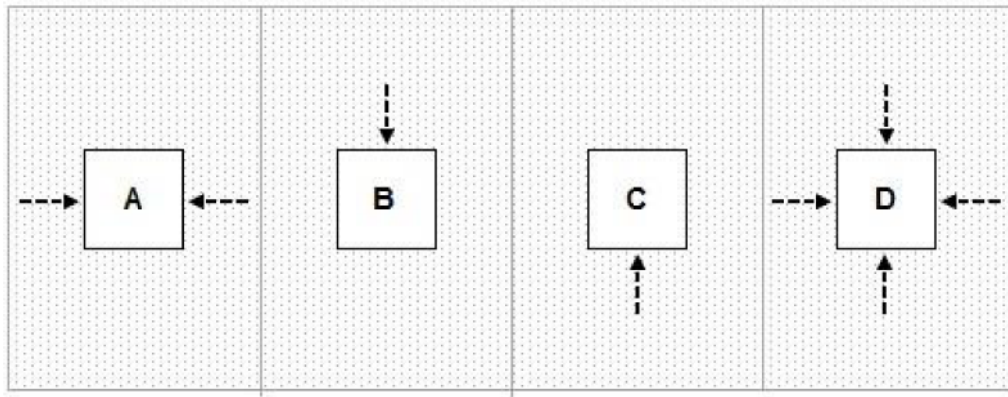


1. A solid block is immersed in a liquid.

Which **one** of the diagrams, **A**, **B**, **C** or **D**, best shows the **direction** of all the force(s) on the solid caused by the liquid pressure?

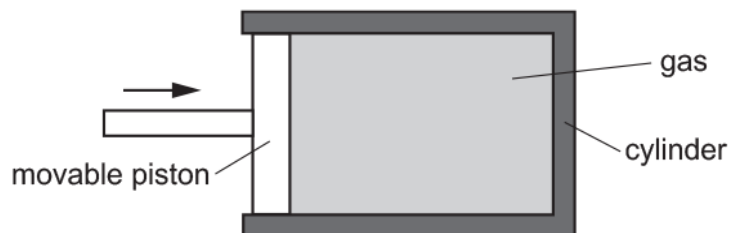


----- [1]

2(a). This question is about the particles in a gas and the pressure they exert on a container.

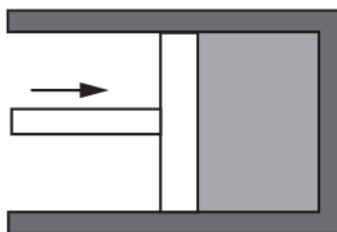
A tight-fitting moveable piston traps gas in a cylinder as shown in the diagram.

The gas has volume 300 cm^3 and pressure of 100 kilopascals (kPa).



The piston is now pushed in and changes the volume of the gas to 150 cm^3 .

The temperature of the gas has not changed.



Calculate the new pressure of the gas.

Use the equation: old pressure \times old volume = new pressure \times new volume

New pressure = ----- kPa [2]

(b). The piston is moved to a new position.

The force with which the gas pushes out on the piston is 300 N.

The area of the piston is 0.002 m².

Calculate the pressure of the gas in pascals (Pa).

Pressure = ----- Pa [3]

END OF QUESTION PAPER

Question		Answer/Indicative content	Marks	Guidance
1		D	1	
		Total	1	
2	a	<p>FIRST CHECK THE ANSWER ON THE ANSWER LINE. If answer = 200 (kPa) award 2 marks</p> <p>$100 \text{ (kPa)} \times 300 \text{ (cm}^3\text{)} = 30\,000 \text{ (kPa cm}^3\text{)}$ ✓ (AO 1.2)</p> <p>$\text{New P} \times 150 \text{ (cm}^3\text{)} = 30\,000 \text{ (kPa cm}^3\text{)}$ ✓ (AO 2.1)</p> <p>$\text{New P} = 30\,000 \text{ (kPa cm}^3\text{)} / 150 \text{ cm}^3 = 200 \text{ (kPa)}$ ✓</p> <p>OR (AO 1.2)</p> <p>$100 \text{ (kPa)} \times 300 \text{ (cm}^3\text{)} = \text{New P} \times 150 \text{ (cm}^3\text{)}$ ✓ (AO 2.1)</p> <p>$\text{New P} = 100 \text{ (kPa)} \times 300 \text{ (cm}^3\text{)} \div 150 \text{ (cm}^3\text{)}$ ✓ (AO 2.1)</p> <p>$\text{New P} = 200 \text{ (kPa)}$ ✓</p>	2	<p>ALLOW e.g 'half V means double P'</p> <p>Examiner's Comments</p> <p>The majority of candidates could do this question. There were also a number who were credited with one mark for multiplying the original pressure by the original volume and then stopped. Others calculated the original product but then made an error with the next stage. Fortunately more candidates did write down their workings for this question and so they could be credited for the correct stages of their process.</p>
	b	<p>FIRST CHECK THE ANSWER ON THE ANSWER LINE. If answer = 150 000 (Pa) award 3 marks</p> <p>Pressure = force/area ✓ (AO 1.2)</p> <p>= $300 \text{ (N)} / 0.002 \text{ (m}^2\text{)}$ ✓ (AO 2.1)</p> <p>= $150\,000 \text{ (Pa)}$ ✓ (AO 2.1)</p>	3	<p>Examiner's Comments</p> <p>In contrast to part (b), the majority of candidates did not successfully complete this question. A common misconception was candidates who thought that pressure = force × area. Other candidates squared the given value for the area of the piston, $300 \div 0.000\,004 = 75\,000\,000 \text{ Pa}$.</p>
		Total	5	