



# GCSE

## Science B

General Certificate of Secondary Education

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

## Mark Scheme for January 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.

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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

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.

## 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

## Subject-specific Marking Instructions

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)		<b>any two from</b> don't smoke (1) reduce blood pressure / reduce stress (1) exercise (more) (1) reduce weight / keep weight down / reduce excess fat /AW(1)	2	<b>ignore</b> eat 5 (fruit / veg) a day / less alcohol / drugs
	(b)		to see if they work /AW(1)  to see if they are safe / check for side-effects / may be harmful (1)	2	<b>allow</b> to get the dosage right (1)  <b>allow</b> ora e.g. to check they are not harmful (1) <b>allow</b> they might be dangerous (1)  <b>ignore</b> may affect body / organs unless qualified <b>ignore</b> check for faults
			<b>Total</b>	<b>4</b>	

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Question			Answer	Marks	Guidance
2	(a)	(i)	plaster is a barrier / stops microbes entering (1)  microbes cause disease <b>or</b> microbes cause infection (1)  BUT stop pathogens entering (2)	2	<b>allow</b> correct alternatives for microbes: bacteria / viruses / fungi (1) <b>ignore</b> stop bleeding / stop germs / stop parasites / stop diseases getting in  <b>allow</b> stop infection (1)  <b>allow</b> stops microbes getting in and causing infection (2)  <b>ignore</b> reference to scabs or clotting
		(ii)	protein (1)	1	<b>allow</b> other indication e.g. underlining or ticking more than one answer = 0
	(b)	(i)	<u>37</u> (°C) (1)	1	
		(ii)	sweating / more blood flow (in skin) (1)	1	<b>allow</b> higher level answers: evaporation / vasodilation <b>allow</b> perspiring <b>ignore</b> hairs lie flat / references to clothing
	(c)		pressure / temperature / pain / touch (1)	1	<b>allow</b> texture <b>allow</b> heat / warmth / cold <b>ignore</b> feel / feelings
			<b>Total</b>	<b>6</b>	

Question		Answer	Marks	Guidance
3	(a)	<p><b>[Level 3]</b> Identify more than one difference <b>and</b> link one difference to <b>environment and</b> explains that <b>genes</b> also affect characteristics. Quality of written communication does not impede communication of the science at this level. (5 – 6 marks)</p> <p><b>[Level 2]</b> Identify one difference <b>and</b> makes an attempt to explain why the feature is different <b>or</b> identify one difference <b>and</b> attempts to explain that characteristics can be inherited. Quality of written communication partly impedes communication of the science at this level. (3 – 4 marks)</p> <p><b>[Level 1]</b> Identify at least one difference <b>or</b> makes an attempt to explain why features can be the same or 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>Indicative scientific points at Level 3 may include:</b></p> <ul style="list-style-type: none"> <li>• hairstyle / scar controlled by environment or lifestyle</li> <li>• different characteristics are due to the environment</li> <li>• height / mass is affected by both genes and environment</li> <li>• eye colour is controlled by genes</li> </ul> <p><b>Indicative scientific points at Level 2 may include:</b></p> <ul style="list-style-type: none"> <li>• hairstyle because Jane has had hers cut</li> <li>• Jane has a scar because of something that happened after she was born.</li> <li>• Jane eats more so is heavier</li> <li>• Julia is thinner as she does more exercise</li> <li>• eye colour is same because they get this from their parents</li> </ul> <p><b>Indicative scientific points at Level 1 may include:</b></p> <ul style="list-style-type: none"> <li>• differences include mass (weight) / size / hairstyle / scar</li> <li>• idea of features can be inherited or environmental</li> </ul>
	(b)	<p>girls have XX (chromosomes) (1) boys have XY (chromosomes) (1)</p>	2	<p><b>allow</b> girls <b>only</b> have X chromosomes (1)</p> <p><b>allow</b> idea of two types of sperm determining sex e.g. if sperm is X you get a girl (1) if sperm is Y you get a boy (1)</p>
<b>Total</b>			<b>8</b>	

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Question			Answer	Marks	Guidance
4	(a)		18 (ml) (1)	1	
	(b)	(i)	90 (min) (1)	1	<b>allow</b> 1 hour 30 min (1) <b>allow</b> 1.5 hours (1) <b>ignore</b> 1.3 / 1.30
		(ii)	(Billy) has different mass or weight or size (than average adult) (1)  <b>ecf</b> if answer to (i) > 120, (Billy) has different mass or weight or size (than average adult) (1)	1	<b>allow</b> liver not working properly / liver damaged / smaller liver than normal (1)  <b>allow</b> cirrhosis (1) <b>allow</b> (Billy) is a child / (Billy) is younger / (Billy) is smaller (1) <b>allow</b> idea that (Billy) is different from the average mass or weight or size (1) <b>ignore</b> slower metabolism / lower tolerance (to alcohol)  <b>allow</b> (Billy) is bigger (1) <b>allow</b> idea that (Billy) is different from the average mass or weight or size (1) <b>ecf</b> if answer to (i) = 120, there is no credit worthy answer to this question
	(c)		(brand) <b>E</b> (1)  calculation showing that unit: volume ratio is highest for <b>E</b> , eg units per ml for <b>E</b> = 0.0052 <b>or</b> $(100 / 330) \times 1.7$ <b>or</b> 0.52 or 0.51 or 0.5 (1)	2	<b>if E not correct, scores 0</b>  <b>allow</b> correct description (1) <b>allow</b> 0.005 or 0.0051 (1)  <b>allow</b> 1.7 / 330 or 1.7 / 33 (1) <b>allow</b> 330 / 1.7 or 194.1 (1)
	(d)		because of impaired judgement / blurred vision / drowsiness / slower reactions / slower brain activity (1)  he is (more) likely to have accident / AW (1)	2	<b>allow</b> dizziness (1) <b>allow</b> reaction time is <b>longer</b> (1) <b>but</b> reaction time is shorter = 0 <b>ignore</b> brain slows <b>ignore</b> could be dangerous unless linked to driving e.g. danger on the road (1) its dangerous or its not safe (0) <b>allow</b> might hurt someone (1)
			<b>Total</b>	<b>7</b>	



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Question			Answer	Marks	Guidance
5	(a)		<b>B</b> (1)	1	<b>allow</b> C <sub>2</sub> H <sub>6</sub> <b>allow</b> correct answer ticked, circled or underlined if answer line is blank
	(b)		<b>D</b> (1) because it contains oxygen / does not contain carbon and hydrogen only (1)	2	<b>allow</b> has O in the formula
	(c)		<b>A</b> (1)	1	<b>allow</b> C <sub>2</sub> H <sub>4</sub> <b>allow</b> correct answer ticked, circled or underlined if answer line is blank
	(d)		polyethene	1	<b>allow</b> polythene / poly(ethene) <b>not</b> poly
	(e)		C <sub>3</sub> H <sub>8</sub> (1)	1	<b>not</b> C <sub>3</sub> H <sub>8</sub> / C <sup>3</sup> H <sup>8</sup>  <b>allow</b> H <sub>8</sub> C <sub>3</sub>
			<b>Total</b>	<b>6</b>	

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Question			Answer	Marks	Guidance
6	(a)		<b>C</b> (1)	1	<b>allow</b> correct answer ticked, circled or underlined if answer line is blank
	(b)		<b>D</b> (1) because (D) is insoluble in <b>water</b> or (D) is non-biodegradable (1)	2	<b>ignore</b> high melting point / soluble in petrol  <b>allow</b> C because it is insoluble in <b>water</b> (1) <b>but</b> C is insoluble in <b>water and</b> must be biodegradable (0) <b>allow</b> B because it is non-biodegradable (1) <b>but</b> B is soluble in <b>water and</b> must be non - biodegradable (0)
	(c)		landfill site /  burning or incineration / recycling (1)	1	<b>ignore</b> just thrown away <b>but allow</b> AW to landfill e.g. / put in ground / put in big holes / put in the earth / bury it  <b>ignore</b> melt <b>ignore</b> reuse unless qualified
			<b>Total</b>	<b>4</b>	

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Question		Answer	Marks	Guidance
7	(a)	<p><b>[Level 3]</b> Analysis of shortfalls <b>and</b> excesses of named fractions <b>and</b> a detailed description of cracking to include a condition. Quality of written communication does not impede communication of the science at this level. (5 – 6 marks)</p> <p><b>[Level 2]</b> Simple analysis of shortfall <b>or</b> excess of named fractions <b>and</b> idea that cracking could be used to solve the problem Quality of written communication partly impedes communication of the science at this level. (3 – 4 marks)</p> <p><b>[Level 1]</b> Simple analysis of shortfall <b>or</b> excess of fractions <b>or</b> basic description of cracking 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>This question is targeted at grades up to C</p> <p><b>Indicative scientific points at Level 3 may include:</b></p> <ul style="list-style-type: none"> <li>• paraffin / fuel oil / naphtha more than needed and petrol / gases less than needed</li> <li>• idea that cracking breaks large molecules into smaller molecules</li> <li>• a catalyst is needed</li> <li>• a high temperature is needed</li> </ul> <p><b>allow</b> high pressure <b>allow</b> higher level answers e.g. cracking converts large (alkane) molecules into smaller (alkane and alkene) molecules which are more useful</p> <p><b>Indicative scientific points at Level 2 may include:</b></p> <ul style="list-style-type: none"> <li>• paraffin / fuel oil / naphtha more than needed</li> <li>• petrol / gases less than needed</li> <li>• uses the word cracking</li> </ul> <p><b>Indicative scientific points at Level 1 may include:</b></p> <ul style="list-style-type: none"> <li>• idea that there is too much of some fractions</li> <li>• idea that there is not enough of other fractions</li> <li>• idea that one fraction can be changed into another fraction</li> </ul>

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Question			Answer	Marks	Guidance
	(b)		<b>any two from</b> idea that oil slicks form / oil spreads out over water (1)  idea of harm to wildlife (1)  idea of damage to beaches (1)  idea need to use dangerous detergents to remove oil (1)  idea of economic consequences (1)	2	ignore just 'affects the environment'
			<b>Total</b>	<b>8</b>	

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Question		Answer	Marks	Guidance
8	(a)	because it has (good) availability (1) so it is easy to get hold of / lots of places to refuel (1) <b>or</b> idea of because liquid (1) so it is easier to use <b>or</b> because liquid can flow through the engine (1) <b>or</b> it has another 20 years (1) which is a reasonable period of supply (1)	2	<b>allow</b> two reasons <b>or</b> one reason and a linked explanation for two marks  e.g. it has 20 years left and is a liquid (2)
	(b)	<b>any <u>two</u> from the advantages</b> because it is the cheapest (1) because it has high energy value (1) because it has (good) availability (1) because it has longest supply (1)  <b>and the disadvantage</b> because it is (the most) polluting (1)	3	<b>allow</b> it is cheap (1) <b>allow</b> it has an energy value of 8950(kJ) / it has a good energy value (1) <b>allow</b> it has a long supply / last a long time / lasts 50 years (1)  <b>ignore</b> it is a solid  <b>allow</b> gives off sulfur dioxide (1) <b>ignore</b> bad for the environment
	(c)	<b>any one from</b> storage (1) toxicity / poisonous (1) ease of use (1)	1	<b>allow</b> flammability / flash point / <b>allow</b> idea of deciding if it is renewable or not <b>ignore</b> pollution / cost / energy value / supply / availability  <b>ignore</b> harmful / safer
	(d)	sulfur reacts / combines with air or oxygen (1)	1	
		<b>Total</b>	<b>7</b>	

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Question			Answer	Marks	Guidance
9	(a)	(i)	crest (1)	1	allow peak
		(ii)	amplitude (1)	1	
	(b)		16 (cm/s) (2)  <b>but if incorrect</b>  8 x 2 (1)	2	
	(c)		deeper ..... increases / <b>AW</b> (1)  <b>or</b>  shallower /less deep ..... decreases / <b>AW</b> (1)	1	allow faster / higher / bigger for <b>increases</b>    allow slower / lower / smaller for <b>decreases</b>
			<b>Total</b>	<b>5</b>	

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Question			Answer	Marks	Guidance
10	(a)		highest temperature (difference) / <b>AW</b> (1)	1	<b>allow</b> lowest mass <b>allow</b> hottest
	(b)	(i)	0.25 (2)  <b>but if incorrect</b>  $\frac{80\,000}{320\,000} \times 100$ <b>or</b> $\frac{80\,000}{320\,000}$ (1)	2	<b>allow</b> 25% (2)  <b>allow</b> 0.25% / 25 (1)
		(ii)	<b>any one from</b> less water / use just the water needed (1) use all the water for making many cups of tea without re-boiling it (1) use plastic kettle rather than metal one (1) use a tall kettle rather than a round one (1)	1	<b>ignore</b> use less energy  <b>ignore</b> use an environmentally friendly kettle <b>ignore</b> insulate the kettle
			<b>Total</b>	<b>4</b>	

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Question	Answer	Marks	Guidance
11	<p><b>[Level 3]</b> Suggests one form of insulation <b>and</b> explains how it works in terms of conduction or convection or radiation <b>and</b> explains why the energy loss is not reduced by 50%. Quality of written communication does not impede communication of the science at this level. (5 – 6 marks)</p> <p><b>[Level 2]</b> Suggests one form of insulation <b>and</b> mentions basic ideas of how any one form of insulation works. <b>or</b> Suggests one form of insulation <b>and</b> attempts to explain why the energy loss is not reduced by 50%. Quality of written communication partly impedes communication of the science at this level. (3 – 4 marks)</p> <p><b>[Level 1]</b> Suggests one form of insulation <b>or</b> attempts to explain why the energy loss is not reduced by 50%. 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>• some of the points from level 2 plus</li> <li>• insulation contains air which reduces conduction</li> <li>• insulation contains trapped air which reduces convection</li> <li>• reflective foil reflects heat or energy or radiation back into a room</li> <li>• idea that heat or energy is lost from other named places other than windows</li> </ul> <p><b>Indicative scientific points at Level 2 may include:</b></p> <ul style="list-style-type: none"> <li>• air is a good insulator</li> <li>• loft insulation / cavity foam / carpets / curtains trap air <b>or</b> stops heat (energy) escaping</li> <li>• draft excluders stop movement of air or stop cold air entering</li> <li>• energy lost from roof</li> <li>• foil reduces heat loss into wall</li> </ul> <p><b>allow</b> descriptions of how double glazing could be improved and why this would reduce heat loss</p> <p><b>ignore</b> draught excluders stop air getting out</p> <p><b>Indicative scientific points at Level 1 may include:</b></p> <ul style="list-style-type: none"> <li>• loft insulation / cavity foam</li> <li>• (thick) carpets / curtains / draught excluders</li> <li>• reflective foil (behind radiators or in cavity walls)</li> <li>• energy loss is not just from window</li> </ul>
	<b>Total</b>	<b>6</b>	



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Question		Answer	Marks	Guidance
12	(a)	<p>any one correct reflection at surface (1)</p> <p>no more than 5 reflections at the upper surface (1)</p> 	2	<p>for second mark ray <b>MUST</b> be continuous and touch surface(s) each time, ie no gaps, and reach other end of fibre</p> <p>reflections may all be just at upper surface</p> <p><b>allow</b> reflections drawn that do not reach the other end of the fibre, but if next reflection had been drawn this would have been the case (2)</p>
	(b)	<p>CD players / dentistry / cutting materials / warfare / pointers / laser pens / surgery / printers / photocopiers (1)</p>	1	<p><b>allow</b> laser light show / holograms</p> <p><b>ignore</b> burglar alarms</p>
	(c)	<p><b>health risks</b>  <b>any one from</b>            (microwaves cause) heating <b>brain</b> / may heat or cook <b>brain</b> (1)            (microwaves may) damage cells or tissues (1)            (microwaves cause) cancer or tumours (1)</p> <p><b>risks limited</b>  <b>any one from</b>            limit or reduce use / AW (1)            use remote earpiece / use handsfree / use loudspeaker (1)            bluetooth / AW (1)</p>	2	<p><b>ignore</b> reference to type of radiation</p> <p><b>allow</b> can affect the brain or can damage the brain or cause brain problems (1)</p> <p><b>ignore</b> damages ear drum or hearing</p> <p><b>allow</b> risk of accident if using mobile phone while driving (1)</p> <p><b>allow</b> texting instead of phoning (1)</p> <p><b>ignore</b> hold further from your ear or body</p> <p><b>ignore</b> changes to the microwaves used</p>
Total			5	

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Question			Answer	Marks	Guidance
13	(a)		E (1)	1	<b>allow</b> correct answer ticked, circled or underlined if answer line is blank <b>allow</b> catan
	(b)		skin cancer / blindness / eye damage / cataracts / aging of <b>skin</b> (1)	1	<b>not</b> just cancer  <b>allow</b> production of vitamin D <b>allow</b> heatstroke / sunstroke
	(c)		ultra violet (1)	1	<b>allow</b> UV
			<b>Total</b>	<b>3</b>	

Question			Answer	Marks	Guidance
14			Olivia (1)  because silver foil <b>reflects</b> infrared (1)	2	<b>allow</b> silver foil reflects IR <b>allow</b> because silver foil reflects heat (1) <b>allow</b> silver is a poor absorber of infrared /IR / heat (1) <b>ignore</b> infrared / heat bounces back
			<b>Total</b>	<b>2</b>	

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