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Mark Scheme (Results)
November 2009

IGCSE

IGCSE Science (Double Award) (4437) Paper 3F

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The following abbreviations have been used:

ecf error carried forward

dop dependent on previous

owtteor words to that effect

ora or reverse argument

Question Number	Acceptable Answers	Extra Information	Mark
1 (a)	friction	accept 'air resistance' or 'friction with the air/table' or 'drag'	1

Question Number	Acceptable Answers	Extra Information	Mark
1 (b)(i)	gravitational (potential) (1) kinetic (1)	do not credit just 'potential' correct order essential	2

Question Number	Acceptable Answers	Extra Information	Mark
1 (b)(ii)	heat (1) sound (1)	accept 'thermal' either order	2

Question Number	Acceptable Answers	Extra Information	Mark
1 (b)(iii)	chemical		1

(Total 6marks)

Question Number	Acceptable Answers	Extra Information	Mark
2 (a)	45		1

Question Number	Acceptable Answers	Extra Information	Mark
2 (b)(i)	Hooke's	accept minor misspellings	1

Question Number	Acceptable Answers	Extra Information	Mark
2 (b)(ii)	extension is (directly) proportional to load		1

Question Number	Acceptable Answers	Extra Information	Mark
2 (b)(iii)	elastic (1) removed (1) longer (1)	accept 'taken off'	3

(Total 6 marks)

Question Number	Acceptable Answers	Extra Information	Mark
3 (a)(i)	LDR	accept ldr or Ldr	1

Question Number	Acceptable Answers	Extra Information	Mark
3 (a)(ii)	shine a light (on it)/increase the illumination		1

Question Number	Acceptable Answers	Extra Information	Mark
3 (a)(iii)	cover it/put it in the dark	credit (1) if the answers to (a)(ii) and (a are 'correct' but reversed	1

Question Number	Acceptable Answers	Extra Information	Mark
3 (b)	thermistor		1

Question Number	Acceptable Answers	Extra Information	Mark
3 (c)(i)	variable resistor	allow 'variable resistance'	1

Question Number	Acceptable Answers	Extra Information	Mark
3 (c)(ii)	....increased .... decreased	or .... decreased .... increased	1

(Total 6 marks)

Question Number	Acceptable Answers	Extra Information	Mark
4 (a)	either energy ... information ... matter	or information ... energy matter all correct in either case	1

Question Number	Acceptable Answers	Extra Information	Mark
4 (b)	any one of • sound (waves) • ultrasound (waves) • push and pull wave (on a spring/slinky/in an earthquake) P/primary (seismic waves)	do not credit just 'seis waves' or 'in an earthquake'	1

Question Number	Acceptable Answers	Extra Information	Mark
4 (c)(i)	transverse	or electromagnetic/em (waves)	1

Question Number	Acceptable Answers	Extra Information	Mark
4 (c)(ii)	**no ecf** any one of • water (waves) • S/secondary (seismic waves) • light (waves)	do not credit 'side to side wave on a spring/slinky' do not credit just 'seismic waves' or 'in an earthquake' or gamma/X-ray/ultraviolet/infra-red /microwaves/radio	1

(Total 4 marks)

Question Number	Acceptable Answers	Extra Information	Mark
5 (a)	gamma rays → sterilising medical equipment (1) infra-red → night vision equipment (1) microwaves → satellite transmissions (1) ultra violet → fluorescent lamps (1)	if more than one link to or from a box then cancel all the links to or from the box	4

Question Number	Acceptable Answers	Extra Information	Mark
5 (b)	speed	accept 'velocity'	1

(Total 5 marks)

Question Number	Acceptable Answers	Extra Information	Mark
6 (a)	all six ticked (2)	any four or five ticked (1) otherwise (0)	2

Question Number	Acceptable Answers	Extra Information	Mark
6 (b)(i)	.....magnet .....wire..... coil.....field	either all four correct (2) or any two correct (1)	2

Question Number	Acceptable Answers	Extra Information	Mark
6 (b)(ii)	any two (1) each • increase the strength of the magnet/field /magnetic field • spin/rotate/move the magnet /field/coil faster • more turns on coil • larger area of coil	do not credit just 'use a bigger magnet' accept 'greater (relative) movement'	2

(Total 6 marks)

Question Number	Acceptable Answers	Extra Information	Mark
7 (a)(i)	... neutrons ... protons	both required but either order	1

Question Number	Acceptable Answers	Extra Information	Mark
7 (a)(ii)	protons (1) neutrons (1)	correct order essential	2

Question Number	Acceptable Answers	Extra Information	Mark
7 (a)(iii)	... electrons ... protons	both required but either order	1

Question Number	Acceptable Answers	Extra Information	Mark
7 (b)	... particles ... particles ... rays	all three correct (2) any two correct (1) otherwise (0)	2

(Total 6 marks)

Question Number	Acceptable Answers	Extra Information	Mark
8 (a)	arrow from centre (by eye) of X vertically (by eye) downwards		1

Question Number	Acceptable Answers	Extra Information	Mark
8 (b)(i)	90 (seconds) (2)	or 1.5 x 60 for (1)	2

Question Number	Acceptable Answers	Extra Information	Mark
8 (b)(ii)	(average) speed = $\frac{\text{distance (moved)}}{\text{time (taken)}}$	allow any correctly transposed version	1

Question Number	Acceptable Answers	Extra Information	Mark
8 (b)(iii)	6 (m/s) (2)	or $\frac{500}{90}$ or 5.5..... (1)	2

(Total 6 marks)

Question Number	Acceptable Answers	Extra Information	Mark
9 (a)	wire melts/blows breaks circuit/no current		1 1

Question Number	Acceptable Answers	Extra Information	Mark
9 (b)	Use of P = V I 1500 / 240 = 6.25 (A)		3

Question Number	Acceptable Answers	Extra Information	Mark
9 (c)(i)	13A		1

Question Number	Acceptable Answers	Extra Information	Mark
9 (c)(ii)	all the others would blow **dop**		1

Question Number	Acceptable Answers	Extra Information	Mark
9 (d)	toaster / oven / kettle /bread machine /soldering iron etc.	not microwave	1

(Total 8 marks)

Question Number	Acceptable Answers	Extra Information	Mark
10 (a)(i)	protons and neutrons/ Helium atom 2p + 2n /He nucleus/nuclei scores 2		2

Question Number	Acceptable Answers	Extra Information	Mark
10 (a)(ii)	another source of background radiation	buildings rock soil nuclear power medical uses radon etc	1

Question Number	Acceptable Answers	Extra Information	Mark
10 (b)	less absorption/space less dense or vacuum **owtte**		1

Question Number	Acceptable Answers	Extra Information	Mark
10 (c)(i)	time for activity to halve **owtte**		1

Question Number	Acceptable Answers	Extra Information	Mark
10 (c)(ii)	1. method shown on graph 6 000 (years) 2. count similar to background/no (carbon-14) activity		1 1 1

Question Number	Acceptable Answers	Extra Information	Mark
10 (c)(iii)	smoke detector sterilising tracers checking welds cancer treatment etc	accept 'medical'	1

(Total 9 marks)

Question Number	Acceptable Answers	Extra Information	Mark
11 (a)	force distance direction	either order *independent marks*	1 1 1

Question Number	Acceptable Answers	Extra Information	Mark
11 (b)	2000/ 5 = 400 (W)		1 1

Question Number	Acceptable Answers	Extra Information	Mark
11 (c)(i)	efficiency = useful output energy/ input energy	= (input energy – waste energy) / input energy	1
11 (c)(ii)	20 000/ 50 000 = 0.4 or 40%	0.4 scores 3 (c) marks	1 1

(Total 8 marks)

Question Number	Acceptable Answers	Extra Information	Mark
12 (a)(i)	(loft) insulation or named material		1

Question Number	Acceptable Answers	Extra Information	Mark
12 (a)(ii)	curtains/shutters/double glazing/triple glazing		1

Question Number	Acceptable Answers	Extra Information	Mark
12 (b)	air heated/hot air expands / less dense rises **ora**	not 'lighter'	1 1 1

(Total 5 marks)

PAPER TOTAL: 75 MARKS

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