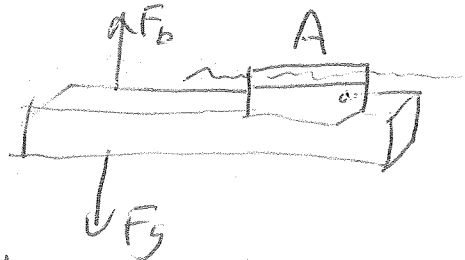
14-40 What if the gator eats 1% more rocks (= 1.3 kg) more, how much further does it sink?

$m_{gator} = 130\,kg$

$A_{head} = 0.20\,m^2$



If it's floating, $F_b = F_g$

$F_b = m_D g$, where m_D = mass of water displaced.

if it gets 1.3 kg more mass, 1.3 kg more water needs displaced.

The only volume still above the water is the box which makes the head. It's A across, and will sink by "h" more depth, displacing $A \cdot h$ volume and $A \cdot h\rho$ more mass.

So $1.3\,kg = \Delta m = A\,\Delta h\,\rho_{H_2O}$

or $\Delta h = \frac{\Delta m}{A\rho} = \frac{1.3\,kg}{0.20\,m^2 \cdot 998\,kg/m^3} = 6.5\,cm$