



# 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:
  - a. **Read through the whole answer from start to finish**
  - b. **Decide the level that best fits** the answer – match the quality of the answer to the closest level descriptor
  - c. **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 <b>not</b> 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
<b>(1)</b>	=	separates marking points
<b>allow</b>	=	answers that can be accepted
<b>not</b>	=	answers which are not worthy of credit
<b>reject</b>	=	answers which are not worthy of credit
<b>ignore</b>	=	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	<b>not dead</b> plants
	(b)	<p><b>any two from:</b> bacteria are eaten by snail <b>or</b> water boatman (1)</p> <p>snail <b>or</b> water boatman are eaten by dragonfly larvae <b>or</b> diving beetle larvae (1)</p> <p>dragonfly larvae <b>or</b> 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 = <b>1 mark</b></p>
	(c)	insect (1)	1	<b>allow</b> ringed answer if no answer on line
	(d)	<p><b>any two from:</b> idea of elements (in platypus) being recycled <b>or</b> made available for others (1)</p> <p><b>bacteria</b> in food web decompose/break down the platypus (1)</p> <p><b>mayfly larvae/shrimp/snail</b> can feed on the decomposing/ dead body (1)</p>	2	<p><b>ignore</b> 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>
		<b>Total</b>	<b>6</b>	

Question			Answer	Marks	Guidance
2	(a)	(i)	2 (1)	1	<b>mark answer line</b> <b>allow</b> 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 <b>or</b> anomalous results (1) everyone's eyes are different/ has different eyesight (1)	2	<b>ignore</b> they need to be tested several times  <b>allow</b> Sally might have one strong and one weak eye (1) and we don't know which one she used (1)  <b>allow</b> they may have improved with practice (1)
<b>Total</b>				<b>4</b>	

Question		Answer	Marks	Guidance
3	(a)	<p><b>Level 3 (5–6 marks)</b>  <b>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.</b>            Quality of written communication does not impede communication of the science at this level.</p> <p><b>Level 2 (3–4 marks)</b>  <b>Answer identifies one advantage AND one disadvantage of the conservation programme to the people of Madagascar OR one advantage or disadvantage qualified or explained.</b>            Quality of written communication partly impedes communication of the science at this level.</p> <p><b>Level 1 (1–2 marks)</b>  <b>Answer identifies one advantage OR one disadvantage of the conservation programme to the people of Madagascar.</b>            Quality of written communication impedes communication of science at this level.</p> <p><b>Level 0 (0 marks)</b>            Insufficient or irrelevant science. Answer not worthy of credit.</p>	6	<p><b>This question is targeted at grades up to grade C</b>  <b>Relevant points include:</b>  <b>advantages qualified or explained for level 3</b></p> <ul style="list-style-type: none"> <li>• more tourists mean local people could get money as tour guides or park rangers</li> <li>• stops deforestation so preserves the habitats of other animals</li> <li>• more tourism because lemurs are rare</li> <li>• fewer people to disturb the lemurs as they are not allowed in conservation area</li> </ul> <p><b>disadvantages qualified or explained for level 3</b></p> <ul style="list-style-type: none"> <li>• people worse off because they cannot sell materials they find in forest</li> </ul> <p><b>advantages</b></p> <ul style="list-style-type: none"> <li>• (more) tourists attracted</li> <li>• (more) jobs</li> <li>• education about lemurs / scientists can study lemurs</li> <li>• could find plants for medical purpose</li> <li>• habitat still available for food</li> <li>• stops deforestation</li> </ul> <p><b>allow</b> 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><b>disadvantages</b></p> <ul style="list-style-type: none"> <li>• unable to collect timber/unable to sell timber</li> <li>• can't use rainforest for resources</li> <li>• can't cut down forest to grow own food</li> <li>• more lemurs could alter food chain/ecosystem</li> <li>• too much tourism causes disruption</li> <li>• expensive to police or maintain the conservation areas</li> </ul> <p><b>Use L1, L2, L3 annotations in scoris. Do not use ticks.</b></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	<b>allow</b> (introduction of a new) disease
	(c) (i)	(group of organisms capable of interbreeding) to produce <b>fertile</b> offspring (1)	1	
	(ii)	Darwin (tick in first box) (1)	1	more than one tick scores 0
		<b>Total</b>	<b>9</b>	

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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	<b>ignore</b> less moose are hunted on its own <b>ignore</b> moose reproduce more
	(b)		<b>any three from:</b>  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) <b>strong</b> 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) <b>allow</b> monocular vision for eyes in the side of head (still needs explanation for the mark)  <b>allow</b> bring down for kill <b>allow</b> poor spelling of antler <b>unless</b> it is a correct word eg antelopes  <b>allow</b> large ears so they can hear wolves <b>allow</b> brown so camouflaged/difficult to see
<b>Total</b>				<b>6</b>	

Question			Answer	Marks	Guidance
5	(a)		acidic – red (1) alkaline – blue (1)	2	<b>allow</b> pink <b>not</b> green
	(b)		potassium nitrate (1)	1	<b>allow</b> potassium nitrate solution/potassium nitrate salt (1) <b>allow</b> KNO <sub>3</sub> (1)
	(c)		<b>any two from:</b> 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	<b>allow</b> see if results are correct or valid <b>allow</b> peer review/evaluation of his work
<b>Total</b>				<b>5</b>	

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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><b>allow</b> solder has a low melting point</p> <p><b>allow</b> density of solder is between lead and tin</p> <p><b>allow</b> solder has a high electrical conductivity</p>
	(b)	<p>solder (1)</p> <p>it has a low melting point (1)</p>	2	<p><b>Second mark is dependent on correct first mark</b></p> <p><b>allow</b> 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><b>property marks are dependent on the choice of aluminium unless no metal is chosen</b></p> <p><b>ignore</b> just light</p> <p><b>allow</b> does not corrode (1)</p> <p><b>allow</b> strong/malleable (1)</p> <p><b>ignore</b> other properties mentioned</p>
		<b>Total</b>	<b>8</b>	

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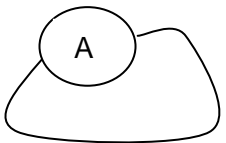
Question			Answer	Marks	Guidance
7	(a)	(i)	50 (%) scores (2)  if numerical answer is incorrect then $\frac{200 \times 100}{400}$ scores (1)	2	if no other marks awarded 400 for total = (1) anywhere on the answer since it shows a total cost of £400
		(ii)	gas and electricity are needed in large quantities or gas and electricity are expensive (1) uses a lot of energy (1) energy is expensive (1)	1	<b>allow</b> 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	<b>allow</b> water is renewable <b>ignore</b> steam is easy to get <b>allow</b> ethene is a non-renewable source/ethene comes from crude oil (1)
	(c)		reaction that goes both ways/AW (1)	1	<b>allow</b> returns to original reactants/goes back to where it started/example
			<b>Total</b>	<b>6</b>	

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

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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	<b>allow</b> not all the heat from power station wasted
<b>Total</b>			<b>6</b>	

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Question		Answer	Marks	Guidance
10	(a)	<p><b>Level 3 (5–6 marks)</b>  <b>Considers all three energy sources AND makes a choice with a detailed explanation of their choice in terms of transport, availability and waste.</b>  Quality of written communication does not impede communication of the science at this level.</p> <p><b>Level 2 (3–4 marks)</b>  <b>Considers two energy sources with limited comparison in terms of advantages and disadvantages.</b>  Quality of written communication partly impedes communication of the science at this level.</p> <p><b>Level 1 (1–2 marks)</b>  <b>Considers an energy source AND gives a simple advantage or disadvantage.</b>  Quality of written communication impedes communication of the science at this level.</p> <p><b>Level 0 (0 marks)</b>  Insufficient or irrelevant science. Answer not worthy of credit.</p>	6	<p><b>This question is targeted at grades up to C. Relevant points include:</b>  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><b>any two from:</b>  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><b>not</b> just cheap</p> <p><b>not</b> just expensive</p>
<b>Total</b>			<b>8</b>	

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Question		Answer	Marks	Guidance
11	(a)	<p>alpha →            beta →            gamma →          </p> <p>aluminium    paper    lead    (2)</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	
<b>Total</b>			<b>3</b>	

Question		Answer	Marks	Guidance
12	(a)	a group of <b>stars</b> (1)	1	<b>ignore</b> named galaxies/ignore other objects that may be in a galaxy. The word <b>Stars must be present</b>
	(b)	(idea of) very long distance (1)	1	
	(c) (i)	<b>rock</b> (1)	1	<b>allow</b> rock <b>and</b> ice <b>and</b> 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	<b>allow</b> wipes out dinosaurs <b>ignore</b> 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
<b>Total</b>			<b>4</b>	





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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 <b>deaths per million</b> with a higher limit/ORa (1)  allow more <b>deaths</b> with a higher alcohol limit/ORa (1)
			<b>Total</b>	<b>10</b>	

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