Question number	Answer	Notes	Marks
1 (a)	B (hit the walls of the container harder)		1
(b)	(average) **KE** (of particles) **decreases** (as the temperature falls); AND one of • (because) they move slower; • idea that at 0 K the particles have no kinetic energy; • idea that at 0 K the particles are not moving;	ignore • ` particles freeze' • KE is lost allow • 'it' for average KE • absolute zero for 0 K	2
1 (c) (i)	300 K;		1
(c) (ii)	both temperatures seen in Kelvin; Substitution; (Rearrangement and) Evaluation; e.g. $\frac{210\ 000}{300} = \frac{P_2}{354}$ this would get 2 marks if seen $\frac{210\ 000 \times 354}{300} = P_2$ this would get 2 marks if seen $(P_2) = 250$(kPa) this is 3 marks	no mark for equation as it is given on page 2 **allow** • $\frac{210\ 000}{27} = \frac{P_2}{81}$ for 1 mark • 630 (kPa) for 2 marks • bald answer 248 (kPa) for 3 marks • answers which round to 250 Power of Ten error (POT) =-1	3

(Total for Question 1 = 7 marks)

Question number		Answer	Notes	Marks
2 (a) (i)		Power (rating) or watt(s); Rate of energy transfer / joule per second / J/s ;	 Ignore equation from p2: energy (transferred) / time (taken)	2
(ii)		Any two of MP1 Idea of a fault causing a hazard; MP2 Idea that current goes to Earth / not to user; MP3 Idea of fuse action, e.g. blows /melts / breaks circuit; MP4 idea of a low resistance path;	 Ignore: current surge, fire Allow: • prevents electrocution / shock • flow of charge as current • current to ground Ignore: electricity / energy goes to earth Allow case at earth potential	2
(b) (i)		Agree / disagree - no mark Any three of MP1 Statement of an appropriate equation e.g. power = current x voltage; MP2 At least one appropriate current value calculated, e.g. 2.92 (A) or 0.13 (A); MP3 Idea that fuse rating must be more than working current; MP4 EITHER Idea that 2.92 A is close to 3A, making 3A fuse a poor choice for soldering iron 'B'; OR Idea that 3A is much larger than 0.13 A, making 3A fuse a poor choice for soldering iron 'A'	 Allow abbreviation and rearrangements e.g. P=IV, I=P/V Ignore s.f. 30 ÷ 230 = 0.13 (A) 70 ÷ 24 = 2.9 (A) Allow 70 ÷ 230 = 0.30 (A) Allow reverse arguments, e.g. "lower value fuse would melt" Allow ecf from incorrect calculation	3

(ii)		Any three of MP1 primary **AND** secondary (coils); MP2 (soft) iron core; MP3 primary/input (coil) has more turns; MP4 further **structural** detail e.g. insulated wire, core laminations;	May be shown on a labelled diagram Ignore equations Allow input and output (coils) Ignore: magnet Allow: • reverse argument • clear indication of relative turns on diagram (judge by eye) • appropriate numbers	3

Total for question 2 = 10 marks

Question number		Answer	Notes	Marks
3 (a) (i)		90 (K)		1
(ii)		Any three of MP1 Idea that particles/molecules move apart; MP2 Idea that particles/molecules gain (kinetic) energy; MP3 Idea that particles/molecules move more freely; MP4 Idea that particles/molecules leave the liquid;	Ignore: molecules vibrate Allow: molecules spread out, take up more space May be shown on labelled diagram Allow: idea of moving **faster** Ignore : 'move **more**' Allow bonds break Ignore unqualified 'move **more**' Allow escape Ignore evaporate	3
(b) (i)		Any two of MP1 radiation / infrared; MP2 Idea of reflection; MP3 Idea of little/no absorption; MP4 Idea of poor emission;	 Allow IR Allow bad radiator	2
(ii)		Any two of (in a vacuum there are) no atoms/molecules/particles; so no/poor conduction; so no/little convection (currents);	 Allow: no 'medium' no 'material' There are no molecules to conduct = 2 marks There are no molecules to convect = 2 marks	2

(c)		Any two of MP1 Idea that there is cold gas/air/oxygen just above the liquid (surface); MP2 Idea that the gas/air/oxygen in the room is warmer; MP3 Idea that convection currents in air (above liquid surface) unlikely; MP4 Idea that (evaporated) oxygen /air / gas would insulate the surface; MP5 Idea that oxygen/gas would build up pressure in a sealed vessel;	Ignore "heat rises" Allow: warm air won't fall, cool air won't rise Ignore density arguments Allow: gas is a poor conductor Allow: flask would burst if it had a lid	2

Total for question 3 = 10 marks

Question number	Answer	Accept	Reject	Marks
4 (a) (i)	Work done = force x distance (in direction of force);	W = F x d d = W / F F = W / d		1
(ii)	Substitution (in correct equation); Answer; e.g.: W = 1.7 x 0.46 = 0.78 (J);;	 0.782		2
(iii)	Response must match 7a(ii) ; e.g. 0.78	Accept word answer e.g. "the same"		1
(b) (i)	KE is zero /less / decreased;	No KE The KE is transferred (to other forms)		1
(ii)	Centre of gravity is lower;	Centre of mass is lower Height is lower <u>and</u> reference to mgh		1

Total 6 marks