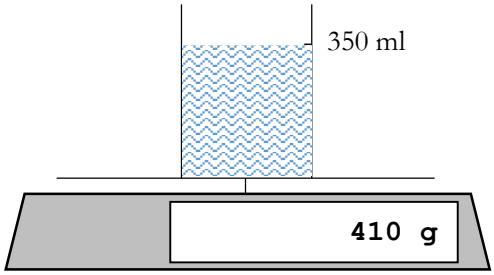
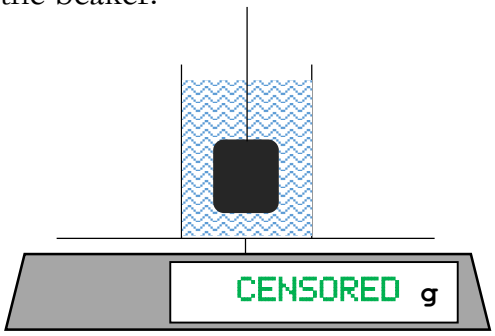
Archimedes on the Balances

A beaker is filled with 350ml of water (density = 1.0 g cm^{-3}) and placed on a balance. The balance reads 410g:



A 900g steel mass (density = 7.8 g cm^{-3}) is held by a light string above the water and gently lowered into the beaker so the mass is completely submerged but not touching the sides or bottom of the beaker:



1) As the mass is lowered into the water:
   a) What happens to the tension in the string? (circle one)

      Goes up *Goes down* *Stays the same*

   b) Explain your answer

   c) What happens to the reading on the balance? (circle one)

      Goes up *Goes down* *Stays the same*

   d) Explain your answer

2) Once the mass is completely submerged, calculate the reading (in ml) on the beaker that the water level will have risen to.

3) Calculate the tension in the string:
a) before the mass is submerged

b) after the mass is submerged

4) Once the mass is completely submerged, state or calculate the new reading on the balance.