

Pressure

Total marks:20

Q1.

Figure 3 shows an oxygen cylinder.



Figure 3

The volume of the gas in the cylinder is 2100 cm^3 .

When the gas is released into the atmosphere the volume of the gas is 8600 cm^3 .

The pressure of the atmosphere is 98 kPa .

Calculate the pressure of the gas when it is in the cylinder.

Use the equation

$$P_1 = \frac{P_2 \times V_2}{V_1}$$

(2)

pressure of the gas in the cylinder = kPa

(Total for question = 2 marks)

Q2.

Figure 1 shows a fixed mass of gas inside a cylinder with a movable piston.

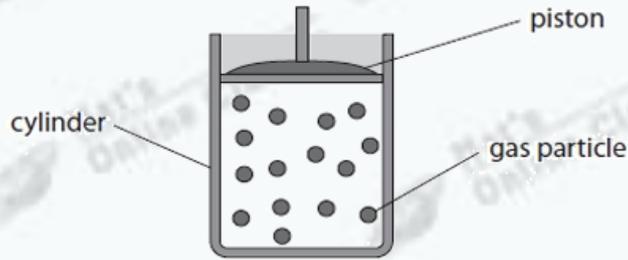


Figure 1

(i) Describe, in terms of **gas particles**, how the gas exerts a pressure on the cylinder.

(3)

.....

.....

.....

.....

.....

(ii) Figure 2 shows the same gas squashed into a smaller volume.

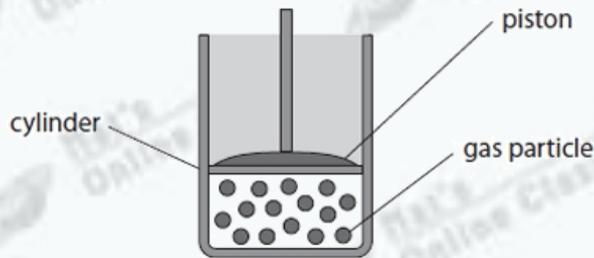


Figure 2

State what happens to the pressure the gas exerts on the cylinder when the volume of gas is reduced, as in Figure 2.

(1)

.....

.....

(iii) State what happens to the gas particles when the volume of the gas is reduced, as in Figure 2.

(1)

.....

.....

(Total for question = 5 marks)

Q3.

Figure 8 shows a small container of carbon dioxide at high pressure.

The pressure, P_1 , in the container is 8.00 MPa.

The volume, V_1 , of the container is 14.5 cm³.



Figure 8

The container is pierced and all of the carbon dioxide goes into a large balloon.

The volume of gas, V_2 , in the large balloon is 1160 cm³.

Calculate the pressure, P_2 , in the large balloon.

Use the equation

$$P_1 V_1 = P_2 V_2$$

(3)

pressure in the large balloon = MPa

(Total for question = 3 marks)

Q4.

A student investigates the pressure and volume of some trapped gas. Figure 4 shows the apparatus used.

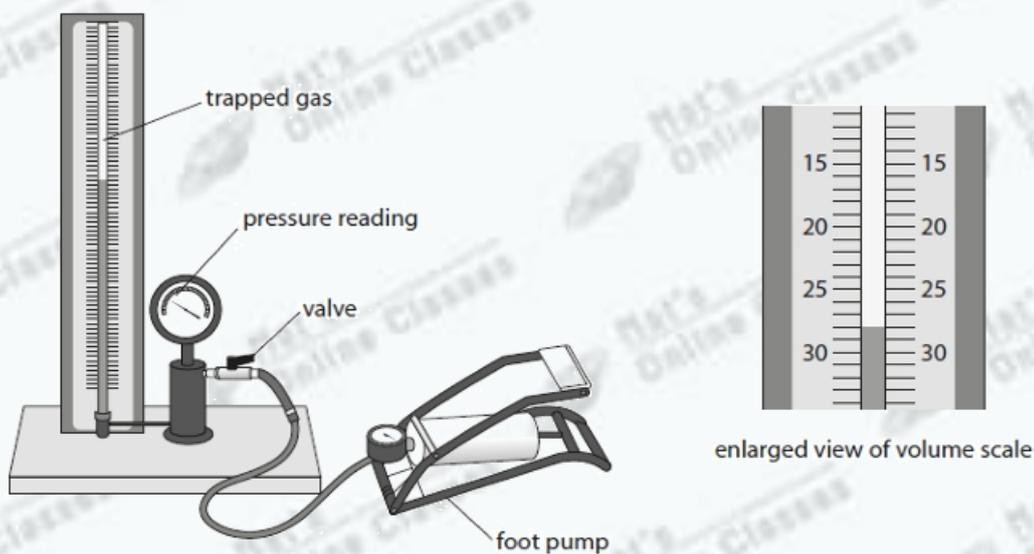


Figure 4

Figure 5 shows the student's table of results.

p	V	$p \times V$
100	28.0	2800
123	23.0	2829
140	20.0	2800
160	18.0	2880
180	16.5	2970

Figure 5

(i) Suggest what the student should add to the headings of the table in Figure 5.

(1)

.....
.....

(ii) Use Figure 5 to estimate the volume of gas for a pressure reading of '170'.

(2)

volume of gas =

(iii) Suggest **two** ways the student could improve the investigation.

(2)

1

.....

2

.....

(iv) Explain whether the values, in the column headed ' $p \times V$ ' in Figure 5, fit the equation

$$p_1 \times V_1 = p_2 \times V_2$$

(3)

.....

.....

.....

.....

.....

(Total for question = 8 marks)

Q5.

Figure 16 shows a metal container with a movable piston.

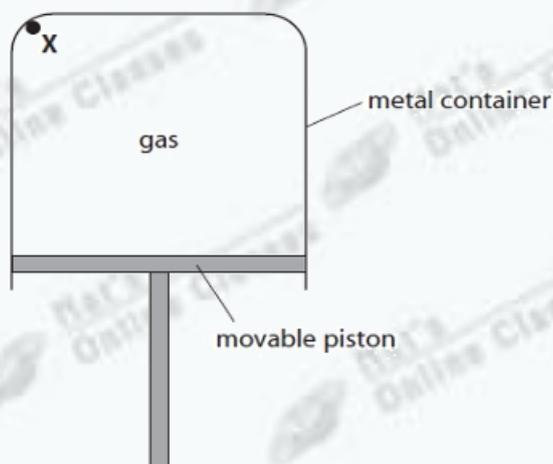


Figure 16

Point X is on the inner surface of the container.

The gas in the container is at a higher pressure than the air outside the container.

The pressure of the gas in Figure 16 (P_1) is 120 kPa.

The volume of the gas in Figure 16 (V_1) is 2500 cm³.

The piston is pushed up slowly so that the temperature of the gas does not change.

The new volume of the gas (V_2) is 1600 cm³.

Calculate the new pressure of the gas, P_2 .

Use the equation

$$P_2 = \frac{P_1 \times V_1}{V_2}$$

(2)

new pressure, $P_2 = \dots\dots\dots$ kPa

(Total for question = 2 marks)