7 **(a)** Explain the difference in densities in solids, liquids and gases using ideas of the spacing between molecules.

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.....[3]

(b) A hydrogen nucleus (proton) may be assumed to be a sphere of radius 1×10^{-15} m. Calculate the density of a hydrogen nucleus.

density = ... $kg\,m^{-3}$ [3]

(c) The density of hydrogen gas in a pressurised cylinder is $4\,kg\,m^{-3}$. Suggest a reason why this density is much less than your answer in **(b)**.

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.....[1]