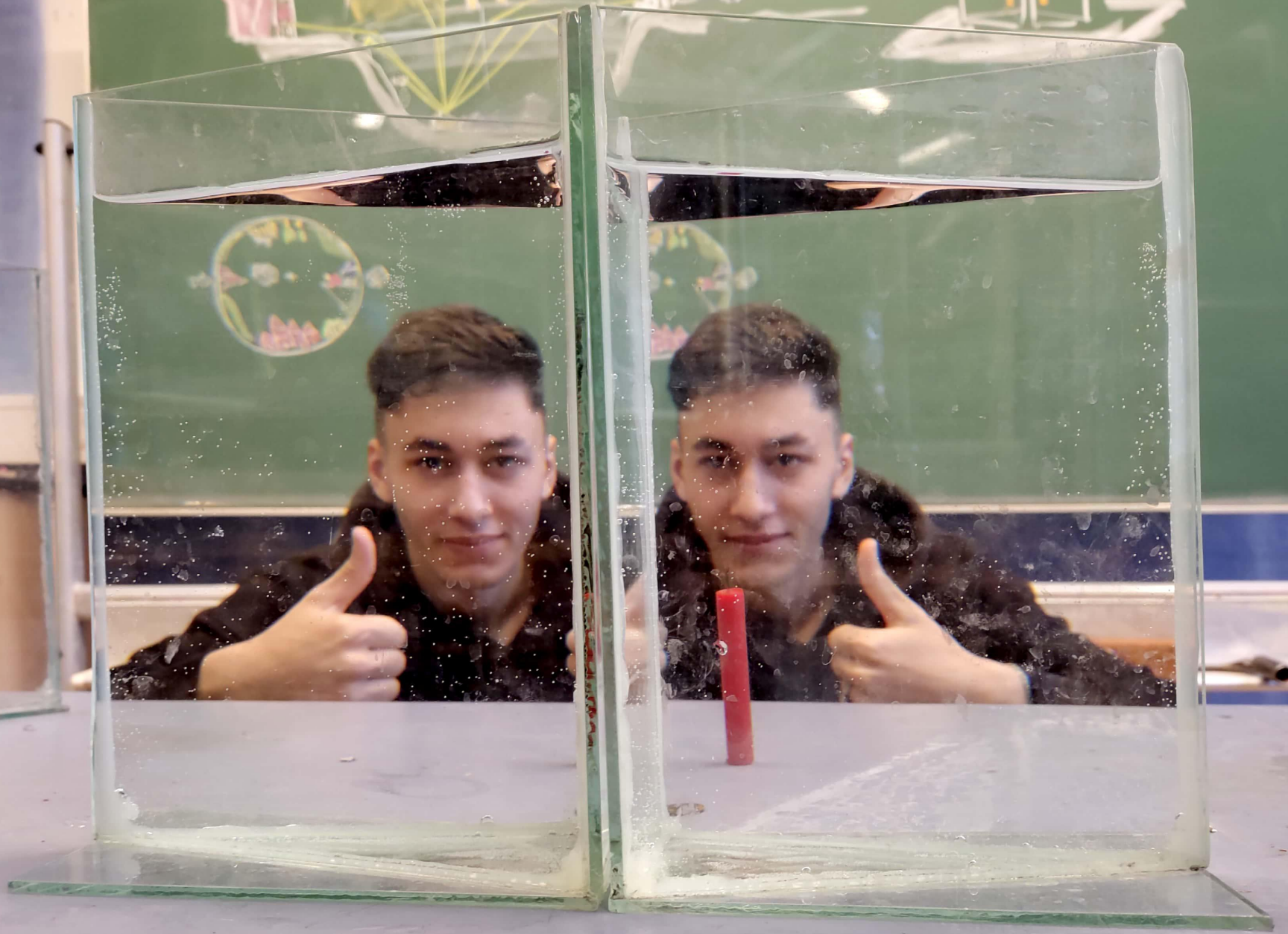
$$\sin \beta_G = \frac{3}{4} = 0,75 \quad \beta_G = \sin^{-1} 0,75$$

$$\beta_G = 48,6^\circ$$

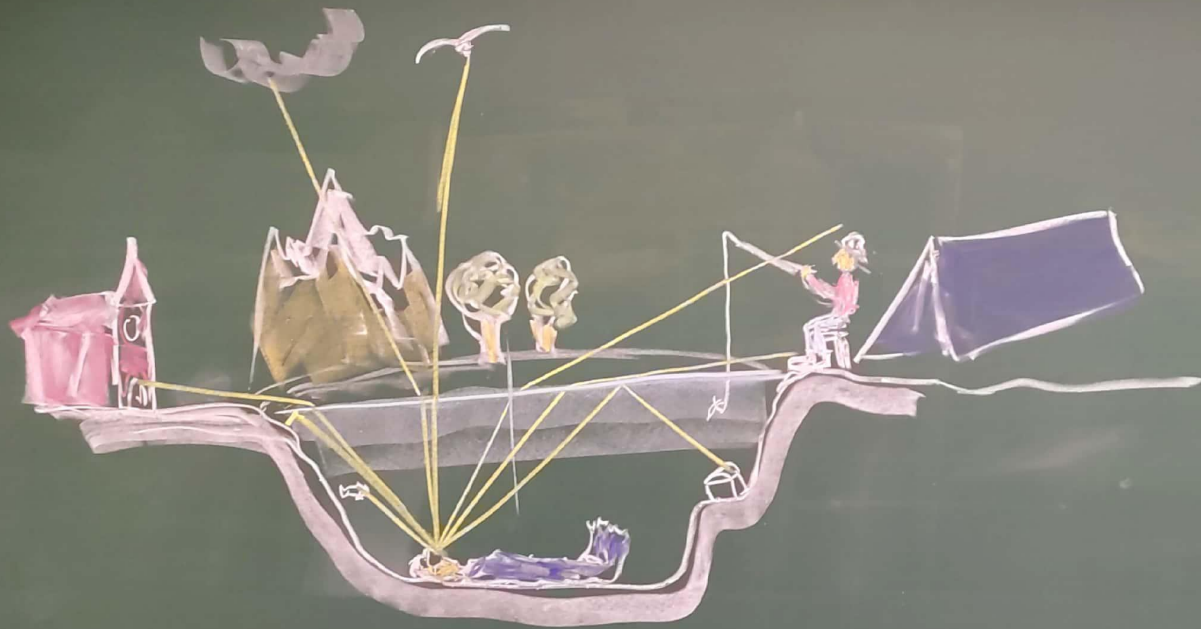


Bei  $\alpha = 90^\circ$ , kann man nicht aus dem Wasser heraussehen.





Was sieht der Taucher



Blick durch  
Wasserprismen

