1 **(a** **(i)** and **(ii)** marked together to maximum of 3 marks

(i) molecules escape/leave the liquid/form gas or vapour B1

(ii) evaporation OR heat/(thermal) energy needed for evaporation leaves sweat cooler B1
fast(er) molecules/high(er) energy molecules escape
OR slow(er) molecules left behind B1
heat flows from body to warm the sweat (so body cools) B1

(b) (Q =) $mc\Delta\theta$ OR mcT OR $60 \times 4000 \times 0.50$ C1
1.2×10^5 J / 120 kJ A1

(ii) $Q = mL$ in any form OR (m =) Q/L OR either with numbers C1
($m = 1.2 \times 10^5 / 2.4 \times 10^6$ =) 0.05 kg e.c.f from **(b)(i)** A1

[Total 7]

2 **(a** any two from:
at surface / not within liquid (if other way round must be explicit) B1
at any temperature / not at boiling point (if other way round must be explicit) B1 [2]
(evaporation) causes cooling
boiling requires a heat source
bubbles rising

(b) **(i)** viable heat source clearly described e.g. electrical/immersion heater B1
appropriate readings e.g. V, I, t or P & t or joulemeter readings B1 [2]
OR
combustion heater but only with some mention of amount of fuel used B1
correct measurement of amount of fuel used B1

(ii) viable mass measuring device clearly described B1
e.g. (top pan) balance/scal
appropriate readings B1 [2]
e.g. mass of water before and after / change of mass of wat
OR
measuring cylinder B1
volume of water before and after / change of volume of water B1

[Total: 6]

3 **(a)** any two of:
boiling throughout liquid (evaporation at surface),
boiling at one temperature (evaporation at any / all temperature / below boiling point),
boiling not affected by draught/area (evaporation is),
boiling produces bubbles (evaporation does not). B2

(b) (thermal energy) does work against intermolecular forces / breaks bonds B1
molecules separated/moved apart OR becomes PE B1

(c) apparatus: e.g. kettle AND balance / scales OR steam condensing in water with measuring cylinder / scales AND thermometer B1
two masses determined OR volume/mass condensed B1
determine energy input: e.g. VIt **or** Pt **or** $mc\Delta T$ B1
(l_e =)Q/m B1 [8]

4 **(a (i)** any two of:
(gas) molecules further apart
greater PE
move singly / in straight lines
OR vice versa for. liquid molecules
(allow faster)

(ii) gases compressible OR liquids incompressible B1
forces between gas molecules weaker OR vice versa for liquid molecules B1

(b) pV = constant OR $p_1V_1 = p_2V_2$ OR $2.6 \times 10^6 \times 0.035$ OR 91 000
$2.6 \times 10^6 \times 0.035/1.0 \times 10^5$ OR $91\,000/1.0 \times 10^5$ C1
$0.91\,m^3$ A1

(ii) slower / less KE B1 [8]

5 **(a** irregular / random / haphazard movement B1

any mention of different directions or clearly described B1 [2]

(b) smoke particles condone atoms, molecules etc. AND (invisible) air molecules B1

air and smoke / dots collide
ignore other collisions B1 [2]

(c) dots move in or out of focus/disappear OR appear brighter / dimmer [1]

[Total: 5]

6 **(a)** T-shirt in wind/on L dries quicker OR T-shirt out of wind/on R dries slower M1
wind removes more evaporated molecules accept quicker
NOT wind gives water molecules more KE A1 [2]

(b) T-shirt folded double/on R dries slower OR T-shirt unfolded/on L dries quicker M1
correct reference to smaller/larger surface area for molecules to evaporate
OR water trapped (in fold) OR more humid in fold A1 [2]

(c) water evaporates from her hair B1
heat required for evaporation OR heat flows (from body/hair) to warm up cold water
OR faster molecules escape leaving water cooler/lowering KE
ignore: there is a cooling effect B1 [2]

[Total: 6]