OCR
RECOGNISING ACHIEVEMENT

GCSE

Additional Science A

General Certificate of Secondary Education

Unit **A152/02:** Modules B5, C5, P5 (Higher Tier)

Mark Scheme for June 2012

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This mark scheme is published as an aid to teachers and students, to indicate the requirements of the examination. It shows the basis on which marks were awarded by examiners. It does not indicate the details of the discussions which took place at an examiners' meeting before marking commenced.

All examiners are instructed that alternative correct answers and unexpected approaches in candidates' scripts must be given marks that fairly reflect the relevant knowledge and skills demonstrated.

Mark schemes should be read in conjunction with the published question papers and the report on the examination.

OCR will not enter into any discussion or correspondence in connection with this mark scheme.

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Annotations

Used in the detailed Mark Scheme:

Annotation	**Meaning**
/	alternative and acceptable answers for the same marking point
(1)	separates marking points
not/reject	answers which are not worthy of credit
ignore	statements which are irrelevant - applies to neutral answers
allow/accept	answers that can be accepted
(words)	words which are not essential to gain credit
words	underlined words must be present in answer to score a mark
ecf	error carried forward
AW/owtte	credit alternative wording / or words to that effect
ORA	or reverse argument

Available in scoris to annotate scripts:

	indicate uncertainty or ambiguity
BOD	benefit of doubt
CON	contradiction
	incorrect response
ECF	error carried forward
	draw attention to particular part of candidate's response
NBOD	no benefit of doubt
R	reject
	correct response
L1 , L2 , L3	draw attention to particular part of candidate's response
^	information omitted

Subject-specific Marking Instructions

a. Accept any clear, unambiguous response (including mis-spellings of scientific terms if they are *phonetically* correct, but always check the guidance column for exclusions).

b. Crossed out answers should be considered only if no other response has been made. When marking crossed out responses, accept correct answers which are clear and unambiguous.

e.g. for a one-mark question where ticks in the third <u>and</u> fourth boxes are required for the mark:

This would be worth 1 mark.

This would be worth 0 marks.

This would be worth 1 mark.

c. The list principle:
If a list of responses greater than the number requested is given, work through the list from the beginning. Award one mark for each correct response, ignore any neutral response, and deduct one mark for any incorrect response, e.g. one which has an error of science. If the number of incorrect responses is equal to or greater than the number of correct responses, no marks are awarded. A neutral response is correct but irrelevant to the question.

d. Marking method for tick-box questions:

If there is a set of boxes, some of which should be ticked and others left empty, then judge the entire set of boxes.
If there is at least one tick, ignore crosses and other markings. If there are no ticks, accept clear, unambiguous indications, e.g. shading or crosses. Credit should be given according to the instructions given in the guidance column for the question. If more boxes are ticked than there are correct answers, then deduct one mark for each additional tick. Candidates cannot score less than zero marks.

e.g. if a question requires candidates to identify cities in England:

Edinburgh	
Manchester	
Paris	
Southampton	

the second and fourth boxes should have ticks (or other clear indication of choice) and the first and third <u>should be blank</u> (or have indication of choice crossed out).

Edinburgh			✓			✓	✓	✓	✓	
Manchester	✓	×	✓	✓	✓				✓	
Paris				✓	✓		✓	✓	✓	
Southampton	✓	×		✓		✓	✓		✓	
Score:	**2**	**2**	**1**	**1**	**1**	**1**	**0**	**0**	**0**	**NR**

e. For answers marked by levels of response:

i. **Read through the whole answer from start to finish**

ii. **Decide the level** that **best fits** the answer – match the quality of the answer to the closest level descriptor

iii. **To determine the mark within the level**, consider the following:

Descriptor	Award mark
A good match to the level descriptor	The higher mark in the level
Just matches the level descriptor	The lower mark in the level

iv. Use the **L1**, **L2**, **L3** annotations in Scoris to show your decision; do not use ticks.

Quality of Written Communication skills assessed in 6-mark extended writing questions include:

- appropriate use of correct scientific terms
- spelling, punctuation and grammar
- developing a structured, persuasive argument
- selecting and using evidence to support an argument
- considering different sides of a debate in a balanced way
- logical sequencing.

Question			Answers	Marks	Guidance
1	(a)		3 2 1 5 4	3	5 correct = 3 3 or 4 correct = 2 2 correct = 1 1 correct = 0
	(b)		discusses ***strength*** [of forces] [forces are] ***between*** molecules [not atoms] links forces to ease of separation/ less energy needed	3	**ignore** 'bonding holding them together' unless clear that it is about intermolecular forces
	(c)		***movement*** through the liquid of ***charged*** particles [or a context which implies particles] reference to ***ions***	3	if direction of movement given, it must be correct reference to positive and negative counts as a mention of charge but it must be both, not just one or the other **ignore** 'electrons', so 'particles are electrons and ions' can still get the ion mark **allow** 'charged electrons' for the charge mark **ignore** 'charged electrodes' for the charge mark [not a particle which can move] 'electrodes flow through the liquid' = 1 for movement
			Total	**9**	

Question			Answers	Marks	Guidance
2			**[Level 3]** Identifies four hazards from the question, can state how at least two of the hazards are generated and shows who will be affected by at least one of them. Causality correct throughout. Quality of written communication does not impede communication of the science at this level. (5 – 6 marks) **[Level 2]** Identifies at least two hazards from the question and shows how at least one of them is generated. Causality correct throughout. Quality of written communication partly impedes communication of the science at this level. (3 – 4 marks) **[Level 1]** Identifies at least one hazard from the question and how it is generated, or two hazards but not how they are generated. Examples of incorrect causality. Quality of written communication impedes communication of the science at this level. (1 – 2 marks) **[Level 0]** Insufficient or irrelevant science. Answer not worthy of credit. (0 marks)	6	**This question is targeted at grades up to C** **Indicative scientific points may include:** **risk how generated who injured** • shaft collapse – soft soil/ injury – miner • deep shaft – fall/dropping – miner/people on ground • lead ore dust – [as ore mined] – harms miners • lead ore fumes – from fire – harms surface workers • lead dust/fumes – from the fire – harms surface workers • heat burns – from specified hot things – harms surface workers • sulphur dioxide/acid gas – from the fire – harms surface workers **accept** 'anyone in the vicinity' of the hazard **allow** exposure to lead dust and to lead ore dust as separate hazards **allow** only one risk for unspecified dust or fumes incorrect causality is an answer such as "the fuels cause lead poisoning" "they/who [are burning and melting lead]" shows who is affected **Use the L1, L2, L3 annotations in Scoris; do not use ticks.**

Question			Answers	Marks	Guidance
	(b)	(i)	2,3,2,2	2	LHS correct = 1 RHS correct = 1
		(ii)	reduction / reduced	1	
		(iii)	223	1	
		(iv)	92.8%	1	allow 93%
			Total	**11**	

Question			Answers	Marks	Guidance
3	(a)	(i)	ring around the variable resistor	1	
		(ii)	variable resistance (owtte)	1	both variable AND resistance are needed **accept** variable resistor **ignore** "changes the current" [in stem]
	(b)		negative correlation / so increasing power linked to decreasing resistance (1) resistance of thermistor decreases with increasing temperature; (1) increasing power delivers more energy to thermistor as heat means it gets hotter; (1)	3	[description of correlation] for [1] links P to R correctly – inv [behaviour of thermistor] for [1] links R to T correctly – inv [causal link explained] for [1] links P to T correctly – proportional
	(c)		current = voltage / resistance = 0.5 [A](1); power = 1.5 [W] , so yes, supports the correlation (1)	2	
			Total	**7**	

Question			Answers	Marks	Guidance
4	(a)		**[Level 3]** Shows a clear understanding of both the main aspects of construction and also of the operation of a transformer, and connects those ideas. Mentions six aspects, some of which are high quality such as induction or appropriate mention of magnetism, and at least two of which are operational. Quality of written communication does not impede communication of the science at this level. (5 – 6 marks) **[Level 2]** Understands the basics of how a transformer is constructed but may not be specific in their description of the operation of the transformer. Mentions four aspects, at least one of which is operational. Quality of written communication partly impedes communication of the science at this level. (3 – 4 marks) **[Level 1]** Shows familiarity with the construction of a transformer. At least three construction and/or operation points mentioned. There may well be irrelevant and some incorrect material in the answer. Quality of written communication impedes communication of the science at this level. (1–2 marks) **[Level 0]** Insufficient or irrelevant science. Answer not worthy of credit. (0 marks)	6	**This question is targeted at grades up to A/A*** **Construction points include** • insulated [wire] • round a common core [even if the core is unsuitable] • iron [core] • two sets [of coils/turns/wires] / primary and secondary / different number of turns – accept larger and smaller coils • fewer turns on secondary [=2 as incorporates previous point] **Operation points** • relies on a.c.[in general] • current in primary creates magnetic field • core carries magnetic field to secondary • reference to magnetic component • changing [magnetic field] • induces • alternating p.d. [in secondary] • [which produces] alternating current / a.c. • size of p.d. depends on ratio of turns in coils • [fewer turns in secondary] results in lower p.d. • lower pd enables greater current • power in = power out [ignoring heating effects] **accept** use of the formula instead of fewer coils point **ignore** " the voltage is reduced" [stem] **ignore** "magnet" when describing the core **ignore** correct points in an incorrect context e.g. discussion electric motors **Use the L1, L2, L3 annotations in Scoris; do not use ticks.**

Question			Answers	Marks	Guidance
	(b)		suitable ratio of coils (1) eg 1000/20000 or 20000/1000 suitable ratio of voltages 12/230 or 230/12 or use of 11.5 (1)	2	no credit for comparing 11.5 to 12V each ratio must be clear, not just part of a jumble of calculation to get two marks the overall answer must be correct and both points must be linked one mark answer Vp/Vs = Np/Ns
			Total	**8**	

Question			Answers	Marks	Guidance
5			All parts of the coil are ... [ ] The commutator converts ... [ ] The wires next to the poles ... [✓] The forces on the coil are caused ... [ ]	1	
			Total	**1**	

Question			Answers	Marks	Guidance
6	(a)		0.20 V	1	
	(b)		decreases; stays the same; increases; increases	3	all four correct for (3) any three correct for (2) any two correct for (1) if first response is “increase” then firstly mark as normal THEN use **ecf** giving the higher of the two marks eg of a 2 mark answer [increase] stays the same decreases decreases
			Total	**4**	

Question			Answers	Marks	Guidance
7	(a)		29	1	
	(b)		you also need to know the sequence/order [of bases]	1	triplets implies order **ignore** "to determine genetic code" – STEM
	(c)		**[Level 3]** Shows a grasp of **all** the aspects by discussing switching of genes, links protein to amino acids/ bases/ DNA / RNA, and appreciates that something in the cell carries a set of instructions, and appreciates that the protein is produced in a different part of the cell from the place where the information is stored. Quality of written communication does not impede communication of the science at this level. (5 – 6 marks) **[Level 2]** Discusses amino acids/ bases/ DNA / RNA in an appropriate fashion, and appreciates that there is a code/instruction set and gives further detail. Quality of written communication partly impedes communication of the science at this level. (3 – 4 marks) **[Level 1]** Mentions amino acids/ bases/ DNA / RNA/ genes AND an extra aspect. Quality of written communication impedes communication of the science at this level. (1 – 2 marks) **[Level 0]** Insufficient or irrelevant science. Answer not worthy of credit. (0 marks)	6	**This question is targeted at grades up to A/A*** **indicative scientific points may include:** Nucleus • information stored in nucleus • within the DNA • sequence of bases / code • for order of amino acids • base sequence in nucleus is copied Transport of information • copied information goes to cytoplasm • using mRNA Construction of protein • where protein is assembled • different proteins are made from different sequences of amino acids Switching • muscle and nerve cells have same genes • but specialised cells have only some genes switched on • nerve cells do not have gene for myosin switched on • muscle cells do have gene for myosin switched on NB candidates not expected to know details of transcription or translation **Use the L1, L2, L3 annotations in Scoris; do not use ticks.**

Question			Answers	Marks	Guidance
	(d)		*any three from:* test more/ other people (1) test females (1) test older people (1) test people with weaker muscles (1)	3	one mark for each correct suggestion **ignore** incorrect suggestions credit any suitable suggestion by the candidate **ignore** statements which are too general eg 'different lifestyles' **ignore** "do the experiment again" **ignore** peer review/ get other scientists to test it [this answer not specific to investigation]
			Total	**11**	

Question			Answers	Marks	Guidance
8	(a)		any two correct lines from: <table><tr><th>4 cell stage</th><th>32 cell stage</th></tr><tr><td>identical</td><td>non-identical</td></tr><tr><td>unspecialised</td><td>specialised</td></tr><tr><td>all genes switched on</td><td>some switched off</td></tr><tr><td>can develop into all types of cell</td><td>cannot develop into all types of cell</td></tr></table>	1	**ignore** nomenclature differences eg zygote/embryo as the stem states that these are both stages of embryo
	(b)		46	1	
	(c)		Liza	1	
			Total	**3**	

Question			Answers	Marks	Guidance
9	(a)	(i)	suitable mention/ calculation of slope / ratio/ proportionality allows for the 0.5m at the start in a suitable way	2	the first mark is accessible using a qualitative approach **allow** "growing rate" "14.5 metres" with no form of explanation [1] **ignore** "the tree grows 3m in 5 years, therefore …."
		(ii)	growth fluctuates / will not be the same each year (1) example of a specific varying factor that will affect the growth (1)	2	**allow** variations in named environmental factors, e.g. temperature, rainfall, light, carbon dioxide / competition with other plants / disease / predation (1) **allow** 'the tree has stopped growing' = 1 **ignore** 'auxins may make it grow to one side'
	(b)		tissue is a group of specialised cells (1) organ is a group of tissues [working together] (1)	2	**accept** 'similar' cells **ignore** 'a group of cells' with no further clarification
			Total	**6**	

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