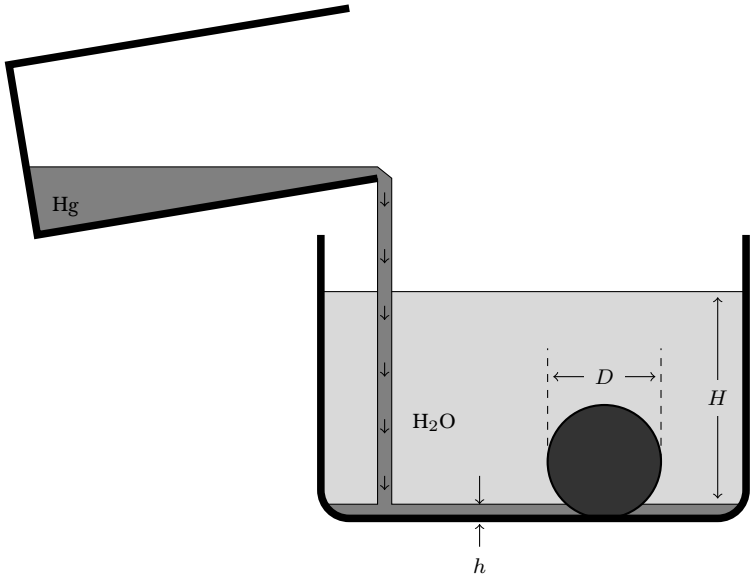
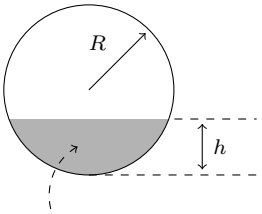
Name:

1) A solid sphere sits at the bottom of a beaker that is full with water to a depth of H. Mercury, $\rho_{\mathrm{Hg}} = 13\,534\,\mathrm{kg/m^3}$, is slowly added to the beaker. When the depth of mercury, h, reaches $\frac{3}{4}D$, the sphere lifts from the bottom. What is the density of the sphere?



Volume of part of a sphere:



$$V = \frac{\pi h^2}{3}(3R - h)$$

Name:

2) A gate is formed from a half cylinder. It has a width, W; a height, $2R$; and is hinged at the bottom. What horizontal force, F_{H} is needed to hold the gate in equilibrium?

Name:

3) A truck is half filled with water and undergoes constant acceleration. What is the maximum acceleration, a_x, that the truck can have without spilling any water? At this acelleration, what is the net pressure force on the back wall of the truck (*i.e.* the surface between A and B).