



GCSE

Science B

General Certificate of Secondary Education

Unit **B712/01**: Modules B2, C2, P2 (Foundation Tier)

Mark Scheme for June 2013

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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.

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1. For answers marked by levels of response:
- Read through the whole answer from start to finish**
 - Decide the level that best fits** the answer – match the quality of the answer to the closest level descriptor
 - 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

- d. 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.

2. Annotations

Annotation	Meaning
	correct response
	incorrect response
	benefit of the doubt
	benefit of the doubt not given
	error carried forward
	information omitted
	ignore
	reject
	contradiction
	Level 1
	Level 2
	Level 3

3. Abbreviations, annotations and conventions used in the detailed Mark Scheme.

/	=	alternative and acceptable answers for the same marking point
(1)	=	separates marking points
allow	=	answers that can be accepted
not	=	answers which are not worthy of credit
reject	=	answers which are not worthy of credit
ignore	=	statements which are irrelevant
()	=	words which are not essential to gain credit
—	=	underlined words must be present in answer to score a mark (although not correctly spelt unless otherwise stated)
ecf	=	error carried forward
AW	=	alternative wording
ora	=	or reverse argument

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Question		Answer	Marks	Guidance
1	(a)	algae/(aquatic) plants (1)	1	not dead plants
	(b)	<p>any two from: bacteria are eaten by snail or water boatman (1)</p> <p>snail or water boatman are eaten by dragonfly larvae or diving beetle larvae (1)</p> <p>dragonfly larvae or diving beetle larvae are eaten by platypus (1)</p>	2	<p>must mention the idea of feeding to gain both marks must name animals/plants etc if feeding not mentioned whole chain is needed for 1 mark eg it passes from bacteria to the snails to the diving beetle and then the platypus = 1 mark</p>
	(c)	insect (1)	1	allow ringed answer if no answer on line
	(d)	<p>any two from: idea of elements (in platypus) being recycled or made available for others (1)</p> <p>bacteria in food web decompose/break down the platypus (1)</p> <p>mayfly larvae/shrimp/snail can feed on the decomposing/ dead body (1)</p>	2	<p>ignore bacteria feed on/off</p> <p>must name animal in the web eg animals can feed on the dead decomposing body = 0 ignore anything feeding on bacteria</p>
		Total	6	

Question			Answer	Marks	Guidance
2	(a)	(i)	2 (1)	1	mark answer line allow answer written in table if answer line blank
		(ii)	two eyes are better than one (for judging distance) (1)	1	
	(b)		idea that more people needed to be tested (1) eg any number greater than one because they may show different results or anomalous results (1) everyone's eyes are different/ has different eyesight (1)	2	ignore they need to be tested several times allow Sally might have one strong and one weak eye (1) and we don't know which one she used (1) allow they may have improved with practice (1)
Total				4	

Question		Answer	Marks	Guidance
3	(a)	<p>Level 3 (5–6 marks) Answer identifies a total of three advantages and disadvantages (to include at least one advantage and one disadvantage) to the people of Madagascar, one of which is correctly qualified or explained. Quality of written communication does not impede communication of the science at this level.</p> <p>Level 2 (3–4 marks) Answer identifies one advantage AND one disadvantage of the conservation programme to the people of Madagascar OR one advantage or disadvantage qualified or explained. Quality of written communication partly impedes communication of the science at this level.</p> <p>Level 1 (1–2 marks) Answer identifies one advantage OR one disadvantage of the conservation programme to the people of Madagascar. Quality of written communication impedes communication of science at this level.</p> <p>Level 0 (0 marks) Insufficient or irrelevant science. Answer not worthy of credit.</p>	6	<p>This question is targeted at grades up to grade C Relevant points include: advantages qualified or explained for level 3</p> <ul style="list-style-type: none"> • more tourists mean local people could get money as tour guides or park rangers • stops deforestation so preserves the habitats of other animals • more tourism because lemurs are rare • fewer people to disturb the lemurs as they are not allowed in conservation area <p>disadvantages qualified or explained for level 3</p> <ul style="list-style-type: none"> • people worse off because they cannot sell materials they find in forest <p>advantages</p> <ul style="list-style-type: none"> • (more) tourists attracted • (more) jobs • education about lemurs / scientists can study lemurs • could find plants for medical purpose • habitat still available for food • stops deforestation <p>allow increase in lemur population/preserve the food chain for the lemurs/protect the lemurs etc. if no other creditworthy response for level 1 (2 marks)</p> <p>disadvantages</p> <ul style="list-style-type: none"> • unable to collect timber/unable to sell timber • can't use rainforest for resources • can't cut down forest to grow own food • more lemurs could alter food chain/ecosystem • too much tourism causes disruption • expensive to police or maintain the conservation areas <p>Use L1, L2, L3 annotations in scoris. Do not use ticks.</p>

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Question		Answer	Marks	Guidance
	(b)	hunting/climate change/pollution/competition from other animals / shortage of food/being killed/poaching (1)	1	allow (introduction of a new) disease
	(c) (i)	(group of organisms capable of interbreeding) to produce fertile offspring (1)	1	
	(ii)	Darwin (tick in first box) (1)	1	more than one tick scores 0
		Total	9	

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Question			Answer	Marks	Guidance
4	(a)	(i)	1980 (1)	1	
		(ii)	less wolves (1) so less moose got eaten/more moose survive (1)	2	ignore less moose are hunted on its own ignore moose reproduce more
	(b)		any three from: moose have eyes on side of head so they have a wide field of view/AW (1) moose live in large herds to reduce chance of getting eaten (1) moose breed at the same time so the herd can protect the young (1) (adult) moose are large animals so difficult to kill (1) use antlers to fight off wolves/protect themselves/defend themselves/AW (1) strong legs that can kick out and hurt wolves/run away (1) camouflaged so they are difficult to see (1)	3	must be an explanation eg live in large herds or eyes on side of head (0) allow monocular vision for eyes in the side of head (still needs explanation for the mark) allow bring down for kill allow poor spelling of antler unless it is a correct word eg antelopes allow large ears so they can hear wolves allow brown so camouflaged/difficult to see
Total				6	

Question			Answer	Marks	Guidance
5	(a)		acidic – red (1) alkaline – blue (1)	2	allow pink not green
	(b)		potassium nitrate (1)	1	allow potassium nitrate solution/potassium nitrate salt (1) allow KNO ₃ (1)
	(c)		any two from: idea of work needs to be checked (1) to see if it can be replicated (1) so can use his results for other work (1)	2	allow see if results are correct or valid allow peer review/evaluation of his work
Total				5	

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Question		Answer	Marks	Guidance
6	(a)	<p>any three from:</p> <p>solder has a lower melting point than tin or lead (1)</p> <p>the density of solder is less than that of lead but greater than tin (1)</p> <p>solder is a better conductor than lead and tin (1)</p> <p>solder is more expensive than lead but cheaper than tin (1)</p>	3	<p>Use ticks</p> <p>answer must relate to solder and not just quote figures</p> <p>allow solder has a low melting point</p> <p>allow density of solder is between lead and tin</p> <p>allow solder has a high electrical conductivity</p>
	(b)	<p>solder (1)</p> <p>it has a low melting point (1)</p>	2	<p>Second mark is dependent on correct first mark</p> <p>allow solder has a reasonable electrical conductivity</p>
	(c)	<p>aluminium (1)</p> <p>low density/lightweight (1)</p> <p>cheapest or just cheap/not expensive (1)</p>	3	<p>property marks are dependent on the choice of aluminium unless no metal is chosen</p> <p>ignore just light</p> <p>allow does not corrode (1)</p> <p>allow strong/malleable (1)</p> <p>ignore other properties mentioned</p>
		Total	8	

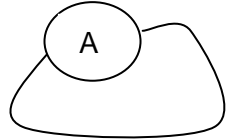
Question			Answer	Marks	Guidance
7	(a)	(i)	50 (%) scores (2) if numerical answer is incorrect then $\frac{200 \times 100}{400}$ scores (1)	2	if no other marks awarded 400 for total = (1) anywhere on the answer since it shows a total cost of £400
		(ii)	gas and electricity are needed in large quantities or gas and electricity are expensive (1) uses a lot of energy (1) energy is expensive (1)	1	allow any reference to maintaining a high temperature or a high pressure (1) more energy needed is insufficient = 0
	(b)		steam is made from water/water is readily available (1) ethene is not readily available (1) steam is easy to make (1) steam uses less energy to make/OR A (1)	2	allow water is renewable ignore steam is easy to get allow ethene is a non-renewable source/ethene comes from crude oil (1)
	(c)		reaction that goes both ways/AW (1)	1	allow returns to original reactants/goes back to where it started/example
			Total	6	

Question	Answer	Marks	Guidance
8	<p>Level 3 (5–6 marks) Answer describes at least one reason that farmers use fertilisers AND correctly explains how fertilisers work AND one disadvantage of using fertilisers. Quality of written communication does not impede communication of the science at this level.</p> <p>Level 2 (3–4 marks) Answer describes at least one reason that farmers use fertilisers AND attempts to explain how fertilisers work OR one disadvantage of using fertilisers AND attempts to explain how fertilisers work OR one reason that farmers use fertilisers AND one disadvantage of using fertilisers. Quality of written communication partly impedes communication of the science at this level.</p> <p>Level 1 (1–2 marks) Answer describes one reason that farmers use fertilisers OR explains how they work OR one disadvantage of using fertilisers. Quality of written communication impedes communication of the science at this level.</p> <p>Level 0 (0 marks) Insufficient or irrelevant science. Answer not worthy of credit.</p>	6	<p>This question is targeted at grades up to C. Relevant points include: Farmers use fertilisers to</p> <ul style="list-style-type: none"> • increase crop yield • grow crops more quickly • grow bigger crops • idea of increase profit. <p>Fertilisers work because</p> <ul style="list-style-type: none"> • they contain essential elements • essential elements are N. P and K • fertilisers are soluble in water • absorbed through roots. <p>Disadvantages</p> <ul style="list-style-type: none"> • kill aquatic organisms • cause eutrophication • pollute water supplies. <p>Use the L1, L2, L3 annotations in scoris. Do not use ticks.</p>
	Total	6	

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Question		Answer	Marks	Guidance
9	(a)	<p>diagram showing wire connected to both sides of ammeter (1)</p> <p>idea of moving wire near to magnet/magnet near to wire (1)</p>	2	<p>all marks can be scored from a labelled diagram</p>  <p>if diagram incorrect or missing one mark can be awarded for correct written description of relative motion</p>
	(b)	<u>alternating current</u> (1)	1	
	(c) (i)	47 (%) (2)	2	<p>if not 2 sig fig max 1 for substitution which can be implied by answer</p> <p>46 (%) (1)</p> <p>46.6 (%) (1)</p> <p>0.47 (%) (1)</p> <p>OR</p> <p>420 / 900 or 42000 / 900 (1)</p>
	(ii)	idea that less energy wasted/wasted energy used for heating/AW (1)	1	allow not all the heat from power station wasted
Total			6	

Question	Answer	Marks	Guidance
10 (a)	<p>Level 3 (5–6 marks) Considers all three energy sources AND makes a choice with a detailed explanation of their choice in terms of transport, availability and waste. Quality of written communication does not impede communication of the science at this level.</p> <p>Level 2 (3–4 marks) Considers two energy sources with limited comparison in terms of advantages and disadvantages. Quality of written communication partly impedes communication of the science at this level.</p> <p>Level 1 (1–2 marks) Considers an energy source AND gives a simple advantage or disadvantage. Quality of written communication impedes communication of the science at this level.</p> <p>Level 0 (0 marks) Insufficient or irrelevant science. Answer not worthy of credit.</p>	6	<p>This question is targeted at grades up to C. Relevant points include: 1 requires large amounts of transport Isolated so roads and rail need to be built Solid waste needs to be removed 2 no transport but pipeline expensive to construct 3 hazards in transporting highly radioactive material 1 and 2 have waste gases 3 no emissions but there is a problem of waste disposal 1 produces ash that needs disposing of level 2 eg 1 has no radioactive waste 3 produces radioactive waste</p> <p>level 1 eg 1 will last a long time 2 it does not need lorries to transport it</p> <p>Use the L1, L2, L3 annotations in scoris. Do not use ticks.</p>
(b)	<p>any two from: no pollution/environmentally friendly (1) cheap to run (1) no transport of fuel (1) expensive to build (1) ugly (1) noisy when working (1) only work if wind is correct /AW (1) kill birds (1)</p>	2	<p>not just cheap</p> <p>not just expensive</p>
	Total	8	

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Question		Answer	Marks	Guidance
11	(a)	<p>alpha → aluminium paper lead (2)</p> <p>beta → </p> <p>gamma → </p>	2	1 or 2 correct (1) all correct (2) all three lines must be extended to score full marks
	(b)	smoke detectors/cancer treatment/tracers/non-destructive testing /radiotherapy/thickness gauge/sterilizing equipment (1)	1	
Total			3	

Question		Answer	Marks	Guidance
12	(a)	a group of stars (1)	1	ignore named galaxies/ignore other objects that may be in a galaxy. The word Stars must be present
	(b)	(idea of) very long distance (1)	1	
	(c) (i)	rock (1)	1	allow rock and ice and dust the word rock must be present rock and fire =0
	(ii)	craters/fires/climate change/species extinction/dust blocks sunlight /clouds of dust (1)	1	allow wipes out dinosaurs ignore holes/tsunamis/damage to existing structures /earth wiped out if type of climate change mentioned it must be correct eg global warming is wrong as the effect causes global cooling
Total			4	

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Question		Answer	Marks	Guidance
13	(a)	highest power rating/uses 3000 W /AW (1)	1	ignore time in answer allow highest wattage
	(b)	yes (no mark) the mains can supply 6900 W (2) but if incorrect $230 \times 30 =$ (1) appliance power less than mains power/appliance power is 6000W (1)	3	If no 2 marks maximum allow all three marks from higher level answers in terms of current: all appliances take 26.1A (2) but if incorrect 6000/230 (1) appliance current less than supply (1)
Total			4	

Question		Answer	Marks	Guidance
14	(a) (i)	Lucy (1) idea of greatest increase or greatest change in stopping distance or correct calculation of the changes in stopping distance shown in table for all drivers (1) OR idea of greatest increase or greatest change in reaction time or correct calculation of the changes in reaction time shown in table for all drivers(1)	2	Second marking point is dependent on choosing Lucy allow Lucy's reaction time has decreased the most (2) calculated changes (allow changes rounded): reaction time stopping distance Peter 0.24 9 Mike 0.25 11 Lucy 0.31 14 Emily 0.17 8 ignore worst stopping distance ignore just longest reaction time

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		(ii) any two from: same age (1) same body mass (1) same road conditions (1) same time of day (1) same car (1) same car conditions eg tyres, brakes, etc. (1) same speed (1) same time after drinking (1) same type of drink (1)	2	ignore repeat the tests allow references to same weather conditions allow qualification of one answer in detail for 2 marks eg same car so you have the same tyres
	(b)	(i) points plotted correctly (1) straight line through points (1)	2	independent marking points tolerance +/- ½ square
		(ii) 8.3 – 9.0 (hours) (1)	1	allow ecf only if line continued to axis from 14b(i) if number lies outside the range then check graph and if number correctly read off graph (with a tolerance of ± 1.5 small square) award 1 mark
	(c)	(i) UK – 53.4 (1) Hungary – 129.6 (1)	2	allow 53.41 or 53 or any correct number of decimal places or any correct rounding allow 130
		(ii) idea that relationship appears to be the wrong way round/AW (1)	1	allow other factors can be responsible for road deaths allow there is insufficient data allow a statement of the findings eg (data could suggest that) there is a lower deaths per million with a higher limit/ORa (1) allow more deaths with a higher alcohol limit/ORa (1)
		Total	10	

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