01. 0625_m20_MS_62 Q: 1

(a)(i)	l = 4.5 (cm) and d = 2.0 (cm)	1
	both to 1 decimal place	1
(a)(ii)	method outlined /	1
	how diameter determined accurately e.g. use of string wrapped round rod and measured / several turns and calculate diameter from circumference, OR use of rod between two blocks and measure gap / in at least 2 places and take average, OR means of measuring diameter across ends / at several places and take average, OR use of micrometer, (vernier) callipers / at various points (along length or across ends) and take average	1
(b)	m present and ρ_1 = 0.55 / ecf	1
	correct unit (g / cm^3)	1
(c)	V_1 = 144 (cm^3) and V_2 = 152 (cm^3)	1
(d)	ρ_2 = 0.57 / ecf	1
	ρ_1 and ρ_2 to consistent 2 or consistent 3 significant figures	1
(e)	straight arrow perpendicular to measuring cylinder	1

(f)	suitable source of inaccuracy e.g.: measuring cylinder scales less precise / accurate, water lost on transfer / droplets on clay, wood might absorb water	1

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02. 0625_s18_MS_62 Q: 1

(a)(i)	2 or more measurements seen	1
	D_B = 4.8 ± 0.1 (cm)	1
(a)(ii)	D = 6.0 (cm)	1
(b)	1 h = 7.8 (cm) **AND** 2 V = 220(.428) (cm^3)	1
(c)	ρ = 1 / 1.1 / 1.05(…….)	1
	2 or 3 significant figures	1
	g / cm^3	1
(d)	any **one** from: part **(a)** drawn circle not exact / thickness of rim or cup / thickness of the pencil line part **(b)** difficult to measure the height (in practice) / D^2 increases inaccuracy in D part **(c)** mass of cup has been ignored	1
(e)	diagram showing clearly:	
	line of sight perpendicular to measuring cylinder	1
	to the bottom of the meniscus	1

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03. 0625_w18_MS_63 Q: 1

(a)(i)	l = 6.0, w = 3.0, h = 4.0 (cm)	1
(a)(ii)	V_1 = 72 (cm^3)	1
(b)	difficult to measure irregular dimensions / owtte	1
	repeat (in several places for each dimension and take averages)	1
(c)	W = 1.4 (N)	1
(d)	ρ_1 = 1.9(4)	1
	unit g / cm^3	1
(e)(i)	V_2 = 160 (cm^3)	1
(e)(ii)	line of sight perpendicular	1
(f)(i)	V_3 present and ρ_2 = 2.0(g / cm^3)	1
(f)(ii)	*suggestion supported by valid reason e.g.* ρ_2 as volume is measured directly; ρ_1 as measuring cylinder is less precise; string adds to volume displaced.	1

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04. 0625_s17_MS_63 Q: 1

(a)	W_1 = 1.5 (N)	1
(b)(i)	V_1 = 155 (cm^3)	1
(b)(ii)	line of sight perpendicular	1
	to bottom of meniscus	1
(c)	W_2 = 0.7 (N) and V_2 = 235 (cm^3)	1
(d)	ρ_1 = 1.0 or ecf	1
	unit g/cm^3	1
(e)	m_1 = 241 (g)	1
(f)	ρ_{AV} 0.978 / 0.977(g/cm^3)	1
(g)	appropriate cause of inaccuracy: e.g: • some water still in empty measuring cylinder • water spilled, splashed when putty put in water • water drops on putty when removed • air bubbles on putty	1
	suitable improvement: e.g: • measure m_2 at start (when cylinder dry) • measure new volume in Method OR refill to correct value • shake putty to remove air / smooth surface to minimise bubbles	1
	Total:	11

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05. 0625_m16_MS_62 Q: 2

(a) (i) l = 14.7 AND d = 2.5 [1]

(ii) boiling tube between blocks and ruler spanning gap [1]

suitable precaution e.g. [1]
measure in (at least) 2 places and take average,
avoid lip,
ensure blocks smooth,
no dirt between tube and block

(iii) V_1 = 72 [1]

(b) (i) V_2 = 54 [1]

(ii) line of sight perpendicular to reading / [1]
read from bottom of meniscus

(iii) V_3 correctly calculated [1]

(c) (i) ρ = 1.7 to 1.8 [1]

unit g / cm^3 [1]

(ii) m = 32 (g) [1]

(d) suitable source of inaccuracy [1]
e.g.
- any reference to why tube is not a cylinder,
- tube may contain some water when mass taken,
- difficult to fill to brim and then pour out

appropriate effect on value of ρ explained [1]

[Total: 12]

(a)(i)(ii) $m_1 = 40.68\,(g)$ and $m_2 = 113.60\,(g)$
correct answer only (not 40:68, 113:60) [1]

(iii) $V_1 = 72\ (cm^3)$ correct answer only [1]

(iv) ρ_1 with unit of g/cm^3 or kg/m^3 seen in **(a)**, **(b)** or **(c)** and not contradicted
(unit must match value) [1]

(b)(i)(ii) $m_3 = 15.47\,(g)$ and $V_2 = 88\,(cm^3)$ correct answer only [1]

(iii) $V_3 = 16\ (cm^3)$ / ecf [1]

(iv) ρ_2 to 2 / 3 sig. figs. [1]

(c) ρ_{AV} 0.99(1) (g/cm^3) **or** 991 / 990 (kg/m^3) **or** ecf from **(a)** and **(b)** [1]

(d) any one from:
- take reading perpendicularly / at right angles to scale
- read bottom of meniscus
- other suitable precaution [1]

(e) appropriate source of inaccuracy, other than in **(d)**
e.g. balance not at zero / test-tube catches on side of measuring cylinder [1]

matching effect on ρ with explanation
e.g. ρ greater as mass reading larger / ρ greater as volume smaller [1]

[Total: 10]

07. 0625_s13_MS_63 Q: 4

(a) $V_1 = 66\,(cm^3)$ [1]
$V_2 = 83\,(cm^3)$ [1]

(b) density = 6.7 or 6.71 / allow e.c.f. [1]
unit g/cm^3 [1]

(c) suitable cause:
e.g. object not dried before measuring mass
mass measured after immersion
measuring cylinder not read at eye-level / parallax explained
measuring cylinder not read at meniscus (o.w.t.t.e.)
zero reading on balance not allowed for [1]

[Total: 5]