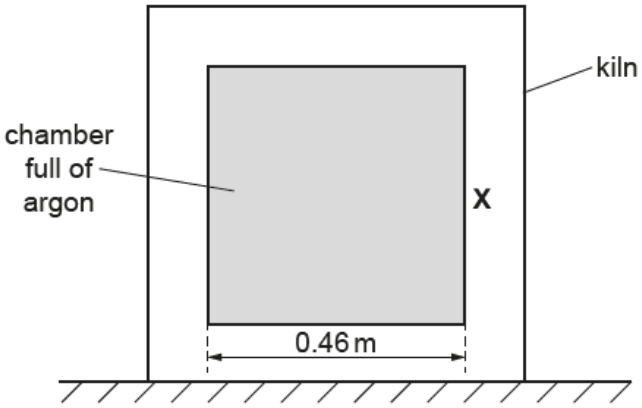
Density and Pressure – 2021/20 GCE Physics A Component 01

1. Nov/2020/Paper_H556_01/No.21(a)

A kiln used to harden ceramics is shown below.



The internal chamber is a cube. Each side of this cube has length 0.46 m.
The chamber is sealed and full of argon. Argon behaves as an ideal gas.

(a) The kiln is initially at 20 °C.
The argon in the kiln has an initial pressure of 100 kPa.

(i) Calculate the amount of argon *n* in the chamber in moles.

n = ... mol **[2]**

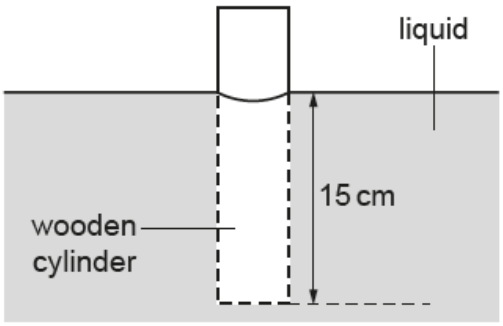
(ii) The temperature of the kiln is increased from 20 °C to 1300 °C.

Calculate the pressure in kPa at 1300 °C.

pressure = ... kPa **[2]**

2. Nov/2020/Paper_H556_01/No.22(a)

A long wooden cylinder is placed into a liquid and it floats as shown.



The length of the cylinder below the liquid level is 15 cm.

(a) (i) State **Archimedes' principle**.

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..... **[1]**

(ii) The pressure exerted by the liquid alone on the bottom of the cylinder is 1.9×10^3 Pa.

Calculate the density ρ of the liquid.

ρ = ... $kg\,m^{-3}$ **[2]**