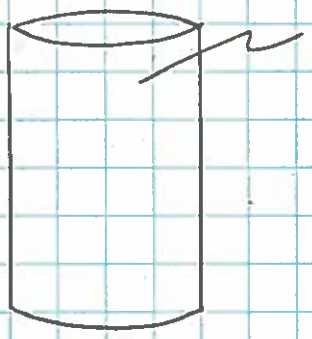

Neon gas

$\left(\frac{N}{V}\right) = 5\times10^{25}\ m^{-3}$

$v_{rms} = 660\ \frac{m}{s}$

For Neon: $m = 20u\left(\frac{1.67\times10^{-27}\ kg}{1u}\right) = 3.34\times10^{-26}\ kg.$

a.) $v_{rms} = \sqrt{\frac{3k_BT}{m}}$

So $T = \frac{mv_{rms}^2}{3k_B} = \underline{351.4\ K}$

b.) Can use:

$PV = Nk_BT \Rightarrow P = \left(\frac{N}{V}\right)k_BT = \underline{2.425\times10^5\ Pa}$

or,

$P = \frac{1}{3}\left(\frac{N}{V}\right)mv_{rms}^2 = \underline{2.245\times10^5\ Pa}$