

Question number		Answer	Notes	Marks
1 (a) (i)		C (decreases by 2)		1
(ii)		D (decreases by 4)		1
(b)		D (has less penetrating power)		1
(c)		<p>Any four of:</p> <p>MP1 Use of ratemeter / scaler / counter;</p> <p>MP2 Idea of measuring <u>background</u> radiation e.g. background count / correction / subtraction;</p> <p>MP3 A safety precaution (based on distance or absorption) e.g. use of tongs / shielding;</p> <p>MP4 A controlled variable (time / distance / positioning) e.g. "source near/by/to detector", "for a minute";</p> <p>MP5 A practical consideration e.g. repeat / average / reset (scaler);</p> <p>MP6 Mention of becquerel / Bq</p>	<p>Allow description e.g. "count the clicks"</p> <p>Allow Geiger counter</p> <p>Ignore GM detector or tube</p> <p>Ignore descriptions of GM tube</p> <p>Allow "stand back", "wear gloves / protective clothing" "do not point source at people"</p> <p>Ignore "counts per minute"</p> <p>Ignore: mention of anomalies</p> <p>Accept phonetic spellings</p>	4

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

(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		Answer	Notes	Marks
4 (a) (i)		Momentum = mass x velocity	Allow abbreviations and rearrangements e.g. $p=mv$, mass = $\frac{\text{momentum}}{\text{velocity}}$	1
(ii)		Substitution into correct equation; Calculation; e.g. $17\,000 \times 13$ $220\,000 \text{ (kg m/s)}$	Allow 221 000	2
(b) (i)		Answers should be in the context of momentum (when the lorry stops) the load still has momentum; Idea that lorry stops in a shorter time; OR Idea that load takes more time to stop;	Allow: $(mv - mu) = Ft$ Allow for TWO marks lorry loses momentum more quickly;; OR load loses momentum more slowly;;	2
(ii)		MP1 Centre of gravity is closer to the front of the lorry; MP2 Clockwise and anticlockwise moments equal; MP3 Increase in force related to decrease in distance (to provide balancing moment);	Ignore action and reaction arguments Allow: centre of mass nearer front of lorry there is more weight near the front of the lorry / near B C of G further from rear (wheel) Allow: <ul style="list-style-type: none"> Moments are balanced total moment = 0 	3
(c) (i)1		Pressure = $\frac{\text{force}}{\text{area}}$;	Allow abbreviations and rearrangements, e.g. $P=F/A$, force = pressure x area	1
(ii)2		Substitution into correctly rearranged formula; Calculation; e.g. $53\,000 \div 390\,000$ $0.14 \text{ (m}^2\text{)}$	0.136 0.135897 Allow 1400 cm ²	2

Total for question 4 = 11 marks