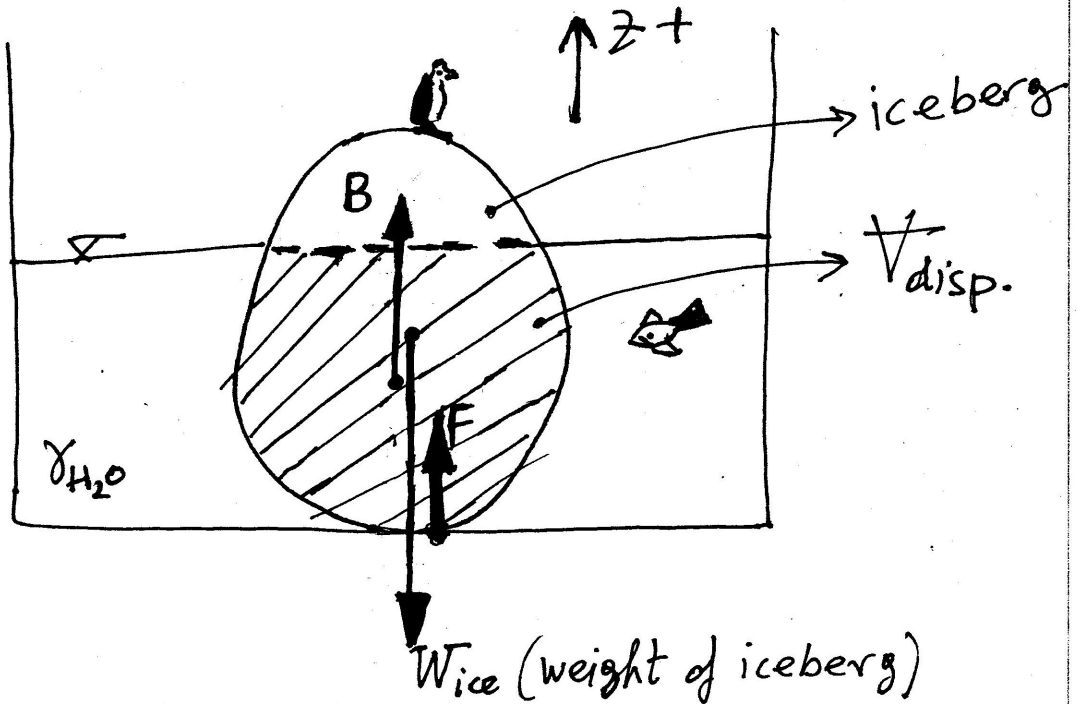


A non-floating ice berg: 2/28/13



This iceberg rests on the sea floor, which exerts a force F on it (an equal and opposite force is exerted by the iceberg on the sea floor)

From $\sum F_z = 0 \Rightarrow B + F - W_{ice} = 0 \Rightarrow$

$\Rightarrow W_{ice} = B + F \Rightarrow \underline{W_{ice} > B}$ (since $F > 0$) (1)

$B = \gamma_{H_2O} V_{disp}$ (2) (buoyancy)

V_{disp} = volume of displaced H_2O = volume of iceberg under H_2O

When the ice melts the volume of melted ice will be $V_{melted\ ice} = W_{ice} / \gamma_{H_2O}$ (since the $W_{ice} = W_{melted\ ice}$) (3)

Putting (2) and (3) in (1) we get:

~~$\gamma_{H_2O} V_{melted\ ice} > \gamma_{H_2O} V_{disp}$~~ $\Rightarrow \underline{V_{melted\ ice} > V_{disp}}$ \Rightarrow
 \Rightarrow level will rise!

Note: If iceberg were floating $\Rightarrow F = 0 \Rightarrow V_{melted\ ice} = V_{disp} \Rightarrow$ level stays the same!