

Name of the Student: _____

Max. Marks : 18 Marks

Time : 18 Minutes

Mark Schemes

Q1.

Question number	Answer	Additional guidance	Mark
(i)	substitution into $\Delta Q = m \times s \times \Delta T$ (1) $(\Delta Q) = 1.41 \times 4200 \times (100-25)$ evaluation (1) (energy =) 444,150 (J) answer to 2 sf (1) 440,000 (J)	ignore POT error for this mark independent mark allow 3 sf 444,000 award full marks for the correct answer without working award 1 mark for answers with values 148,050 or 592,200 (incorrect temp and sf) award 2 marks for answers with values 150,000 or 148,000 or 590,000 or 592,000 (incorrect temp but allowed sf)	(3) AO2

Question number	Answer	Additional guidance	Mark
(ii)	substitution into $\Delta Q = m \times L$ $450,000 = (1.41 - 1.21) \times L$ (1) rearrangement $L = \frac{450,000}{0.2}$ (1) evaluation $(L) = 2\,200\,000 \text{ (J/kg)}$ (1)	allow substitution and rearrangement in either order accept 2 250 000 award full marks for the correct answer without working award 1 mark for answers that round to 330,000 or 370,000 (incorrect mass used)	(3) AO2

Q2.

Question Number:	Answer	Additional Guidance	Mark
	substitution (1) $(Q =) \frac{380 \times 3.34 (\times 10^5)}{(1000)}$ evaluation (1) $1.27 \times 10^5 \text{ (J)}$	127 kJ 126920 (J) accept answers that round to 1.27×10^5 e.g. 1.2692×10^5 accept 130 kJ or $1.3 \times 10^5 \text{ (J)}$ POT error max. 1 mark award full marks for correct answer without working	(2) AO 2 1

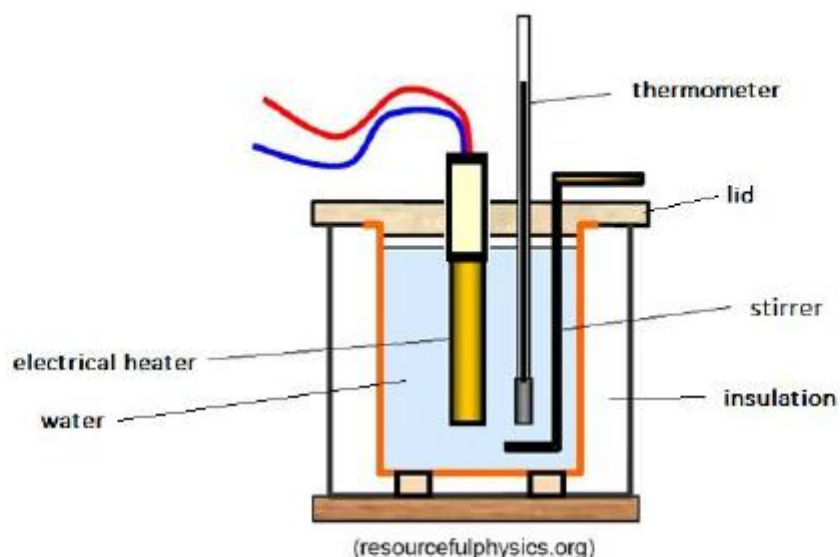
Q3.

Question number	Answer	Mark
(i)	C	(1)

Question number	Answer	Additional guidance	Mark
(ii)	Equating the same variable in both equations (1) $\Delta Q = m \times c \times \Delta\theta = P \times t$ Rearrangement (1) $t = \frac{(m \times c \times \Delta\theta)}{P}$ Substitution and evaluation (1) $t = \frac{(1 \times 4200 \times 77)}{3500}$ $= 92 \text{ s}$	allow $\Delta\theta$ seen as 95 – 18 92.4 evaluation must be seen to at least 2 s.f. at some point in the working	(3)

Q4.

SSQ NO:	CS NO:	Answer	Mark
*		Answers will be credited according to candidate's deployment of knowledge and understanding of the material in relation to the qualities and skills outlined in the generic mark scheme. The indicative content below is not prescriptive and candidates are not required to include all the material which is indicated as relevant. Additional content included in the response must be scientific and relevant. (Accept the method of cooling a heated object in water but consult your TL.) AO1 strand 2 (6 marks) Details of the apparatus to include:	(6) AO1.2



- credit all elements seen in diagram or stated
- may also include power supply / electrical circuitry
- other apparatus – balance / scales ; stopwatch ; voltmeter / ammeter / joulemeter

- ignore bunsen burner

(continued ...)

Steps taken with the procedure and calculation including:

- measure mass of water (with a balance)
- measure initial temperature (with thermometer)
- switch on for a (set) time / use of stopwatch
- measure final / highest temperature (reached)
- measure energy input on joulemeter / measure V, I and t
- extra detail e.g. stirring / how to get final maximum temperature
- rearrange $\Delta Q = m \times c \times \Delta\theta$ to find c $c = \frac{\Delta Q}{m \times \Delta\theta}$
- correct use of graph to determine c

Level	Mark	Descriptor
	0	No rewardable material.
Level 1	1-2	- Demonstrates elements of physics understanding, some of which is inaccurate. Understanding of scientific, enquiry, techniques and procedures lacks detail. (AO1) - Presents a description which is not logically ordered and with significant gaps. (AO1)
Level 2	3-4	Demonstrates physics understanding, which is mostly relevant but may include some inaccuracies. Understanding of scientific ideas, enquiry, techniques and procedures is not fully detailed and/or developed. (AO1)

		Presents a description of the procedure that has a structure which is mostly clear, coherent and logical with minor steps missing. (AO1)
Level 3	5-6	- Demonstrates accurate and relevant physics understanding throughout. Understanding of the scientific ideas, enquiry, techniques and procedures is detailed and fully developed. (AO1) - Presents a description that has a well-developed structure which is clear, coherent and logical. (AO1)

Level	Mark	Additional Guidance	General additional guidance – the decision within levels e.g. - At each level, as well as content, the scientific coherency of what is stated will help place the answer at the top, or the bottom, of that level.
	0	No rewardable material.	
Level 1	1–2	<u>Additional guidance</u> list of relevant apparatus: at least 2 items AND at least one reasonable step described OR gives equation to find c	<u>Possible candidate responses</u> some apparatus named e.g. thermometer, balance, stirrer, joulemeter, ammeter, voltmeter, beaker diagram with some labels measure mass of water use a thermometer use of $\Delta Q = m \times c \times \Delta\theta$

Level 2	3–4	<u>Additional guidance</u> list of apparatus for measurements AND logical steps including how to find $\Delta\theta$ OR ΔQ	<u>Possible candidate responses</u> balance / thermometer together with joulemeter / stopwatch etc. measure initial and final temperatures with a thermometer realistic use of joulemeter
Level 3	5–6	<u>Additional guidance</u> understanding is detailed and fully developed. includes detail about apparatus used to obtain measurements AND details in steps taken, including how to find $\Delta\theta$ AND ΔQ	<u>Possible candidate responses</u> (use of) balance / thermometer / stopwatch / insulated can / electrical heater etc. measure mass of water (with a balance) / measure initial and final temperatures with a thermometer + electrical heating applied
		AND how to determine c	for a (set) time + realistic use of joulemeter (or power (VI) and time) $c = \frac{\Delta Q}{m \times \Delta\theta}$