

| 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 <ul style="list-style-type: none"> (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 <ul style="list-style-type: none"> ' particles freeze' KE is lost allow <ul style="list-style-type: none"> '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. $\frac{210\,000}{300} = \frac{P_2}{354}$ $\frac{210\,000 \times 354}{300} = P_2$ $(P_2) = 250(\text{kPa})$ | this would get 2 marks if seen this would get 2 marks if seen this is 3 marks | no mark for equation as it is given on page 2 allow <ul style="list-style-type: none"> $\frac{210\,000}{27} = \frac{P_2}{81}$ 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: <u>energy (transferred)</u> 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: <ul style="list-style-type: none"> • 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. $30 \div 230 = 0.13$ (A) $70 \div 24 = 2.9$ (A) Allow $70 \div 230 = 0.30$ (A) Allow reverse arguments, e.g. "lower value fuse would melt" Allow ecf from incorrect calculation | 3 |

| | | | | |
|------|--|--|---|---|
| (ii) | | <p>Any three of</p> <p>MP1 primary AND secondary (coils);</p> <p>MP2 (soft) iron core;</p> <p>MP3 primary/input (coil) has more turns;</p> <p>MP4 further structural detail e.g. insulated wire, core laminations;</p> | <p>May be shown on a labelled diagram Ignore equations</p> <p>Allow input and output (coils) Ignore: magnet</p> <p>Allow:</p> <ul style="list-style-type: none"> • 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) | | <p>Any two of</p> <p>MP1 Idea that there is cold gas/air/oxygen just above the liquid (surface);</p> <p>MP2 Idea that the gas/air/oxygen in the room is warmer;</p> <p>MP3 Idea that convection currents in air (above liquid surface) unlikely;</p> <p>MP4 Idea that (evaporated) oxygen /air / gas would insulate the surface;</p> <p>MP5 Idea that oxygen/gas would build up pressure in a sealed vessel;</p> | <p>Ignore "heat rises"</p> <p>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</p> | 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); | $W = F \times d$ $d = W / F$ $F = W / d$ | | 1 |
| (ii) | Substitution (in correct equation); Answer; e.g.: $W = 1.7 \times 0.46 = 0.78$ (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