3(a)	(thermal) energy per unit mass (to cause state change)
	(thermal) energy to change state at constant temperature
3(b)	(for vaporisation): involves greater change in volume (of substance) **or** involves greater increase in separation of molecules
	more work has to be done by molecules (to separate) **or** greater increase in potential energy of molecules
	kinetic energy of molecules unchanged, so more thermal energy needed
3(c)	$Q = mc\Delta\theta$ **and** $Q = mL$
	$\Delta\theta$ for the water = 26.4 – 10.3
	$(37.0 \times L) + (37.0 \times 4.18 \times 10.3) = (208 \times 4.18 \times 16.1)$
	$L = 335\ \text{J g}^{-1}$

3(a)	(thermal) energy per unit mass (to cause temperature change)
	(thermal) energy per unit change in temperature
3(b)(i)	density = mass / volume
	mass $= 2.700 \times 10^3 \times 3.612 \times 10^{-3}$ $= 9.752\ \text{kg}$
3(b)(ii)	volume $= 3.612 \times 10^{-3} \times (2.700 / 2.620) = 3.722 \times 10^{-3}\ \text{m}^3$ **or** volume $= 9.752 / (2.620 \times 10^3) = 3.722 \times 10^{-3}\ \text{m}^3$
3(b)(iii)	$W = p\Delta V$
	$= 1.01 \times 10^5 \times (3.722 - 3.612) \times 10^{-3}$ $= 11.1\ \text{J}$
3(b)(iv)	volume (of block) increases
	work is done against the atmosphere so work done (on block) is negative
3(b)(v)	thermal energy $= (4.38 \times 10^6) + 11.1$
	specific heat capacity $= (4.38 \times 10^6) / (9.75 \times 500)$
	$= 898\ \text{J kg}^{-1}\ ^\circ\text{C}^{-1}$
3(c)	work done is negligible compared with (change in) internal energy so (answer in **(b)(v)** would be) unchanged

3(a)	(thermal) energy per unit mass (to cause state change)
	(thermal) energy to change state at constant temperature
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	more work has to be done by molecules (to separate) **or** greater increase in potential energy of molecules
	kinetic energy of molecules unchanged, so more thermal energy needed
3(c)	$Q = mc\Delta\theta$ **and** $Q = mL$
	$\Delta\theta$ for the water = 26.4 – 10.3
	$(37.0 \times L) + (37.0 \times 4.18 \times 10.3) = (208 \times 4.18 \times 16.1)$
	$L = 335\ \text{J g}^{-1}$

2(a)	same temperature (as each other)
	no net transfer of thermal energy (between them)
2(b)(i)	$E_1 = XL$
2(b)(ii)	$E_2 = Mc(t - \theta)$
2(b)(iii)	$E_3 = Xc\theta$
2(c)	$E_2 = E_1 + E_3$
	$Mc(t - \theta) = XL + Xc\theta$ **and** completion of algebra to reach $\theta = (Mct - XL) / c(M + X)$