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Mark Scheme (Results)
Summer 2010

IGCSE

IGCSE Physics (4420) Paper 1F

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aps accept phonetic spelling

ecf error carried forward

dna do not allow

nwn no working necessary

owtte or words to that effect

Question Number	Acceptable Answers	Extra Information	Mark
1(a)(i)	faster quicker further		
			(1)

Question Number	Acceptable Answers	Extra Information	Mark
1(a)(ii)1	speed		
			(1)

Question Number	Acceptable Answers	Extra Information	Mark
1(a)(ii)2	straight		
			(1)

Question Number	Acceptable Answers	Extra Information	Mark
1(b)	9 – 6 = 3 (m)	**nwn** **no ecf**	
			(2)

Question Number	Acceptable Answers	Extra Information	Mark
1(c)(i)	ave speed = dist/time	Use of symbols s,d,t in any form	1
			(1)
1(c)(ii)	(6÷4)= 1.5 m/s or mps	accept 1½ or 3/2 **no ecf** from (i)	1 1
			(2)

Question Number	Acceptable Answers	Extra Information	Mark
2(a)	each terminal connected to a wire end	either way round **dna** short circuiting of wire ignore other circuit components such as switches and ammeters	
			(1)

Question Number	Acceptable Answers	Extra Information	Mark
2(b)	series		
			(1)

Question Number	Acceptable Answers	*Extra Information*	Mark
2(c)	less wire *(on front)* more wire <u>*on back*</u>	Ignore references to current	
			(1)
2(d)	(thin) wire(s) over shoulder no padding over shoulders no ties between back and front no switch battery is outside warmer		
			(1)

Question Number	Acceptable Answers	Extra Information	Mark
2(e)	resistance		
			(1)

Question Number	Acceptable Answers	Extra Information	Mark
2(f)	ANY TWO from: toaster iron hairdryer oven fire microwave cooker (immersion) heater or shower washing machine kettle lamp radiator		
			(2)

Question Number	Acceptable Answers	Extra Information	Mark
3(a)(i)	<table><tr><td>radio</td><td>**microwave**</td><td>**IR**</td><td>visible</td><td>**UV**</td><td>**X**</td><td>gamma ray</td></tr></table> **1 correct (1), 2correct (2), 4 correct (3)**		
			(3)

Question Number	Acceptable Answers	Extra Information	Mark
3(a)(ii)1	frequency		
			(1)

Question Number	Acceptable Answers	Extra Information	Mark
3(a)(ii)2	wavelength	**aps**	
			(1)

Question Number	Acceptable Answers	Extra Information	Mark
3(a)(ii)3	speed		
			(1)

Question Number	Acceptable Answers	Extra Information	Mark
3(b)(i)	cooking heaters night vision equipment TV remote control burglar alarm		
			(1)
3(b)(ii)	skin burns		
			(1)

Question Number	Acceptable Answers	Extra Information	Mark
4(a)	reflection/reflect/reflected Incidence/incident	either order **dna** 'refraction'	
			(1)

Question Number	Acceptable Answers	Extra Information	Mark
4(b)(i)	continuation of ray to reflector reflected to **B** by 1 or 2 reflections		1 1
			(2)
4(b)(ii)	waves converge/focus	accept :'largest amplitude'	
			(1)

Question Number	Acceptable Answers	Extra Information	Mark
4(c)	longitudinal	**aps**	
			(1)

Question Number	Acceptable Answers	Extra Information	Mark
4(d)	Increase in temperature quieter	gets hot/heats up/quiet	
			(1)

Question Number	Acceptable Answers	Extra Information	Mark
5(a)	= <u>useful energy output</u> total energy output	= <u>useful energy output</u> total energy input	
			(1)

Question Number	Acceptable Answers	Extra Information	Mark
5(b)(i)1	conserved		
			(1)

Question Number	Acceptable Answers	Extra Information	Mark
5(b)(ii)2	inefficient		
			(1)

Question Number	Acceptable Answers	Extra Information	Mark
5(b)(ii)	50 ÷ 10 = 5 (J/s)		1 1
			(2)

Question Number	Acceptable Answers	Extra Information	Mark
5(b)(iii)	Watt watt	**aps** accept W, w, watts, watte or N m s^{-1} or kg m^2 s^{-3}	1
			(1)

Question Number	Acceptable Answers	Extra Information	Mark
6(a)	ANY TWO from : cosmic rays or Sun radon (gas) nuclear power medical food or drink ground (or rock or soil) or buildings weapon testing		1 1
			(2)

Question Number	Acceptable Answers	Extra Information	Mark
6(b)(i)	**Be**cquerel	must start with Be must end with l, le, ll or lle or plural must have three syllables in total allow Beckerel / bequerel **dna** becquel	
			(1)

Question Number	Acceptable Answers	Extra Information	Mark
6(b)(ii)	time (taken)/how long it takes for activity to halve **owtte**	*independent marks* e.g. half the atoms are left	1 1
			(2)
6(b)(iii)	Idea of two half-lives 6 hours	 scores both marks	1 1
			(2)
6(b)(iv)	small (compared to source activity) or none as all figures are quoted for the source	(much) less than 10 Bq negligible	
			(1)

Question Number	Acceptable Answers	Extra Information	Mark
6(c)	ANY TWO from: tracer smoke detectors or fire alarm thickness control or gauging sterilising dating checking welds cancer treatment fluid flow		1 1
			(2)

Question Number	Acceptable Answers	Extra Information	Mark
7(a)	middle mid-point centre (of gravity) central half-way		
			(1)

Question Number	Acceptable Answers	Extra Information	Mark
7(b)	Increase(s) Decrease(s)	Both required in correct order	
			(1)

Question Number	Acceptable Answers	Extra Information	Mark
7(c)	ANY THREE of the following • mass is 52 kg (weight = 520 N) or double or more than 26 kg • each balance reading could not be 26 kg e.g. 13 kg each • beam has a mass or weight • mass of beam has to be subtracted/removed • weight is in N / mass is 26 kg • mass is less than 52 kg because beam mass not considered	allow weight is 52 kg *This response is worth 3 marks* Ignore problems with, or weight of, electronic balances	
			(3)

Question Number	Acceptable Answers	Extra Information	Mark
8(a)	Labels (clockwise from the top) input coil; output coil; core; power supply	4 labels correct (3) each error –1	
			(3)

Question Number	Acceptable Answers	Extra Information	Mark
8(b)(i)	more turns/coils/wire/winds on <u>output</u> (than input)	less on <u>input</u> allow more voltage in output more current in input **dna** input is smaller	
			(1)

Question Number	Acceptable Answers	Extra Information	Mark
8(b)(ii)	<u>outside</u> power station/ after generation	<u>before</u> pylon/ transmission	
			(1)

Question Number	Acceptable Answers	Extra Information	Mark
9(a)	(semiconductor) diode	accept light emitting diode/LED (half-wave) rectifier	
			(1)
9(b)	can change the resistance of a variable (resistor) variable (resistor) can change current/voltage	or the converse or the converse must refer to I, V or R ignore reference to symbol	
			(1)

Question Number	Acceptable Answers	Extra Information	Mark
9(c)(i)	(6 volt) battery (of cells)	**dna** power supply	
			(1)
9(c)(ii)	6 (V)		
			(1)
9(c)(iii)	2.2 (V)	**ecf** candidate's cii – 3.8	
			(1)

Question Number	Acceptable Answers	Extra Information	Mark
9(d)	40 (mA)…….40 (mA).	both required	
			(1)

Question Number	Acceptable Answers	Extra Information	Mark
10(a)(i)	1.6 (s)		
			(1)

Question Number	Acceptable Answers	Extra Information	Mark
10(a)(ii)	4.4 (s)		
			(1)

Question Number	Acceptable Answers	Extra Information	Mark
10(b)(i)	increase(d)/longer /more	**dna** slower/slowed it down	
			(1)

Question Number	Acceptable Answers	Extra Information	Mark
10(b)(ii)	no effect/no change/stays the same/ no difference/none/nothing		
			(1)

Question Number	Acceptable Answers	Extra Information	Mark
10(c)	wet/slippery/icy/greasy/ loose surface/muddy /snow/rain /smooth /gravel /oil	**dna** poor condition of the tyres or brakes	
			(1)

Question Number	Acceptable Answers	Extra Information	Mark
10(d)(i)	Single straight arrow pointing downwards and on a vertical line through **C**	judge by eye ignore labels	
			(1)
10(d) (ii)	friction (between lorry and air)/air resistance/drag	**dna** wind resistance	
			(1)

Question Number	Acceptable Answers	Extra Information	Mark
11(a)(i)	Twice amplitude/double amplitude/2× amplitude/ amplitude x 2	**dna** just 'amplitude'	
			(1)

Question Number	Acceptable Answers	Extra Information	Mark
11a)(ii)	wavelength	**aps** dna just 'λ'	
			(1)

Question Number	Acceptable Answers	Extra Information	Mark
11(b)	(f =) 30 ÷ 60 or (T =) 60 ÷ 30 or T = 2 (s) = 0.5 (Hz)	 allow ½ (Hz)	1 1
			(2)

Question Number	Acceptable Answers	Extra Information	Mark
11(c)(i)	transverse (waves)	**aps**	
			(1)

Question Number	Acceptable Answers	Extra Information	Mark
11(c)(ii)	Any one from • oscillates • vibrates • up and down • vertical • perpendicular to wave direction or water surface	allow (simple) harmonic motion/s.h.m. ignore any horizontal motion	
			(1)

Question Number	Acceptable Answers	Extra Information	Mark
12(a)(i)	chemical chemical energy chemical potential chemical potential energy	**aps**	
			(1)

Question Number	Acceptable Answers	Extra Information	Mark
12(a)(ii)	kinetic KE	**dna** 'movement' (energy) ignore 'heat' 'sound'	
			(1)

Question Number	Acceptable Answers	Extra Information	Mark
12(a)(iii)	electrical electric	Allow 'electricity'	
			(1)

Question Number	Acceptable Answers	Extra Information	Mark
12(b)	gravitational potential gravitational potential GPE Kinetic KE Heat thermal sound acoustic	 accept 'movement' accept if a correct pair are given e.g. heat and sound **dna** noise	1 1 1
			(3)

Question Number	Acceptable Answers	Extra Information	Mark
13(a)	14	number at the top left-hand side of the symbol	
			(1)

Question Number	Acceptable Answers	Extra Information	Mark
13(b)	…protons ….nucleus	both required in the correct order accept phonetic spelling **dna** 'neutron'	
			(1)

Question Number	Acceptable Answers	Extra Information	Mark
13(c)	isotopes	Ignore 'radioactive'	
			(1)

Question Number	Acceptable Answers	Extra Information	Mark
13(d)(i)	alpha/α beta/β	either order	
			(1)

Question Number	Acceptable Answers	Extra Information	Mark
13(d)(ii)	random spontaneous	accept erratic/irregular /not regular/not steady /not constant /not predictable	
			(1)

Question Number	Acceptable Answers	Extra Information	Mark
14(a)	Electromagnet	accept Electric magnet	
			(1)

Question Number	Acceptable Answers	Extra Information	Mark
14(b)	any two, (1) each, from: • to prevent a short/shorting/short circuit • iron is a conductor • (so that) current/electricity goes through wire/coil/each turn • to prevent current/electricity going through nail	**dna** any response related to heat insulation or safety	
			(2)

Question Number	Acceptable Answers	Extra Information	Mark
14(c)(i)	it will pick up magnetic materials **or** show field pattern using iron filings **or** it will repel (one pole/end of) a magnet/compass needle	allow any example of a magnetic material e.g. (iron) filings/allow paperclips ignore 'attract to magnet'	
			(1)
14(c)(ii)	idea that when circuit switched off/nail removed from coil, nail quickly loses its magnetism	not 'will lose its magnetism over a period of time'	
			(1)

Question Number	Acceptable Answers	Extra Information	Mark
15(a)	(negative) <u>electrons</u> (dry) cloth ….. balloon friction	**dna** 'negative charges' both required correct order essential	1 1 1
			(3)

Question Number	Acceptable Answers	Extra Information	Mark
15(b)	positive /+ opposite/unlike	 Accept 'different'	1 1
			(2)

Question Number	Acceptable Answers	Extra Information	Mark
16(a)	ice		
			(1)

Question Number	Acceptable Answers	Extra Information	Mark
16(b)(i)	melting/melt(s)	accept 'change of state'	
			(1)

Question Number	Acceptable Answers	Extra Information	Mark
16(b)(ii)	evaporation/evaporating	**aps** **dna** 'boiling'	
			(1)

Question Number	Acceptable Answers	Extra Information	Mark
16(c)	close packed random/irregular/erratic	**dna** 'close packed regular' accept 'in different directions' /'at different speeds' /'at different velocities'	1 1
			(2)

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