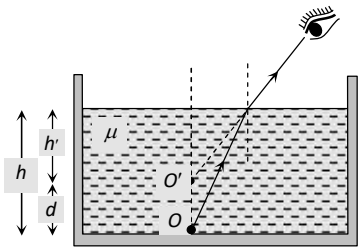
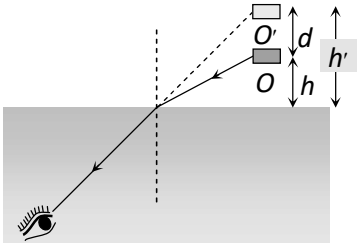
Real and Apparent Depth.

If object and observer are situated in different medium then due to refraction, object appears to be displaced from its real position. There are two possible conditions.

(1) When object is in denser medium and observer is in rarer medium	(1) Object is in rarer medium and observer is in denser medium.
	
(2) $\mu = \frac{\text{Real depth}}{\text{Apparent depth}} = \frac{h}{h'}$ Real depth >Apparent depth that's why a coin at the bottom of bucket (full of water) appears to be raised)	(2) $\mu = \frac{h'}{h}$ Real depth < Apparent depth that's why high flying airplane appears to be higher than its actual height.
(3) Shift $d = h - h' = \left(1 - \frac{1}{\mu}\right)h$	(3) $d = (\mu - 1)h$
(4) For water $\mu = \frac{4}{3} \Rightarrow d = \frac{h}{4}$ For glass $\mu = \frac{3}{2} \Rightarrow d = \frac{h}{3}$	(4) Shift for water $d_w = \frac{h}{3}$ Shift for glass $d_g = \frac{h}{2}$

Note: If a beaker contains various liquids as shown then

Apparent depth of bottom $= \frac{d_1}{\mu_1} + \frac{d_2}{\mu_2} + \frac{d_3}{\mu_3} + ...$

$\frac{d_{AC}}{d_{App.}} = \frac{d_1 + d_2 + ...}{\frac{d_1}{\mu_1} + \frac{d_2}{\mu_2} + ...}$

μ Combination = (In case of two liquids if $d_1 = d_2$ than $\mu = \frac{2\mu_1\mu_2}{\mu_1 + \mu_2}$)