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IGCSE Double Award Science (Physics) 4437/6H

Mark Scheme (Results)

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IGCSE

IGCSE Double Award Science - Physics (4437/6H)

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The following acronyms are used

owtte	or words to that effect
ecf	error carried forward
dop	dependent on previous
nwn	no working necessary

Question Number	Correct Answer	Extra Information	Mark
1 (a)	(A) a.c. (power supply) (B) (open) switch / switch which is off (C) (electric) motor (D) variable resistance / rheostat	do not credit just 'power supply' do not credit 'meter'	**1** **1** **1** **1** **(4)**

Question Number	Correct Answer	Extra Information	Mark
1 (b) (i)	voltmeter voltage/potential difference/p.d.	both parts required do not accept voltameter voltemeter voltagemeter etc	**(1)**

Question Number	Correct Answer	Extra Information	Mark
1 (b) (ii)	ammeter current/rate of flow of charge	both parts required do not accept ampmeter if the meters in both (i) and (ii) are correct award (1) mark	**(1)**

(Total 6 marks)

Question Number	Correct Answer	Extra Information	Mark
2 (a)	0.5 hertz/Hz	accept '½' accept '(waves) per second'	**1** **1** **(2)**

Question Number	Correct Answer	Extra Information	Mark
2(b)	light (or any particular named colour of light) (waves) S-waves secondary waves	or any member of the electromagnetic spectrum or waves on (slinky) s shaken/moved up and down	**(1)**

Question Number	Correct Answer	Extra Information	Mark
2 (c)	information	allow :data /signal	**(1)**

Question Number	Correct Answer	Extra Information	Mark
2 (d)	time between one … wave and the next … complete/full…	or 'time taken for each … wave to pass (a point)' credit 'time period is the inverse / reciprocal of the frequency' with both marks	**1** **1** **(2)**

(Total 6 marks)

Question Number	Correct Answer	Extra Information	Mark
3 (a)	kinetic … thermal/heat … sound	do not credit just 'movement' 'wind' or 'mechanical' both required but either order	**1** **1** **(2)**

Question Number	Correct Answer	Extra Information	Mark
3 (b)	(efficiency) = $\frac{\text{useful (energy) output}}{\text{total (energy) output/input}}$ (×100%)		**(1)**

Question Number	Correct Answer	Extra Information	Mark
3 (c)	**either** 45 000 (2) joules/J (1) **or** 45 kilojoules/kJ (3)	**or** 50 × 15 × 60 (1) joules /J (1) **or** 15 minutes = 900 s (1) 50 x 15 = 750 (0) 750 J (1)	**(3)**

(Total 6 marks)

Question Number	Correct Answer	Extra Information	Mark
4 (a)	rock or named rock e.g granite, sand etc space cosmic rays Sun nuclear waste radon food water medical sources etc etc	allow any reasonable response do not allow '(nuclear) power stations' or 'building materials'	**(1)**

Question Number	Correct Answer	Extra Information	Mark
4 (b) (i)	the <u>card</u> reduces (or stops) the radiation/emission/ count rate/reading	or words to that effect	**(1)**

Question Number	Correct Answer	Extra Information	Mark
4 (b) (ii)	the <u>metal</u> reduces (or stop) the radiation/emission/ count rate/reading	or words to that effect	**(1)**

Question Number	Correct Answer	Extra Information	Mark
4 (b) (iii)	(the card and)the metal will not reduce (or stop) the radiation/emission/count rate/reading from gamma /γ (radiation)	or words to that effect	**(1)**

Question Number	Correct Answer	Extra Information	Mark
4 (c)	25 (MBq)	credit (1) mark if unambiguous indication that one hour equivalent to four half lives	**(2)**

(Total 6 marks)

Question Number	Correct Answer	Extra Information	Mark
5 (a)	water is a good conductor (so increases chance of) (electric) shock /current in the body /heart failure	**or** wet skin has a lower (electrical) resistance (than dry skin)	**1** **1** **(2)**

Question Number	Correct Answer	Extra Information	Mark
5 (b)	(large) current/flow of charge in earth wire melts fuse (wire) (in plug) and cuts off the supply/electricity/current	 both required for this mark	**1** **1** **(2)**

Question Number	Correct Answer	Extra Information	Mark
5 (c)	200 (V)	allow (1) mark for just (V =) 0.02 × 10 000	**(2)**

(Total 6 marks)

Question Number	Correct Answer	Extra Information	Mark
6 (a) (i)	left to right		**(1)**

Question Number	Correct Answer	Extra Information	Mark
6 (a) (ii)	electrons have – ve charge flow from – ve and / or to + ve		**1** **1** **(2)**

Question Number	Correct Answer	Extra Information	Mark
6 (b) (i)	0.20 x 3.0 x 240 = 144 (J)	0.2 x 3 x 4 = 2.4 scores (0/2)	**1** **1** **(2)**

Question Number	Correct Answer	Extra Information	Mark
6 (b) (ii)	thermal/heat		**(1)**

Question Number	Correct Answer	Extra Information	Mark
6 (c) (i)	0.10 x 1.5 x 240 = 36 (J) / quartered	ecf from (b)(i) e.g 0.6(J)	**(2)**

Question Number	Correct Answer	Extra Information	Mark
6 (c) (ii)	*I* halved (*V* halved)		**(1)**

(Total 9 marks)

Question Number	Correct Answer	Extra Information	Mark
7 (a) (i)	I correctly labelled		**(1)**

Question Number	Correct Answer	Extra Information	Mark
7 (a) (ii)	R correctly labelled		**(1)**

Question Number	Correct Answer	Extra Information	Mark
7 (a) (iii)	C correctly labelled		**(1)**

Question Number	Correct Answer	Extra Information	Mark
7 (b) (i)	angle at which refraction still/just occurs		**(1)**

Question Number	Correct Answer	Extra Information	Mark
7 (b) (ii)	sin c = 1/n		**(1)**

Question Number	Correct Answer	Extra Information	Mark
7 (b) (iii)	c = 38.7(°)		**(1)**

Question Number	Correct Answer	Extra Information	Mark
7 (c) (i)	bends more towards normal reflects correctly at glass-air **dop**		**1** **1** **(2)**

Question Number	Correct Answer	Extra Information	Mark
7 (c) (ii)	**dop** refracts more / bends more total internal reflection	 $i > c$	**1** **1** **(2)**

(Total 10 marks)

Question Number	Correct Answer	Extra Information	Mark
8 (a)	150 ×100 = 120 × *p* *p* = 125 (kPa)	150 x 100 = 30 x *p* p = 500(kPa) scores 1	**1** **1** **(2)**

Question Number	Correct Answer	Extra Information	Mark
8 (b)	constant mass of gas	no leaks in or out **owtte**	**(1)**

Question Number	Correct Answer	Extra Information	Mark
8 (c) (i)	bigger		**(1)**

Question Number	Correct Answer	Extra Information	Mark
8 (c) (ii)	**dop** inc in temp molecules move faster **owtte**		**1** **1** **(2)**

(Total 6 marks)

Question Number	Correct Answer	Extra Information	Mark
9 (a) (i)	alpha	allow 'helium nucleus' or He with subscript and superscript	**(1)**

Question Number	Correct Answer	Extra Information	Mark
9 (a) (ii)	gold nucleus	accept 'metal nucleus'	**(1)**

Question Number	Correct Answer	Extra Information	Mark
9 (b) (i)	same	both + <u>or</u> both -	**(1)**

Question Number	Correct Answer	Extra Information	Mark
9 (b) (ii)	repulsion		**(1)**

Question Number	Correct Answer	Extra Information	Mark
9 (c) (i)	using sensible scales and correct orientation		**1**
	axes labelled with quantities and units	minimum S/° and d/fm	**1**
	all points plotted correctly	± 1 mm (–1) per misplot	**2**
	smooth curve		**1** **(5)**

Question Number	Correct Answer	Extra Information	Mark
9 (c) (ii)	35 ±1 (°)		**(1)**

Question Number	Correct Answer	Extra Information	Mark
9 (d)	0° above 90°		**1** **1** **(2)**

Question Number	Correct Answer	Extra Information	Mark
9 (e) (i)	speed/ kinetic energy	momentum	**(1)**

Question Number	Correct Answer	Extra Information	Mark
9 (e) (ii)	(alpha) not diverted from its path by <u>particles</u> in air		**(1)**

Question Number	Correct Answer	Extra Information	Mark
9 (f)	nuclear	allow 'nucleus'	**(1)**

(Total 15 marks)

Question Number	Correct Answer	Extra Information	Mark
10 (a) (i)	1 0 *independent marks*		**1** **1** **(2)**

Question Number	Correct Answer	Extra Information	Mark
10 (a) (ii)	neutron		**(1)**

Question Number	Correct Answer	Extra Information	Mark
10 (b) (i)	$_{-1}\beta^{0}$ 241 95	 **ecf**	**1** **1** **1** **(3)**

Question Number	Correct Answer	Extra Information	Mark
10 (b) (ii)	americium Am	only allow Np, Pu, Am, Cu	**(1)**

(Total 7 marks)

Question Number	Correct Answer	Extra Information	Mark
11 (a) (i)	slope/gradient		**(1)**

Question Number	Correct Answer	Extra Information	Mark
11 (a) (ii)	area (under graph)		**(1)**

Question Number	Correct Answer	Extra Information	Mark
11 (b) (i)	no		**(1)**

Question Number	Correct Answer	Extra Information	Mark
11 (b) (ii)	**dop** graph not horizontal **or** velocity not constant **or** (still) accelerating		**(1)**

Question Number	Correct Answer	Extra Information	Mark
11 (c) (i)	A		**(1)**

Question Number	Correct Answer	Extra Information	Mark
11 (c) (ii)	D		**(1)**

Question Number	Correct Answer	Extra Information	Mark
11 (c) (iii)	C		**(1)**

Question Number	Correct Answer	Extra Information	Mark
11 (d)	• constant velocity • weight downwards/drag upwards • equal • no acceleration	terminal velocity	**1** **1** **1** **1** **(4)**

Question Number	Correct Answer	Extra Information	Mark
11 (e)	greater area under graph before sea		**1** **1** **(2)**

(Total 13 marks)