Q1. (2018)

a)

07.1	**Level 3:** The method would lead to the production of a valid outcome. All key steps are identified and logically sequenced.	5–6	AO1 6.3.1.1
	Level 2: The method would not necessarily lead to a valid outcome. Most steps are identified, but the method is not fully logically sequenced.	3–4	
	Level 1: The method would not lead to a valid outcome. Some relevant steps are identified, but links are not made clear.	1–2	
	No relevant content	0	
	Indicative content • measure mass • use a top pan balance or scales • part fill a measuring cylinder with water • measure initial volume • place object in water • measure final volume • volume of object = final volume − initial volume • fill a displacement / eureka can with water • water level with spout • place object in water • collect displaced water • measuring cylinder used to determine volume of displaced water • use of: $\text{density} = \frac{\text{mass}}{\text{volume}}$		

b)

07.2	all *y*-axis values correct (minimum of 3)	allow **1** mark for two correct values	2	AO2 6.3.1.1
	all bars drawn to the correct height	allow **1** mark for two correct bars allow ± ½ small square	2	

c)

07.3		an answer of 80 scores **2** marks		AO3 6.3.1.1
	$\frac{(1120 - 960)}{2}$	ignore + and / or − signs	1	
	= 80 (kg/m^3)	an answer of 160 scores **1** mark	1	

Q2. (2021)

a)

01.1	the piece of limestone has an irregular shape		1	AO1 6.3.1.1 RPA17

b)

01.2	**Level 2:** The method would lead to the production of a valid outcome. The key steps are identified and logically sequenced.	3–4	AO1 6.3.1.1 RPA17
	Level 1: The method would not lead to a valid outcome. Some relevant steps are identified, but links are not made clear.	1–2	
	No relevant content	0	
	Indicative content • add water to the displacement can until level with the spout • place the limestone in the water • avoid splashing water out of the displacement can • collect the displaced water in the beaker or measuring cylinder • measure the volume of the displaced water • using a measuring cylinder OR • use the large measuring cylinder • part fill the measuring cylinder water • measure the initial volume on the measuring cylinder • submerge the limestone in the water • measure the final volume on the measuring cylinder • volume of limestone = final volume − initial volume To access level 2 the answer must refer to submerging the limestone in water and using the measuring cylinder.		

c)

01.3	density = $\frac{155}{62}$ density = 2.5 (g/cm^3)		2	AO2 6.3.1.1 RPA17

d)

01.4	kg/m^3		1	AO1 6.3.1.1 RPA17

e)

01.5	bar drawn to 2.4 g/cm^3		1	AO2 6.3.1.1 RPA17

f)

01.6	obsidian		1	AO3 6.3.1.1 RPA17

g)

01.7	other types of rock may have the same density as obsidian	allow not all rock types are plotted on the bar chart	1	AO3 6.3.1.1 RPA17

Q3. (2021)

01.9	less than		1	AO3 6.3.1.1

Q4. (2022)

a)

04.6	resolution		1	AO3 6.3.1.1 RPA17

b)

04.7	density = $\frac{\text{mass}}{\text{volume}}$ **or** $\rho = \frac{m}{V}$		1	AO1 6.3.1.1

c)

04.8	$0.300 = \frac{m}{0.186}$ $m = 0.300 \times 0.186$ $m = 0.0558$ (g)		1 1 1	AO2 6.3.1.1

Q5. (2023)

03.6	(the space between the particles) increases	allow the particles move further apart	1	AO1 6.3.1.1

Q6. (2024)

a)

05.6	90 (m^3)		1	AO2 6.3.1.1

b)

05.7	density = $\frac{\text{mass}}{\text{volume}}$ **or** $\rho = \frac{m}{V}$		1	AO1 6.3.1.1

c)

05.8	$1100 = \frac{m}{90}$ mass = 90 × 1100 99 000 (kg)	allow ecf from question **05.6**	1 1 1	AO2 6.3.1.1