

Gas Pressure Temperature

GCSE Physics · Written to the shared content for AQA, Edexcel and OCR

Name _____ Class _____ Date _____

1. Worked example

Explain how the particles of a gas exert a pressure on the walls of their container. (3 marks)

Step 1 · Motion

Gas particles move constantly and randomly at high speed.

Step 2 · Collisions

They collide with the walls of the container and bounce off.

Step 3 · Force

Each collision exerts a small force on the wall. Many collisions per second produce a steady force at right angles to the wall; force per unit area is the pressure.

Answer: Collisions of moving particles with the walls exert a force

Check: The force acts at right angles (normal) to the surface.

2. Now try one with the steps

A sealed can of gas is heated. Its volume does not change. Explain why the pressure increases. (3 marks)

Step 1 · Temperature

Step 2 · Collisions

Step 3 · Pressure

Answer:

3. Practice

Show your working. The marks tell you how much is expected.

1. Describe the motion of the particles in a gas. [1]

2. Explain how a gas exerts a pressure on the walls of its container. [2]

3. State how the temperature of a gas is related to the motion of its particles. [1]

4. A gas is heated in a sealed rigid container. State what happens to its pressure. [1]

5. Explain why the pressure of a gas at constant volume increases when it is heated. [3]

6. State the direction of the force that a gas exerts on the wall of its container. [1]

7. Convert 27 °C into kelvin. [1]

8. Convert 77 K into degrees Celsius. [1]

9. State the value of absolute zero in degrees Celsius. [1]

10. Explain why aerosol cans carry the warning 'do not expose to high temperatures'. [2]

11. Explain why a car tyre's pressure is higher after a long motorway journey. [2]

12. A gas at 300 K has a pressure of 150 kPa. It is heated to 600 K at constant volume. Calculate the new pressure in kPa. [2]

13. Use the particle model to explain why absolute zero is the lowest possible temperature. [2]

14. A gas cylinder at 20 °C has a pressure of 200 kPa. It is heated to 80 °C at constant volume. [3]
Calculate the new pressure in kPa to 3 significant figures.

4. Before you hand it in

Using °C in $p \propto T$: $100 \times 47 \div 20$

Convert to kelvin first (add 273).

"The particles get bigger when the gas is heated."

The particles move faster; if the gas can expand, the spaces between them get bigger.

"The particles hit each other more, so pressure increases."

Say the particles collide with the container walls more often and with more force.

"Heating gives the gas more particles."

The same particles move faster; nothing is added.