Problem 101A

It is often conjectured that the earth was, at one time, comprised of molten material. If the acceleration due to gravity, $g(r)$, at a radius, r, within this fluid sphere (radius, $R = 6440 \ km$) varied linearly with r, if the density of the fluid was uniformly $5600 \ kg/m^2$ and if $g(R) = 9.81 \ m/s^2$, find the pressure at the center of this fluid earth.