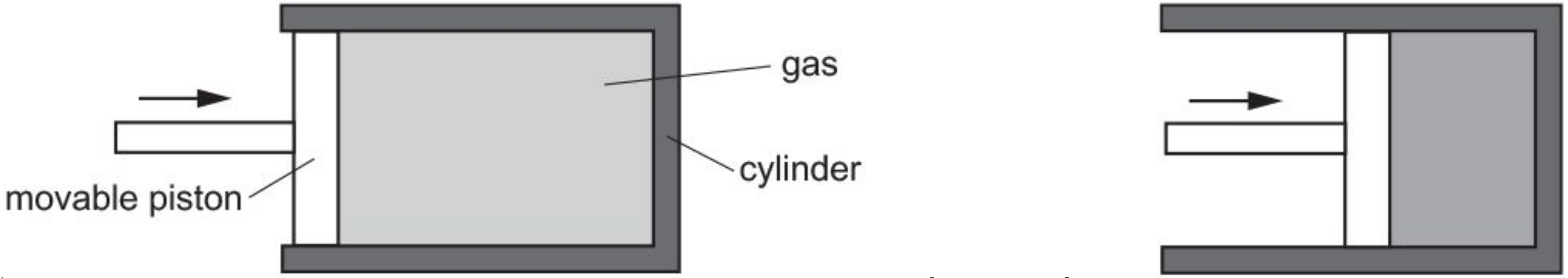
Gas pressure and volume - part 2 Worksheet

Mr Charman

Exam question

Exam questions

1. This question is about the particles in a gas and the pressure they exert on a container.A tight-fitting moveable piston traps gas in a cylinder as shown in the diagram. The gas has volume 300 cm^3 and pressure of 100 kPa.



The piston is now pushed in and changes the volume of the gas to 150 cm3. The temperature of the gas has not changed.

a) Calculate the new pressure of the gas.

New pressure = ________kPa **(2 marks)**

OCR, 21st Century, Paper J259/02, June 2018.

Exam questions

	Pressure (kPa)	Volume (m3)
Cylinder A	23 000	15
Cylinder B	10 000	

2) Assuming both cylinders contain the same mass of gas and are at the same temperature. Calculate the volume of gas in cylinder B. **(2 marks)**

Answers

Exam questions

1) 100 (kPa) × 300 (cm^3) = 30 000 (kPa cm^3) **(1)**

   New P × 150 (cm^3) = 30 000 (kPa cm^3)

   New P = 30 000 (kPa cm^3)/ 150 cm^3 = **200 (kPa)** **(1)**

2) 23 000 × 15 = 345 000 **(1)**

   345 000 / 10 000 = **34.5 m^3** **(1)**

In lesson questions

Warm up

For a gas at a constant temperature, predict what will happen to the pressure when the volume of the container:

1. Doubles

2. Halves

Pause the video to complete your task

Gas pressure and volume

1) Copy out the following equation and state the definition and unit for each variable.

$p_1 \times V_1 = p_2 \times V_2$

Resume once you're finished

Independent practice

1. The volume of a gas is 6 m^3 when its pressure is 200000 Pa. Assuming the temperature does not change, calculate its pressure when the volume is 3 m^3.
2. The volume of a gas is 12 m^3 when its pressure is 400 kPa. Assuming the temperature does not change, calculate its pressure when the volume is 30 m^3.
3. The pressure of a gas is 4×10^5 Pa when its volume is 10 m^3. If the temperature is kept constant, calculate its volume when the pressure becomes 1.5×10^5 Pa.
4. **Challenge:** The pressure of a gas is 8×10^5 Pa when its volume is 100 cm^3. If the temperature is kept constant, calculate its volume when the pressure becomes 2.5×10^5 Pa.

Pause the video to complete your task

Gas pressure

Copy and complete

When you do _____ on a gas, the particle's ______ store increases. This causes the temperature of the gas to ________. Doing work on the gas has increased the ________ energy of the gas.

Resume once you're finished

Independent practice

1. A bicycle pump is used to pump air into a bicycle tyre. Explain how this increases the internal energy of the air in the tyre?

2. Explain why the end nearest the tyre gets hot when using a bicycle pump?

Exam questions

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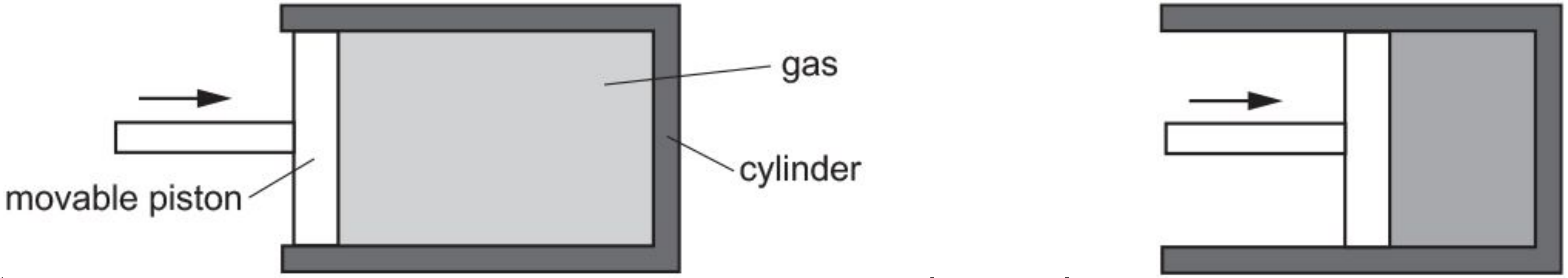

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New pressure = ________kPa **(2 marks)**

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Answers

Review

Warm up

For a gas at a constant temperature, predict what will happen to the pressure when the volume of the container:

1. Doubles - **the pressure halves**

2. Halves - **the pressure doubles**

Review

1. Copy out the following equation and state the definition and unit for each variable.

$p_1 X V_1 = p_2 X V_2$

p_1 = initial pressure measured in Pa.
V_1 = initial volume measure in m^3
p_2 = new pressure measured in Pa
V_2 = new volume measured in m^3

Review

1. The volume of a gas is 6 m^3 when its pressure is 200000 Pa. Assuming the temperature does not change, calculate its pressure when the volume is 3 m^3.
   400000 Pa
2. The volume of a gas is 12 m^3 when its pressure is 400 kPa. Assuming the temperature does not change, calculate its pressure when the volume is 30 m^3.
   160 kPa
3. The pressure of a gas is 4×10^5 Pa when its volume is 10 m^3. If the temperature is kept constant, calculate its volume when the pressure becomes 1.5×10^5 Pa.
   26.3 m^3

Review

Copy and complete

When you do **work** on a gas, the particle's **kinetic** store increases. This causes the temperature of the gas to **increase**. Doing work on the gas has increased the **internal** energy of the gas.

Review

1. A bicycle pump is used to pump air into a bicycle tyre. Explain how this increases the internal energy of the air in the tyre? **Work is done on the air in the tyre. This causes the kinetic energy store of the particles to increase.**

2. Explain why the end nearest the tyre gets hot when using a bicycle pump? **Using the pump does work on the air in the tyre. This causes the temperature of the air to increase because the particle's kinetic store increases.**