The Particle Model

***Total marks**: 11*

1. The atomic model has changed over time. Why did the model need to change over time?

A Models only have a finite lifetime
B Computers were invented
C The older models could not explain new evidence
D Peer review

Your answer ☐ **[1]**

2. What is the typical diameter of an atom?

A 1.0×10^{-15} m
B 1.0×10^{-10} m
C 1.0 µm
D 1.0 mm

Your answer ☐ **[1]**

3. A liquid has a volume of 0.01 m^3 and a mass of 12 kg. What is the density of the liquid?

Use the equation: density = mass × volume

A 0.12 kg / m^3
B 12 kg / m^3
C 120 kg / m^3
D 1200 kg / m^3

Your answer ☐ **[1]**

4. A student investigates what happens when she heats a beaker of water.

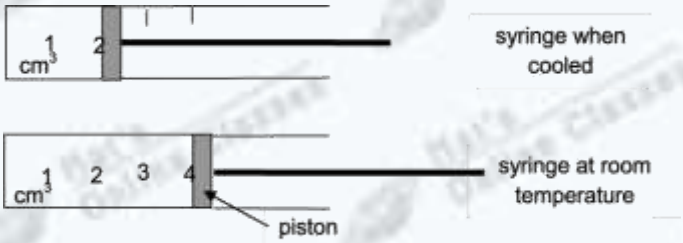
	The temperature increases	**The state changes**	**The energy stored in the water changes**
A	✔	✔	✔
B	✔	***x***	***x***
C	*x*	✔	***x***
D	***x***	***x***	✔

Which row in the table describes what **could** happen when the water is heated?

Your answer ☐ **[1]**

5. A graduated syringe contains air. It is put in a freezer to cool it down.

When it is removed from the freezer the piston has moved inwards.



The density of the air in the syringe when cooled is 2.4 kg/m^3.

What was the density of the air at room temperature?

A. 0.6 kg/m^3
B. 1.2 kg/m^3
C. 2.4 kg/m^3
D. 4.8 kg/m^3

Your answer ☐

[1]

6. A piece of metal has a volume of 2.0×10^{-5} m^3. The density of it is 8.0×10^3 kg/m^3.

What is its mass?

A. 2.5×10^{-3} kg
B. 4.0×10^{-2} kg
C. 1.6×10^{-1} kg
D. 1.6×10^{3} kg

Your answer ☐

[1]

7(a). A student uses a ruler to determine the volume of a cube, **A**. The length of one side of the cube is
0.100 m.

i. Calculate the volume of cube **A**.

Volume of cube **A** = m^3
..... **[2]**

ii. Cube **B** has the same volume as cube **A**.

The mass of cube **B** is ten times greater than the mass of cube **A**.

Compare the density of cube **B** with cube **A**.

Use the equation for density to help your explanation.

_____

[2]

_____

(b). Give **one** reason why a solid is more dense than a gas.

_____

[1]

_____

Mark scheme

Question			Answer/Indicative content	Marks	Guidance
1			C ✓	1 (AO1.1)	**Examiner's Comments** The great majority of candidates gave the correct answer C.
			Total	**1**	
2			B ✓	1 (AO1.1)	**Examiner's Comments** The majority of the candidates correctly recalled the diameter of the atom. A small but significant number of candidates incorrectly chose response A.
			Total	**1**	
3			D ✓	1 (AO2.1)	**Examiner's Comments** Most candidates correctly substituted the numbers into the given equation.
			Total	**1**	
4			A	1 (AO2.1)	
			Total	**1**	
5			B	1	
			Total	**1**	
6			C	1	
			Total	**1**	
7	a	i	**FIRST CHECK THE ANSWER ON ANSWER LINE** **If answer = 0.001 / 1x10^{-3} (m^3) award 2 marks** 0.1 x 0.1 x 0.1 ✓ = 0.001 / 1x10^{-3} (m^3) ✓	2 (AO2x2.2)	
		ii	Density = mass/volume / density is proportional to mass ✓ (Cube B has 10 x mass of cube A, so) density of cube B is 10 x density of cube A ✓	2 (AO1.2) (AO2.2)	**ALLOW** density is 10 times larger **ALLOW** numerical values used to show density of cube B is 10 x density of cube A
	b		Particles (in solid) are close(r) together / (more) compact / ORA / AW✓	1 (AO1.1)	Assume answer refers to a solid unless indicated otherwise