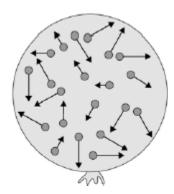
The figure below shows a balloon filled with helium gas.



(a)	Describe the movement of the particles of helium gas inside the balloon.	
		(2)
(b)	What name is given to the total kinetic energy and potential energy of all the particles of helium gas in the balloon?	
	Tick one box.	
	External energy	
	Internal energy	
	Movement energy	
		(1)
(c)	Write down the equation which links density, mass and volume.	
		(4)
		(1)

(d)	The h	nelium in the balloon has a	mass of 0.00254 kg.		
	The b	palloon has a volume of 0.0)141 m ³ .		
	Calcu	ulate the density of helium.	Choose the correct unit fro	om the box.	
		m ³ / kg	kg / m³	kg m ³	
		Density	y =	Unit	(3)
					(Total 7 marks)

In this question you will be assessed on using good English, organising information clearly and using specialist terms where appropriate.

The information in the box is about the properties of solids and gases.

Solids:

- have a fixed shape
- are difficult to compress (to squash).

Gases:

- will spread and fill the entire container
- are easy to compress (to squash).

Use your knowledge of kinetic theory to explain the information given in the box.

You should consider:

- the spacing between the particles
- the movement of individual particles

• the forces between the particles.	
	••
	•••
	•••
	• •
	•••
	•••
Extra space	
	•••
	• •
	• •
	• •

(Total 6 marks)

Mark schemes

1	(a)	range of speeds	1
		moving in different directions accept random motion	1
	(b)	internal energy	1
	(c)	density = mass / volume	1
	(d)	0.00254 / 0.0141	1
		0.18	1
		accept 0.18 with no working shown for the 2 calculation marks	
		kg / m^3	

[7]

2

Marks awarded for this answer will be determined by the Quality of Written Communication (QWC) as well as the standard of the scientific response. Examiners should also apply a 'best-fit' approach to the marking.

0 marks

No relevant content.

Level 1 (1-2 marks)

Considers either solid or gas and describes at least one aspect of the particles.

or

Considers both solids and gases and describes an aspect of each.

Level 2 (3–4 marks)

Considers both solids and gases and describes aspects of the particles.

or

Considers one state and describes aspects of the particles and explains at least one of the properties.

or

Considers both states and describes an aspect of the particles for both and explains a property for solids or gases.

Level 3 (5-6 marks)

Considers both states of matter and describes the spacing and movement / forces between the particles. Explains a property of both solids and gases.

examples of the points made in the response extra information

Solids

- (particles) close together
- (so) no room for particles to move closer (so hard to compress)
- vibrate about fixed point
- strong forces of attraction (at a distance)
- the forces become repulsive if the particles get closer
- particles strongly held together / not free to move around (shape is fixed)

any explanation of a property must match with the given aspect(s) of the particles.

Gases

- (particles) far apart
- space between particles (so easy to compress)
- move randomly
- negligible / no forces of attraction
- spread out in all directions (to fill the container)