Gas pressure

Name _____ Class _____ Date _____

Gas particles are always moving. When they hit the walls of their container, they exert a force: this is gas **pressure**.

KEY IDEAS

- Gas molecules are in constant random motion. Temperature is related to their **average kinetic energy**.
- At constant volume, heating a gas increases its pressure.
- **Physics only:** for a fixed mass of gas at constant temperature, pV = constant. Doing work on a gas increases its temperature.

Section A · Recall

Grade 4–5

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

Constant, random motion in all directions.

2 Explain how gas particles cause pressure on the walls of a container. [2]

Particles collide with the walls,

exerting a force on them; the force per unit area is the pressure.

Section B · Explain

Grade 5–6

3 A sealed container of gas is heated. The volume doesn't change. Explain why the pressure increases. [4]

The particles gain kinetic energy and move faster.

They collide with the walls more often.

They hit the walls with more force.

So the total force on the walls (and the pressure) increases.

4 Explain why car tyre pressure is higher after a long journey. [2]

The tyres and the air inside get warmer,

so the particles move faster and hit the walls more often and harder.

Section C · Physics only

Grade 6–7+

5 A gas has a volume of 0.004 m³ at a pressure of 100 kPa. It is compressed to 0.001 m³ at constant temperature. Calculate the new pressure. [3]

pV = constant: 100 × 0.004 = p × 0.001

p = 0.4 ÷ 0.001

p = 400 kPa

6 Explain why the air in a bicycle pump gets warmer when the plunger is pushed in quickly. [3]
(Higher)

Pushing the plunger does work on the gas.

This transfers energy to the gas, increasing its internal energy,

so its temperature rises.

Exam-style question

AQA style

7 An aerosol can contains gas at high pressure. The label says 'Do not heat'.

a Explain, in terms of particles, why heating the can is dangerous. [3]

Heating makes the particles move faster,

so they hit the walls more often and with more force.

The pressure rises and the can could burst.

b The gas pressure exerts a force on the can. State the direction of this force. [1]

At right angles to the surface of the can (outwards).

Total: _____ / 19

How confident am I?	Not yet	Nearly	Got it
I can explain gas pressure using particles	☐	☐	☐
I can explain how temperature affects pressure	☐	☐	☐
I can use pV = constant (Physics only)	☐	☐	☐