Boyle’s Law

New Regents original practice • Name: _____ Date: _____
Show your work for written answers.

For a fixed amount of gas at constant temperature, use $P_1V_1 = P_2V_2$. Pressures are absolute.

1 A gas occupies 40 mL at 100 kPa. Its volume is reduced to 20 mL at constant temperature. What is its new pressure?

(1) 50 kPa

(2) 100 kPa

(3) 160 kPa

(4) 200 kPa

2 A sealed gas occupies 3.0 L at 120 kPa. Calculate its volume at 180 kPa if the temperature stays constant. Show your setup. [1]

Answer and work

3 Explain why the pressure of a fixed gas sample rises when its volume decreases at constant temperature. [1]

Answer and work

4 Which variables must remain fixed to apply Boyle’s law to a gas sample?

(1) Pressure and volume

(2) Temperature and amount of gas

(3) Temperature and pressure

(4) Volume and amount of gas

Sealed Piston

Use the information below to answer the questions.

A model piston contains a fixed amount of gas. The gas returns to the same temperature before each reading.

Trial	Volume (mL)	Pressure (kPa)
1	60	100
2	50	120
3	40	150

5 Calculate PV for trials 1 and 3. Include units and state how the two products compare. [1]

Answer and work

6 Which additional reading is consistent with the table at the same temperature?

(1) 30 mL and 200 kPa

(2) 30 mL and 100 kPa

(3) 75 mL and 125 kPa

(4) 80 mL and 150 kPa

7 Which property stays the same from trial 1 to trial 3?

(1) Distance between the piston and the bottom

(2) Frequency of particle impacts on the walls per unit area

(3) Average kinetic energy of the gas particles

(4) Pressure on the piston

8 A seal fails and some gas escapes before the next reading. Explain why the original PV product should no longer be used to predict its pressure. [1]

Answer and work