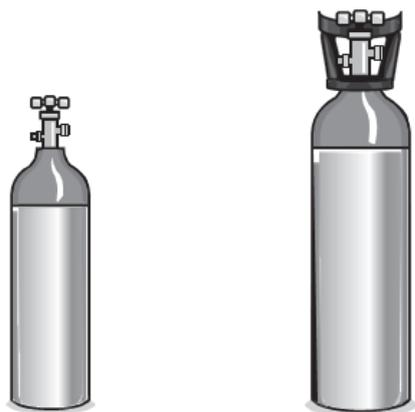


**GCSE Physics B (Twenty First Century Science)**  
**J259/01** Breadth in Physics (Foundation Tier)

**Question Set 19**

1

Hospitals store oxygen at high pressure in metal cylinders. The pictures show two cylinders, **A** and **B**. Both cylinders contain the same mass of gas and have the same temperature.



Cylinder **A**

Cylinder **B**

(a) Cylinder **A** contains oxygen at a pressure of 23 000 kPa.

The area of the base of cylinder **A** is 0.030 m<sup>2</sup>.

Calculate the force exerted by the gas on the base of cylinder **A**.

Use the equation: force normal to a surface = pressure × area of that surface

$$F = 23,000,000 \times 0.03$$

$$= 690,000 \text{ N}$$

Force = ..... 690,000 ..... N [3]

(b) Cylinder **B** has a larger volume than cylinder **A**.

The pressure in cylinder **B** is smaller than the pressure in cylinder **A**.

(i) Explain, using ideas about **particles**, why storing the same mass of gas in a larger volume produces a smaller pressure. [2]

Larger volume means fewer and less frequent collisions of particles so smaller pressure

(ii) Both cylinders contain the same mass of gas and are at the same temperature.

	Pressure (kPa)	Volume (dm <sup>3</sup> )
Cylinder <b>A</b>	23 000	15
Cylinder <b>B</b>	10 000	

Calculate the volume of gas in cylinder **B**.

Use the equation: pressure × volume = constant

$$23000 \times 15 = 10000 \times V \text{ so } V = \frac{345000}{10000}$$

$$V = 34.5 \text{ dm}^3$$

Volume of gas = ..... 34.5 ..... dm<sup>3</sup> [2]

**Total Marks for Question Set 19: 7**

## Resource Materials

Question Set No: 19

### Equations in Physics

change in internal energy = mass  $\times$  specific heat capacity  $\times$  change in temperature

energy to cause a change in state = mass  $\times$  specific latent heat

for gases: pressure  $\times$  volume = constant

(for a given mass of gas and at a constant temperature)

$(\text{final speed})^2 - (\text{initial speed})^2 = 2 \times \text{acceleration} \times \text{distance}$

energy stored in a stretched spring =  $\frac{1}{2} \times \text{spring constant} \times (\text{extension})^2$

potential difference across primary coil  $\times$  current in primary coil =

potential difference across secondary coil  $\times$  current in secondary coil

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