Q1.

Question number	Answer	Additional guidance	Mark
	rearrangement (1) $(l =) \frac{\Delta Q}{\Delta m}$ substitution (1) $l = \frac{270\,000}{0.12}$ answer (1) 2 250 000 (J/kg °C)	award full marks for correct numerical answer without working 2250 (J/kg °C) gains 2 marks as power of 10 error	**(3)**

Q2.

Question Number	Answer	Additional guidance	Mark
(ii)	substitution into Q = m × L (1) 0.34 = 0.15 × L re-arrangement and evaluation (1) $(L = \frac{0.34}{0.15} =)$ 2.3 (MJ/kg)	allow values that round to 2.3 (MJ/kg) allow 1 mark for POT error award full marks for the correct answer without working	**(2)**

Q3.

	Answer	Additional guidance	Mark
	substitution into $Q = m \times L$ (1) (Q =) 60 ($\times 10^{-3}$) $\times$ 2.26 ($\times 10^{6}$) evaluation (1) 1.36×10^{5} (J)	 136 000 (J) 135 600 (J) accept numbers that round to 1.4×10^{5} (J) award full marks for the correct answer without working any answer rounding to 1.4 to any other power of 10 scores 1 mark	**(2)** **AO2.1**

Q4.

Question number	Answer	Additional guidance	Mark
	substitution (1) 566 000 = 0.25 x L rearrangement (1) $\frac{566\ 000}{0.25}$ evaluation (1) 2 260 000 (J/kg)	substitution and rearrangement in either order award full marks for correct answer without working	(3)

Q5.

Question number	Answer	Additional guidance	Mark
ii	substitution into $\Delta Q = m \times L$ $450{,}000 = (1.41 - 1.21) \times L$ (1) rearrangment $L = \frac{450{,}000}{0.2}$ (1) evaluation (L) = 2 200 000 (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**

Q6.

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

Q7.

Question number	Answer	Additional guidance	Mark
(ii)	equating the variables in the three equations/principle of conservation of energy (1) $(m_w \times l_w) + (m_w \times c_w \times \Delta\theta_w) = (m_m \times c_m \times \Delta\theta_m)$ rearrangement (1) $m_m = \frac{(m_w \times l_w) + (m_w \times c_w \times \Delta\theta_w)}{(c_m \times \Delta\theta_m)}$ substitution of correctly calculated quantities (1) $= \left(\frac{\left(\left(\frac{25}{1000}\right) \times 2260000\right) + \left(\left(\frac{25}{1000}\right) \times 4200 \times 35\right)}{3840 \times 60} \right)$ evaluation (1) 0.26 (kg)	allow in words or with suitable alternative subscripts temperature changes and l_w must be correct allow maximum of 3 marks for calculations that omit the energy from cooling of water	(4)

Question number	Answer	Mark
(iii)	Any two of the following reasons: • more steam must condense and transfer the energy that is dissipated to the jug during the process (1) • more steam must condense and transfer the energy that is dissipated to the surroundings during the process (1) • more steam must condense and transfer the energy needed to cause the milk to froth (1) • more steam must condense to replace any steam that might leave the milk without condensing (1)	(2)