

Energy Transfers

Mark Scheme 5

Level	IGCSE(9-1)
Subject	Physics
Exam Board	Edexcel IGCSE
Module	Single Award (Paper 2P)
Topic	Energy resources and energy transfers
Sub-Topic	Energy Transfers
Booklet	Mark Scheme 5

Time Allowed: 40 minutes

Score: /33

Percentage: /100

Grade Boundaries:

A*	A	B	C	D	E	U
>85%	77.5%	70%	60%	55%	50%	<50%

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. $\frac{210\,000}{300} = \frac{P_2}{354}$ this would get 2 marks if seen $\frac{210\,000 \times 354}{300} = P_2$ this would get 2 marks if seen $(P_2) = 250(\text{kPa})$ this is 3 marks	no mark for equation as it is given on page 2 allow <ul style="list-style-type: none"> • $\frac{210\,000}{\text{mark } 27} = \frac{P_2}{81}$ 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: $\frac{\text{energy (transferred)}}{\text{time (taken)}}$	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)	<p>Agree / disagree - no mark</p> <p>Any three of</p> <p>MP1 Statement of an appropriate equation e.g. power = current x voltage;</p> <p>MP2 At least one appropriate current value calculated, e.g. 2.92 (A) or 0.13 (A);</p> <p>MP3 Idea that fuse rating must be more than working current;</p> <p>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'</p>	<p>Allow abbreviation and rearrangements e.g. $P=IV$, $I=P/V$</p> <p>Ignore s.f.</p> <p>$30 \div 230 = 0.13$ (A)</p> <p>$70 \div 24 = 2.9$ (A)</p> <p>Allow</p> <p>$70 \div 230 = 0.30$ (A)</p> <p>Allow reverse arguments, e.g. "lower value fuse would melt"</p> <p>Allow ecf from incorrect calculation</p>	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: <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)	<p>Any three of</p> <p>MP1 Idea that particles/molecules move apart;</p> <p>MP2 Idea that particles/molecules gain (kinetic) energy;</p> <p>MP3 Idea that particles/molecules move more freely;</p> <p>MP4 Idea that particles/molecules leave the liquid;</p>	<p>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</p>	3
	(b)	(i)	<p>Any two of</p> <p>MP1 radiation / infrared;</p> <p>MP2 Idea of reflection;</p> <p>MP3 Idea of little/no absorption;</p> <p>MP4 Idea of poor emission;</p>	<p>Allow IR</p> <p>Allow bad radiator</p>	2
		(ii)	<p>Any two of</p> <p>(in a vacuum there are) no atoms/molecules/particles;</p> <p>so no/poor conduction;</p> <p>so no/little convection (currents);</p>	<p>Allow: no 'medium' no 'material' There are no molecules to conduct = 2 marks There are no molecules to convect = 2 marks</p>	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