

The Particle Model

Q1.(2018)

B ✓

Q2.(2018)

Calculate the volume / measure the three dimensions of the cube / find the volume by displacement / use a Eureka can ✓	3	1.2	
Find its mass / use a balance ✓		1.1	
Density = mass ÷ volume ✓		1.2	IGNORE references to weighing

Q3.(2019)

C

Q4.a(2019)

Measure one edge of the cube ✓ Value of edge cubed / l × w × h / AW ✓	2	2×1.2	ALLOW measure side/width/length/height/ AW
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Q4.b(2019)

FIRST CHECK THE ANSWER ON ANSWER LINE If answer = 6.8 (g / cm³) award 2 marks 850 / 125 ✓ = 6.8 (g / cm ³) ✓	2	2×2.1	ALLOW answer = 7 (g/cm ³) ✓✓
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Q5.a(2019)

Scales / (electronic) balance ✓	1	1.2	ALLOW top-pan balance
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Q5.b(2019)

Measuring cylinder or eureka can or displacement can ✓	1	1.2	ALLOW overflow can
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Q6.(2020)

A

Q7.(2020)

B

Q8.(2020)

Faster ✓
Collide ✓
Pressure ✓

3

Q9.a(2021)

[1 before 5]
5 before 4 ✓
4 before 3 ✓
[3 before 2]

2

Q9.b(2021)

Peer Review
Any one from:
to confirm the experiment is reproducible ✓

to check the method ✓
to check for mistakes ✓

to ensure quality of research / uphold standards / prevent unethical behaviour ✓
to offer advice by experts ✓

Communication
Any one from:
other scientists can check / test / verify / validate results (against own results) ✓
other scientists can develop or use ideas or theories ✓
others can use or compare the data ✓
improve knowledge or education ✓
more data available / allow further development or research ✓
to gain credit or acknowledgement for their work ✓

2

2 × 3.2a

ALLOW to check it is carried out correctly
IGNORE to see if others think the same

ALLOW to ensure the experiments are performed correctly / to know of any downfalls / checking the findings / check the validity / to cross check

ALLOW to detect false claims

ALLOW to add more ideas/points / to give another opinion

ALLOW to make corrections

ALLOW other investigations or experiments could be done afterwards / for more opinions and theories

ALLOW to see similarities and differences

ALLOW help with new technologies

Q10.a(2021)

Any two from:
Density of solids is the greatest / AW ✓

Density of gases is the least / AW ✓

Density of solids > density of liquids / ORA ✓
Density of solids > density of gases / ORA ✓
Density of liquids > density of gases / ORA ✓

2

Q10.b(2021)

Atoms more tightly packed in a solid than liquid / OR A ✓

2

2 × 1.1

ALLOW answers on a labelled diagram

So greater mass in the same volume / OR A ✓

Q11.(2022)

C ✓

Q12.(2022)

Please refer to the marking instructions on page 4 of this mark scheme for guidance on how to mark this question.

6

2 × 1.2
2 × 2.1
2 × 3.3b**AO 1.2 – Demonstrates knowledge and understanding of how density can be measured****Level 3 (5–6 marks)**

Detailed description of how to measure density

AND

calculation of density

AND

suggestion to improve method

There is a well-developed line of reasoning which is clear and logically structured. The information presented is relevant and substantiated.

- Volume measured using displacement of water
- Volume measured using a eureka/displacement/overflow can and measuring cylinder
- Mass measured using a scales/(top-pan) balance
- Density = mass ÷ volume or symbol equation

Level 2 (3–4 marks)

Description of how to measure density

AND

calculation of density

OR

Description of how to measure density

AND

suggestion to improve method

AO 2.1 – Applies knowledge and understanding of density to calculate the density of the eraser

- Density = $12.9 \div 8.6$
- Density = $1.5 \text{ (g / cm}^3\text{)}$

OR

Calculation of density

AND

suggestion to improve method

AO 3.3b – Analyse information and ideas to improve experimental procedure

- Make sure measuring cylinder is dry before measurements taken
- Make sure eureka can is full to edge of spout
- Make sure all water displaced is measured
- Take repeat readings (of mass/volume and calculate mean)
- Insert eraser directly into a wide measuring cylinder (to measure volume directly)
- Use a measuring cylinder with a higher resolution

*There is a line of reasoning presented with some structure. The information presented is relevant and supported by some evidence.***Level 1 (1–2 marks)**

Basic description of how to measure density

OR

reasonable attempt to calculate density

OR

suggestion to improve method

*There is an attempt at a logical structure with a line of reasoning. The information is in the most part relevant.***0 marks***No response or no response worthy of credit.*

Q13.(2022)

Accurate ✓

1

3.2b

more than one word is 0 marks

if answer line blank allow answer indicated in the
list but answer line takes precedence

Q14.(2023)

A

Q15.(2023)

C

Q16.(2023)

A

Q17.(2023)

B

Q18.(2024)

D

Q19.(2024)

D