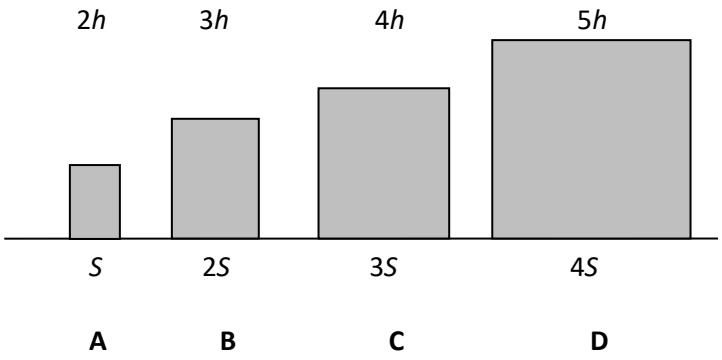
Quiz B9

The gas laws

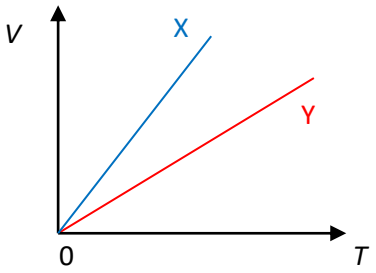
1. The four cylinders are made of the same material. Their heights and cross-sectional areas are shown in the diagram. Which cylinder exerts the **least** pressure on the floor?



2. Which is **not** an assumption in the kinetic theory of gases?

A There are no forces between molecules.
B The collisions are elastic.
C The volume of the molecules is negligible compared to the volume of the gas.
D The average kinetic energy of molecules is proportional to temperature.

3. The graph shows the variation of volume with kelvin temperature for two ideal gases X and Y when the pressure of each gas is kept constant.



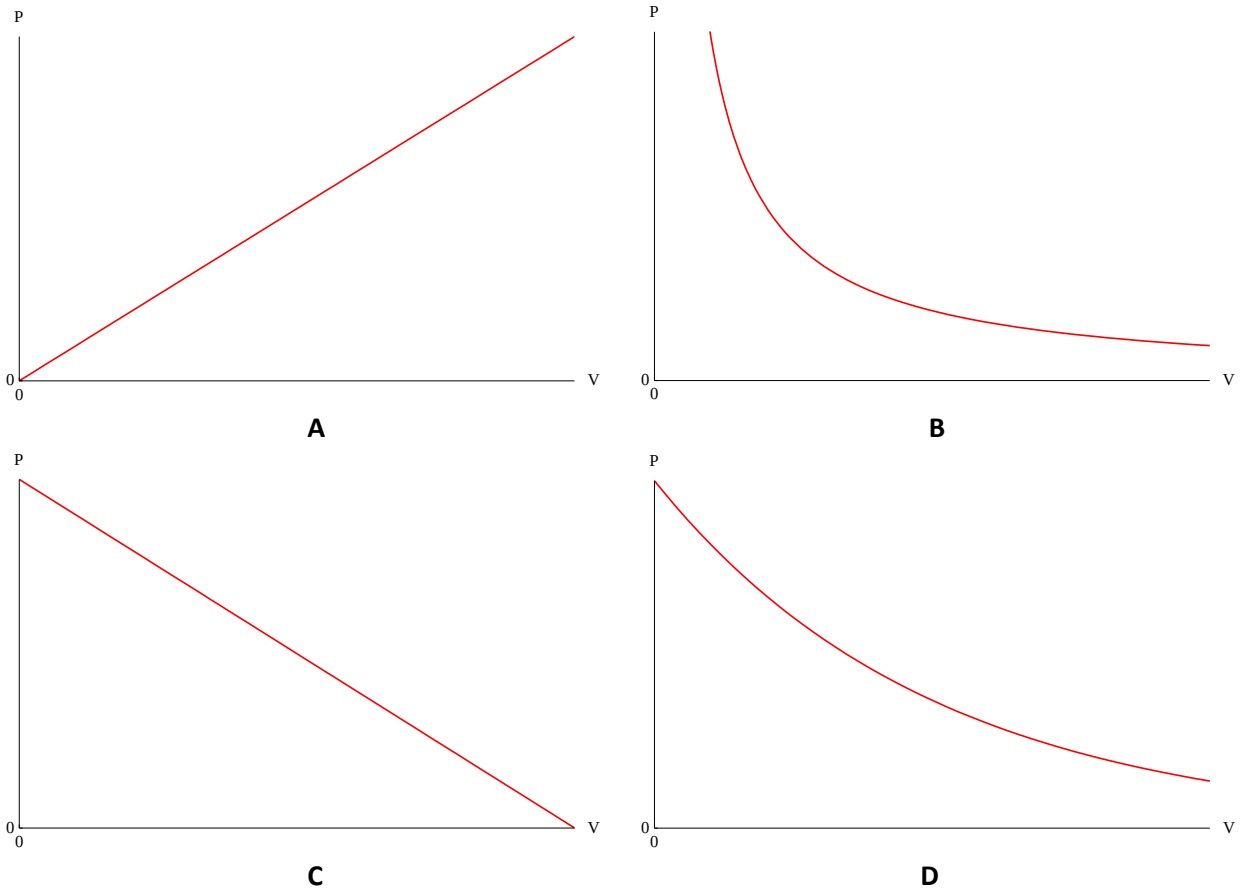
What can be said about the pressure of gas X and that of gas Y?

A $P_X > P_Y$
B $P_X = P_Y$
C $P_X < P_Y$
D Any of the above can be correct depending on the quantity of each gas.

4. The kelvin temperature of an ideal gas is T. The density and pressure of the gas are both doubled. What is the new temperature of the gas?

A $\frac{T}{4}$ **B** $\frac{T}{2}$ **C** T **D** $2T$

5. Which graph shows the variation with volume of the pressure of a fixed quantity of an ideal at constant temperature?



6. Radon is a gas which becomes a liquid at a temperature of about $-62\ ^{\circ}\text{C}$. Under what conditions of density and temperature could radon be described as an ideal gas?

	Density	Temperature
A	Low	Near $-62\ ^{\circ}\text{C}$
B	Low	Much higher than $-62\ ^{\circ}\text{C}$
C	High	Near $-62\ ^{\circ}\text{C}$
D	High	Much higher than $-62\ ^{\circ}\text{C}$

7. A certain mass of helium (molar mass 4 g mol^{-1}) and an equal mass of neon (molar mass 20 g mol^{-1}) are kept in identical containers at the same temperature.
Assuming the gases behave like ideal gases, what is correct about the internal energy and the average speed of molecules for helium and neon?

	Internal energy	**Average speed**
A	Larger for helium	Larger for helium
B	Larger for helium	Larger for neon
C	Larger for neon	Larger for helium
D	Larger for neon	Larger for neon

8. Two containers, X and Y, each contain a quantity of an ideal gas. X has volume V, temperature T and contains N molecules. Y has volume $2V$, temperature $\frac{T}{3}$ and contains $4N$ molecules.

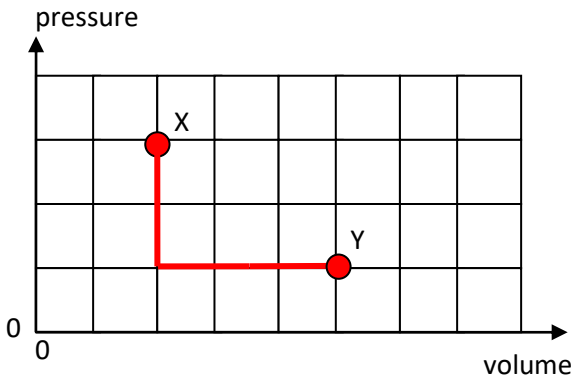
What is the ratio of pressures, $\frac{P_X}{P_Y}$?

A $\frac{1}{6}$ **B** $\frac{3}{8}$ **C** $\frac{3}{2}$ **D** 6

9. A container has volume 3.6 m^3, pressure 1.4 MPa and temperature 600 K. Molecules escape from the container. After 1 hour the pressure in the container dropped to one third of the initial pressure without any change in temperature. What is an estimate of the average rate at which molecules left the container?

A 10^{29} s^{-1} **B** 10^{23} s^{-1} **C** 10^{17} s^{-1} **D** 10^{11} s^{-1}

10. The state of a fixed quantity of an ideal gas is changed from X to Y along the path shown.



What is $\frac{T_Y}{T_X}$, the ratio of the temperature at Y to that at X?

A $\frac{3}{5}$ **B** $\frac{2}{3}$ **C** $\frac{5}{6}$ **D** $\frac{3}{2}$

Quiz B9 Answers	
1	A
2	D
3	D
4	C
5	B
6	B
7	A
8	C
9	B
10	C