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IGCSE Physics 4420/2H
Mark Scheme (Results)
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IGCSE

IGCSE Physics (4420/2H)

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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) spring 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 ea wave to pass (a poin credit 'time period i 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) = useful (energy) output / 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)	B		**(1)**

Question Number	Correct Answer	Extra Information	Mark
6 (b)	electromagnet		**(1)**

Question Number	Correct Answer	Extra Information	Mark
6 (c)	to prevent shorting/a short circuit /to prevent current (accept electricity) from going directly from one turn to the next	accept '… from one coil to the next' do not credit any reference to safety/electric shock/heat insulation	**(1)**

Question Number	Correct Answer	Extra Information	Mark
6 (d)	gravity	accept 'weight (of the iron sphere)	**(1)**

Question Number	Correct Answer	Extra Information	Mark
6 (e)	**either** clockwise moment = anticlockwise moment **or** weight × 1.5 = 900 × 0.1 (1) weight = 90 ÷ 1.5 (1) = 60 (1)	**or** (weight =) 60 (N) (3) **nwn**	**(3)**

(Total 7 marks)

Question Number	Correct Answer	Extra Information	Mark
7 (a)	area of edge (of the blade) is smaller (for a sharp knife) **either** (so) for the same force the pressure (under the blade) will be greater **or** (so) a smaller force required to give the same pressure (under the blade)	**or** the converse for a blunt knife	**1** **1** **(2)**

Question Number	Correct Answer	Extra Information	Mark
7 (b) (i)	two arrows both acting towards the point and no arrows acting away from the point both the same length (as the original line) all right angles **dop**	do not credit anything other than 2 arrows as judged by eye to be a fair attempt	**1** **1** **(2)**

Question Number	Correct Answer	Extra Information	Mark
7 (b) (ii)	(that the body of the) gas is not moving /stationary/at rest		**(1)**

Question Number	Correct Answer	Extra Information	Mark
7 (c)	Use of $\Delta p = m \times g \times \Delta h$ (1) 25 x 1025 x 10 (1) = 256 250 (Pa) (1) **or** 251 125 (Pa) **or** 251 381 (Pa)	**or** answer in kilopascals e.g. 256.25 kPa 25 x 1025 (0)	**(3)**

(Total 8 marks)

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

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

Question Number	Correct Answer	Extra Information	Mark
8 (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
8 (b) (ii)	thermal/heat		**(1)**

Question Number	Correct Answer	Extra Information	Mark
8 (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
8 (c) (ii)	*I* halved (*V* halved)		**(1)**

(Total 9 marks)

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

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

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

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

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

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

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

Question Number	Correct Answer	Extra Information	Mark
9 (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
10 (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
10 (b)	constant mass of gas	no leaks in or out **owtte**	**(1)**

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

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

(Total 6 marks)

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

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

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

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

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

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

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

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

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

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

(Total 15 marks)

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

Question Number	Correct Answer	Extra Information	Mark
12 (a) (ii)	<u>neutron</u>		**(1)**

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

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

(Total 7 marks)

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

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

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

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

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

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

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

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

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

(Total 13 marks)

Question Number	Correct Answer	Extra Information	Mark
14 (a)	direction		**(1)**

Question Number	Correct Answer	Extra Information	Mark
14 (b)	V S S V	-1 for any number of errors up to 2	**1** **1** **(2)**

Question Number	Correct Answer	Extra Information	Mark
14 (c)	0.4 N to the right		**1** **1** **(2)**

(Total 5 marks)

Question Number	Correct Answer	Extra Information	Mark
15 (a)	frequency amplitude speed/wavelength		**1** **1** **1** **(3)**

Question Number	Correct Answer	Extra Information	Mark
15 (b)	microphone	signal generator	**(1)**

Question Number	Correct Answer	Extra Information	Mark
15 (c)	alternating waves 2½ cycles or T = 4 squares amplitude = 2 squares	ignore quality of drawing	**1** **1** **1** **(3)**

Question Number	Correct Answer	Extra Information	Mark
15 (d)	any three points B hears due to diffraction C hears due to diffraction C hears due to reflection **Or** diffraction effect of gap / edge gap about 1 m		**(3)**

(Total 10 marks)