



# GCSE

## Science B

General Certificate of Secondary Education

Unit **B711/01**: Unit 1 Modules B1, C1, P1 (Foundation Tier)

# Mark Scheme for June 2012

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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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B711/01

Mark Scheme

June 2012

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:

<b>Descriptor</b>	<b>Award mark</b>
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.

B711/01

Mark Scheme

June 2012

Annotations used in scoris

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

B711/01

Mark Scheme

June 2012

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

B711/01

Mark Scheme

June 2012

Question		Answer	Marks	Guidance
1	(a)	body mass of 60kg (1) 1.65m tall (1)	2	<b>allow</b> correct ringed answer on paper / answers ticked <b>but</b> answer on answer line takes precedence
	(b)	amino acids / polypeptides / peptides (1)	1	<b>ignore</b> monomers / hydrocarbons
	(c)	<p><b>[Level 3]</b> Knows effect of lack of protein in the diet <b>and</b> why intake varies between countries <b>and</b> varies between age. Suggests why protein intake depends on age and location. Quality of written communication does not impede communication of the science at this level. (5 – 6 marks)</p> <p><b>[Level 2]</b> Knows effect of lack of protein in the diet <b>and</b> why intake varies between countries <b>or</b> varies between age. Quality of written communication partly impedes communication of the science at this level. (3 – 4 marks)</p> <p><b>[Level 1]</b> Knows why protein is important in the diet <b>or</b> that intake varies between countries <b>or</b> varies between age. Quality of written communication impedes communication of the science at this level. (1 – 2 marks)</p> <p><b>[Level 0]</b> Insufficient or irrelevant science. Answer not worthy of credit. (0 marks)</p>	6	<p><b>This question is targeted at grades up to C.</b></p> <p><b>Indicative scientific points at level 3 may include:</b></p> <ul style="list-style-type: none"> <li>developed countries have higher protein intake than developing in both age groups / ora</li> <li>11-18 year olds require more protein than 6-10 year olds in both developed and developing countries / ora</li> <li>teenagers require more protein for growth during growth spurt</li> </ul> <p><b>Indicative scientific points at level 2 may include:</b></p> <ul style="list-style-type: none"> <li>developed countries have higher protein intake than developing / ora</li> <li>age 6-10 / younger children need less protein than 11-18 / older children / ora</li> <li>protein deficiency resulting in kwashiorkor / stunted growth</li> <li>muscle wastage is the result of insufficient protein to meet the needs of the body <b>or</b> when lack of carbohydrate and fat as well as protein results in protein break down as a substitute energy source</li> </ul> <p><b>allow</b> phonetic spelling of kwashiorkor</p> <p><b>Indicative scientific points at level 1 may include:</b></p> <ul style="list-style-type: none"> <li>protein needed for growth and repair (of cells)</li> <li>correct description of swollen tummy from lack of protein</li> </ul>
<b>Total</b>			<b>9</b>	

B711/01

Mark Scheme

June 2012

Question			Answer	Marks	Guidance
2	(a)	(i)	<u>protozoa</u> (1)	1	<b>allow</b> answer underlined or ticked
		(ii)	4(°C) (1)	1	
		(iii)	pain killer / analgesic (1) blocks nerve impulses (1)	2	<b>allow</b> reduce pain / named pain eg headache
	(b)	(i)	inherited / genetic (disorders) (1)	1	<b>allow</b> blood
		(ii)	sample size too small (1) not been tested on adults / only tested on children (1) improved success rate but not by 100% / not all children recover (1) hydroxyurea may have side effects (1)	2	<b>allow</b> not enough tests done <b>allow</b> not tested against control group <b>allow</b> hydroxyurea can weaken immunity (by damaging white blood cells) (1) <b>ignore</b> it's not a fair test / it's not reliable / it's not valid unless qualified
<b>Total</b>				<b>7</b>	

Question			Answer	Marks	Guidance
3	(a)	(i)	decreased (1)	1	<b>allow</b> gone down
		(ii)	death rates for 65-74 year olds are greater than death rates for 55-64 year olds (1)	1	<b>allow</b> ora <b>allow</b> older age group die more <b>ignore</b> older group die faster
		(iii)	$\frac{175}{222} = 78.8\%$ (1)  (almost 4 times) more men dying (from CHD than women) (1)	2	<b>allow</b> 79%
	(b)		because (new drug) does not kill bacteria (1) build-up of fat in the artery is not caused by bacteria (1)	2	<b>ignore</b> does not kill fungi / destroy infection
<b>Total</b>				<b>6</b>	

B711/01

Mark Scheme

June 2012

Question		Answer	Marks	Guidance
4	(a)	as an electrical signal (1) along the axons / nerve fibres / neurones (1) travel at high speed (1)	2	<b>allow</b> electrical pulse <b>allow</b> named examples of neurones eg sensory / relay / motor neurone <b>but ignore</b> order if route given <b>ignore</b> travel down spinal cord <b>ignore</b> references to passage across synapses
	(b)	(Andrew has sensory neurone works to conduct a stimulus) but damaged relay / motor neurone do not work (so no response) (1)	1	<b>allow</b> axon damaged so message cannot reach effector <b>allow</b> synapse between sensory and relay neurone damaged
<b>Total</b>			<b>3</b>	

Question		Answer	Marks	Guidance
5	(a)	oil (1)	1	
	(b)	did not have enough evidence / used different evidence (1)	1	<b>allow</b> might not use the same evidence <b>allow</b> might not use the same methods (for collecting evidence)
	(c)	<b>any two from:</b> oil slicks (1) beaches covered with oil / coastline covered with oil (1) animals killed / fish killed / plants killed (1)	2	<b>allow</b> oil floating on sea <b>allow</b> habitats damaged <b>allow</b> sea-life harmed
<b>Total</b>			<b>4</b>	

Question		Answer	Marks	Guidance
6	(a)	butane / C <sub>4</sub> H <sub>10</sub> (1)	1	formulae must be correct if used
	(b)	increases (1)	1	<b>allow</b> smaller molecules decrease melting point
	(c)	hexane / C <sub>6</sub> H <sub>14</sub> (1)	1	formulae must be correct if used
<b>Total</b>			<b>3</b>	



B711/01

Mark Scheme

June 2012

Question		Answer	Marks	Guidance
7	(a)	H <sub>2</sub> O (1)	1	$2\text{NaHCO}_3 \rightarrow \text{Na}_2\text{CO}_3 + \text{CO}_2 + \text{H}_2\text{O}$
	(b)	(i) (bubbled gas made into) lime water (1) which will go milky / AW (1)	2	second marking point is <b>dependent</b> on identification of lime-water
		(ii) goes down because a gas is given off / goes down because steam is given off / goes down because carbon dioxide is given off (1)  stops going down when all the baking powder has reacted / reaction has finished / no more gas is made (1)	2	<b>not</b> a named gas other than steam or carbon dioxide
<b>Total</b>			<b>5</b>	

Question		Answer	Marks	Guidance
8	(a)	<b>B</b> because it dissolves both nail varnish colours (1)  because it is not poisonous (1)	2	marks are for the <b>reasons</b> and not the choice of <b>B</b> <b>allow</b> takes off both nail varnish colours <b>ignore</b> references to flammability
	(b)	<b>any two from:</b> will it irritate the skin (1) how much does it cost to make (1) does it evaporate easily / is it volatile (1) does it smell (1)	2	<b>allow</b> does it damage clothing
<b>Total</b>			<b>4</b>	

B711/01

Mark Scheme

June 2012

Question		Answer	Marks	Guidance
9	(a)	50(%) (1)	1	
	(b)	<p><b>use</b>  <b>any one from:</b>  (warnings on hot water) cups (1)  (to tell if water is hot in a) kettle / pans (1)  drink cans / bottle labels (1)  thermometers (on babies head or wall strips) (1)  (babies) spoons (1)  babies bath toys (1)  radiators (1)  mood rings (1)  battery testing (1)  T shirts (1)  wall paper (1)  paint (1)</p> <p><b>explanation</b>  <b>any one from:</b>  (because) change colour when heated (1)  (because) change colour when cooled (1)</p>	2	<p><b>allow</b> any other suitable use for a thermochromic pigment (1)  <b>allow</b> detect temperature changes (1)</p> <p><b>ignore</b> references to cooker hobs / fridges / freezers</p> <p><b>not</b> paint in wrong context eg paint can be spread on walls</p> <p><b>allow</b> colour changes as temperature changes (1)</p>
		<b>Total</b>	<b>3</b>	

B711/01

Mark Scheme

June 2012

Question	Answer	Marks	Guidance				
10	<p><b>[Level 3]</b> Suggests two suitable properties of poly(ethane) <b>and</b> links these to its uses <b>and</b> discusses a disposal method <b>or</b> a disposal problem. Quality of written communication does not impede communication of the science at this level. (5 – 6 marks)</p> <p><b>[Level 2]</b> Suggests a suitable property of poly(ethene) <b>and</b> a disposal method <b>or</b> disposal problem. Quality of written communication partly impedes communication of the science at this level. (3 – 4 marks)</p> <p><b>[Level 1]</b> Suggests a suitable property of poly(ethene) <b>or</b> a disposal method <b>or</b> disposal problem. Quality of written communication impedes communication of the science at this level. (1 – 2 marks)</p> <p><b>[Level 0]</b> Insufficient or irrelevant science such as repeating the question. Answer not worthy of credit. (0 marks)</p>	6	<p><b>This question is targeted at grades up to C.</b> <b>Indicative scientific points at level 2 and 3 may include: suitable properties linked to use (2 required for L3) eg</b></p> <ul style="list-style-type: none"> <li>• flexible so can fold bag up / fit around the shopping</li> <li>• waterproof so will not dissolve in rainwater or can hold wet items / shopping stays dry</li> <li>• strong / tear-proof so does not break when it has shopping in it</li> <li>• non-toxic or not poisonous so food stuffs do not get contaminated</li> <li>• it is lightweight so easy to carry</li> <li>• printable or can be coloured to add logos</li> </ul> <p><b>problem discussed</b></p> <ul style="list-style-type: none"> <li>• land-fill sites - (many polymers) are non-biodegradable so will not rot / land-fill sites get filled up quickly / need for more land-fill site / uses up valuable land space</li> <li>• burning - produces greenhouse gases or toxic gases</li> <li>• recycling - difficult to sort / difficult to get everyone to do it</li> </ul> <p><b>Indicative scientific points at level 1 may include:</b></p> <p><b>properties</b></p> <ul style="list-style-type: none"> <li>• flexible /waterproof / strong / tear-proof /non-toxic or non-poisonous / lightweight / printable / can be coloured</li> </ul> <table border="0" style="width: 100%;"> <tr> <td style="width: 50%;"><b>disposal methods</b></td> <td style="width: 50%;"><b>disposal problems</b></td> </tr> <tr> <td> <ul style="list-style-type: none"> <li>• land-fill sites</li> <li>burning</li> <li>recycling</li> </ul> </td> <td> <ul style="list-style-type: none"> <li>not enough / use up space / do not rot/ causes litter / costly to dispose of</li> <li>produces gases</li> <li>not everyone does it / has to be sorted</li> </ul> </td> </tr> </table>	<b>disposal methods</b>	<b>disposal problems</b>	<ul style="list-style-type: none"> <li>• land-fill sites</li> <li>burning</li> <li>recycling</li> </ul>	<ul style="list-style-type: none"> <li>not enough / use up space / do not rot/ causes litter / costly to dispose of</li> <li>produces gases</li> <li>not everyone does it / has to be sorted</li> </ul>
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	<b>Total</b>	<b>6</b>					

B711/01

Mark Scheme

June 2012

Question		Answer	Marks	Guidance
11	(a)	<p><b>information</b>  <b>any one from:</b>            temperature (of parts) of the house (1)</p> <p>light parts show heat/are hot / dark parts show cold/are cold (1)</p> <p>shows 'hot spots' (1)</p> <p>idea that it shows where most heat is 'lost' / wasted (1)</p> <p><b>useful</b>  <b>any one from:</b>            idea that it shows which part needs insulating (1)            idea of where or how to save energy / heat (1)</p>	2	<p><b>allow</b> temperature of named part of house eg windows have highest temperature (1)  <b>allow</b> correct examples eg windows are hottest (1)</p> <p><b>allow</b> named example of type of insulation</p>

Question	Answer	Marks	Guidance
(b)	<p><b>[Level 3]</b> Describes how the materials reduce heat loss <b>and</b> why the percentage reduction in heat loss is different, recognising the significance in the percentages. Quality of written communication does not impede communication of the science at this level. (5 – 6 marks)</p> <p><b>[Level 2]</b> Describes how the materials reduce heat loss <b>and</b> how the percentage reduction in heat loss is different. Quality of written communication partly impedes communication of the science at this level. (3 – 4 marks)</p> <p><b>[Level 1]</b> Name the best material for reducing heat loss <b>or</b> comments on how the percentage reduction in heat loss is different. Quality of written communication impedes communication of the science at this level. (1 – 2 marks)</p> <p><b>[Level 0]</b> Insufficient or irrelevant science. Answer not worthy of credit. (0 marks)</p>	6	<p><b>This question is targeted at grades up to E.</b></p> <p><b>At all levels ignore air</b> stops heat escaping / mention of heat particles</p> <p><b>Indicative scientific points at level 3 may include:</b></p> <ul style="list-style-type: none"> <li>• trapped air reduces energy transfer</li> <li>• light weight curtains reduce heat loss a little because lightweight curtains are thin / don't trap air very well</li> <li>• heavyweight curtains better because better at trapping air / thicker</li> <li>• shutters better than curtains at reducing heat loss because shutters fit over whole window / trap air</li> </ul> <p><b>allow</b> higher level answers eg trapped air reduces convection currents</p> <p><b>Indicative scientific points at level 2 may include:</b></p> <ul style="list-style-type: none"> <li>• air is a good insulator / poor conductor</li> <li>• air is trapped or cannot move (in the material / behind the shutters)</li> <li>• shutters best to use as percentage loss is the biggest number</li> <li>• heavyweight curtains are better than lightweight curtains because reduction in heat loss is 10 times better / AW</li> </ul> <p><b>Indicative scientific points at level 1 may include:</b></p> <ul style="list-style-type: none"> <li>• best one to use is shutters</li> <li>• curtains not as good as shutters</li> <li>• heavyweight curtains are better than lightweight curtains</li> </ul>

B711/01

Mark Scheme

June 2012

Question		Answer	Marks	Guidance
	(c) (i)	<p><b>lightweight curtains</b> 13 (years)</p> <p><b>heavyweight curtains</b> 20 (years) (1)</p>	1	<p><b>both correct in correct order for one mark</b></p> <p><b>if table blank look for correctly indicated answers</b></p>
	(ii)	<p>heavyweight curtains (no mark)</p> <p>idea that the heavyweight curtains are saving more energy or money each year (1)</p> <p><b>or</b></p> <p>idea that the lightweight curtains are saving less energy or money each year (1)</p> <p><b>but</b></p> <p>idea that once heavyweight curtains are paid back he make a saving on his fuel bill of <b>£500</b> (over the next 5 years) (2)</p> <p><b>or</b></p> <p>idea that once lightweight curtains are paid back he make a saving on his fuel bill of <b>£120</b> (over the next 13 years) (2)</p>	2	<p><b>if candidate writes lightweight curtains</b></p> <p><b>allow</b> lightweight curtains would be cheaper to buy / fit (max.1)</p> <p><b>allow</b> higher level answers eg difficult to work out the payback time over long periods of time as based on today's fuel prices / as fuel prices likely to rise in the future (1)</p>
		<b>Total</b>	<b>11</b>	

B711/01

Mark Scheme

June 2012

Question			Answer	Marks	Guidance
12	(a)	(i)	<p><b>any two from:</b>  allows results to be replicated (1)  allows further evidence to be collected (1)  idea that results can be checked or compared (1)  so other scientists know what work they have done (1)  so the public is made aware (of possible dangers) (1)  so the public can make informed decisions (1)  so they can get credit for their work (1)</p>	2	<p><b>allow</b> so other scientist can develop or further the results (1)</p> <p><b>allow</b> so other scientists can read about their work (1)</p> <p><b>allow</b> named examples of credit eg awards / money for further research (1)</p>
		(ii)	<p><b>any valid conclusion:</b>  an idea of insignificant number of people that report an effect / AW <b>or</b> a correct calculation of percentages involved (1)</p>	1	<p>examples of valid conclusions:  Jadyen has 0.12% with more people in study (1)  Kiera has 0.11% with more people (1)  Masie has 0.1% with more / most people in study (1)  Jayden's, Kiera's and Masie's results are very similar / about 0.1% / reliable (1)</p>
	(b)		<p><b>any two from:</b>  (microwaves cause a) heating effect (1)  possible cell / tissue damage / DNA mutation (1)  cell damage greatest in young (1)  possible cancer risk / tumour (1)  idea that less concerned about texting as phone not so close to head (1)  RSI (1)  danger of accident due to poor concentration (1)</p>	2	<p><b>allow</b> brain damage</p> <p><b>allow</b> brain cancer only if brain damage not mentioned</p> <p><b>ignore</b> cyber bullying</p>
<b>Total</b>				<b>5</b>	

B711/01

Mark Scheme

June 2012

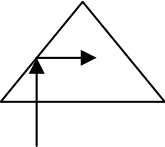
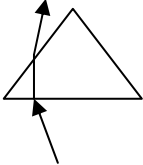
Question		Answer	Marks	Guidance
13	(a)	seismometer (1)	1	<b>allow</b> seismograph accept phonetic spelling <b>allow</b> microphone
	(b)	(i) 200 (mm) (1)	1	<b>allow</b> 0.2m or 20cm if units have been crossed out <b>ignore</b> + / -
		(ii) 2:15 (hours) (1)	1	<b>allow</b> 2.25 or 2¼
	(c)	P / Primary wave / longitudinal (no mark) fast(er) (1)	1	<b>no mark for wave but must have P wave / longitudinal somewhere in answer before mark can be awarded for reason</b>
		<b>Total</b>	<b>4</b>	



B711/01

Mark Scheme

June 2012

Question		Answer	Marks	Guidance
14	(a)	<p>radio (mast) (microwave) (visible/candle) <b>light</b> (ultraviolet) <b>X-ray</b> (1)</p>	1	<p><b>all 3 correct for one mark</b></p> <p><b>ignore</b> gamma in bottom box</p>
	(b)	any frequency in the range $10^{10}$ to $10^{15}$ (Hz) (1)	1	<p><b>allow ecf from 14(a)</b> <b>if light is top box</b> <math>10^6</math> to <math>10^{10}</math> (Hz) <b>if light is bottom box</b> <math>10^{10}</math> to <math>10^{18}</math> (Hz)</p>
	(c)	<p>correct completion of ray diagram to show reflection happening at <b>X</b> (1)</p> <p>correct completion of ray diagram to show refraction happening at <b>X</b> (1)</p> <p>(idea that refraction occurs at the boundary between mediums) due to a change in the (wave) speed (1)</p>	3	<p>award marks from diagrams and/or descriptions <b>allow</b> reflected line to right of incident line but must remain inside of prism</p>  <p><b>allow</b> refracted line to bend to the right but must stay outside of prism</p>  <p><b>allow</b> (idea that refraction occurs at the boundary between mediums) due to a change in the (material) density (1)</p>
<b>Total</b>			<b>5</b>	

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