Question number	Answer	Notes	Marks
4 (a)	temperature difference calculated; substitution into given formula; correct evaluation; e.g. $\Delta T = 100 - 16 = 84$ (°C) energy supplied = $0.45 \times 4200 \times 84$ (energy supplied =) 160 000 (J)	e.g. 84 seen or 100 - 16 seen allow ecf for incorrect temperature difference 158 000 (J) scores 2 marks only allow 159 000, 158 760 (J)	3
(b) (i)	(7.4 – 3.0) = 4.4 (minutes);	allow 4 minutes and 24 seconds, 4 and $^4/_{10}$ minutes	1
(ii)	conversion of time into seconds; substitution into P = W/t OR rearrangement; correct evaluation; e.g. time = 264 (s) 2200 = W / 264 OR W = P × t energy supplied = 580 000 (J)	allow ECF from (i) allow ECF from (i) allow substitution in minutes 9700, 9680 (J) scores 2 marks allow 581 000, 580 800 (J)	3
(c)	idea of all water being the same temperature;	allow idea of distributing thermal/heat (energy) evenly throughout water	1
(d)	**arrangement** idea that liquid has molecules that are close together; idea that gas has (widely) spaced molecules; **motion** idea that liquid has molecules that move/slide past each other; idea that gas has molecules that move {faster/freely/randomly/straight lines};	allow marks if seen on diagrams allow particles for molecules ignore random/irregular arrangement for liquid and gas	4

Total for Question 4 = 12 marks

Question number	Answer	Notes	Marks
5 (a)	step-up transformer increases voltage OR step-down transformer decreases voltage; step-up transformer reduces current; (lower current means) lower heating/energy losses; (town) requires low voltage {for safety / to reduce chance of electrocution / so appliances operate correctly};		4
(b) (i)	$N_p/N_s = V_p/V_s$;	allow any correct rearrangement or word formula allow n, T for turns allow 1, in for p allow 2, out for s	1
(ii)	substitution; rearrangement; evaluation; e.g. $3300/N_s = 15/340$ $N_s = (3300 \times 340) \div 15$ (N_s =) 75 000	 -1 for POT error allow 74 800	3
(c) (i)	thermal (store);	condone heat	1
(ii)	any three from: MP1. field lines cut by core; MP2. idea of an induced voltage; MP3. conductors have **free** electron(s); MP4. idea that there is a force on the electron(s); MP5. idea that the movement of electrons is the current;		3

Total for Question 5 = 12 marks