

GCSE

Science B

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

General Certificate of Secondary Education

Mark Scheme for June 2015

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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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Annotations used in scoris

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

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

MARK SCHEME

Question	Answer	Marks	Guidance
1 a i	<p>any two from: idea grow towards light / away from gravity (1)</p> <p>(get light) for photosynthesis (1)</p> <p>idea of more chance of survival (1)</p>	2	<p>allow grow towards the Sun / to get light or energy from the Sun (1)</p> <p>allow higher level answers eg (shoots are) positively phototropic / negatively geotropic (1)</p>
ii	<p>any one from: get water / minerals (1)</p> <p>idea of anchorage (1)</p> <p>idea of growing towards gravity (1)</p>	1	<p>allow to get moisture (1)</p> <p>ignore get nutrients / get food</p> <p>allow higher level answers eg (roots are) negatively phototropic / positively geotropic (1)</p>
b	<p>hypothesis <input checked="" type="checkbox"/></p> <p>observation <input type="checkbox"/></p> <p>prediction <input type="checkbox"/></p> <p>variable <input type="checkbox"/></p> <p>(1)</p>	1	more than one tick scores 0
Total		4	

Question	Answer	Marks	Guidance
2 a	<p>Level 3 Describes a detailed pattern including data AND explains a reason why temperature increases in terms of respiration and decreases in terms of evaporation of sweat.</p> <p>Quality of written communication does not impede communication of the science at this level. (5 – 6 marks)</p> <p>Level 2 Describes a simple pattern AND gives a simple explanation why temperature increases or a simple explanation why temperature decreases.</p> <p>Quality of written communication partly impedes communication of the science at this level. (3 – 4 marks)</p> <p>Level 1 Describes a simple pattern OR gives a simple explanation why temperature increases or a simple explanation why temperature decreases.</p> <p>Quality of written communication impedes communication of the science at this level. (1 – 2 marks)</p> <p>Level 0 Insufficient or irrelevant science. Answer not worthy of credit. (0marks)</p>	6	<p>This question is targeted at grades up to C</p> <p>Indicative scientific points at Level 3 may include:</p> <ul style="list-style-type: none"> • temperature goes up during exercise to 37.34 °C (± 0.02) / temperature increases by 0.7°C (±0.02) • temperature returns to 36.6°C after exercise • exercise causes increase in body temperature because respiration (in muscles) increases • idea that temperature goes down because of evaporation of sweat • sweat evaporates and takes heat energy from the body <p>Indicative scientific points at Levels 1 & 2 may include:</p> <p>Description</p> <ul style="list-style-type: none"> • temperature goes up / he gets warm or hotter, during exercise • temperature goes down / he cools down, after exercise <p>Explanation</p> <ul style="list-style-type: none"> • idea that sweating causes a decrease in body temperature • idea that (exercise causes increase in body temperature because) muscles are working harder <p>ignore (exercise causes increase in body temperature because) heart beats faster</p> <p>Use the L1, L2, L3 annotations in Scoris. Do not use ticks.</p>

Question	Answer	Marks	Guidance
b	Eat a diet with no proteins. <input type="checkbox"/> Eat less salt. <input checked="" type="checkbox"/> Eat only saturated fats. <input type="checkbox"/> Increase body mass. <input type="checkbox"/> (1)	1	more than one tick scores 0
c	carbohydrates (1)	1	
	Total	8	

Question	Answer	Marks	Guidance
3 a	growth / repair (1)	1	<p>allow make enzymes (1) allow source of amino acids (1) allow build muscles up (1)</p> <p>ignore gain weight / get stronger ignore for a healthy diet</p>
b i	<p>source 1 and (EAR =) 42 (g) (2)</p> <p>but 42 (g) with no reference to source 1 (1)</p> <p>but if answer is incorrect then source 1 and 0.6 x 70 (1)</p>	2	<p>allow teenage males and (EAR =) 42 (g) (2) allow source 1 is 10g more / source 2 is 10g less (2)</p> <p>unqualified reference to source 1 scores 0</p>

Question	Answer	Marks	Guidance
ii	<p>any two from:</p> <p>age source 1 based on age or idea that source 2 or EAR does not take into account age (1)</p> <p>mass idea that source 1 does not take into account body mass or weight or source 2 or EAR is based on mass or weight (1)</p> <p>gender source 1 based on gender or source 2 is not based on gender (1)</p>	2	<p>allow reference to teenage males instead of source 1</p> <p>allow source 2 or EAR based on body size (1) ignore source 2 or EAR is based on height ignore source 2 is calculated by EAR</p> <p>If no other mark awarded, allow idea that (recommended amounts of protein) vary with age / body mass / gender (1) i.e. without specific mention of source 1 or 2</p> <p>ignore idea that source 1 is only an average as true for both</p>
	Total	5	

Question	Answer	Marks	Guidance
4 a i	brain and spinal cord (1)	1	Both required for the mark not brain and spine not brain and spinal column
ii	electrical (1)	1	allow electric (1) ignore electronic
b	any three from: smoke without tobacco (1) because the tobacco is (more) harmful (1) (if legalised) make cannabis available on prescription only (1) so that it can be more controlled (1) (have cannabis in) tablet form / spray form (1) idea that harmful effects on airways are reduced (1)	3	allow (tobacco) causes named effect such as emphysema / cancer (1) allow so they can only have so much / can be monitored / less likely to take other drugs / know the correct strength or dose / decrease strength of cannabis (1) ignore just idea of make cannabis legal
c i	26 (%) (1)	1	
ii	any two from: most or many people want cannabis available legally / ora (1) idea that nearly half or most or many want it available on prescription / for medicinal purposes (1) legal through licensed outlets and illegal have the same values (1) freely available and no penalty have the same values (1)	2	allow both marks for quoting data from the pie chart eg 17% think it should be illegal (1) but 17% think it should be illegal and 9% want it available like tobacco or alcohol (2) allow idea that there are (lots of) different opinions (1)
	Total	8	

Question	Answer	Marks	Guidance
5 a	because it contains bromine / does not contain carbon and hydrogen only (1)	1	allow has Br in the formula (1) ignore contains bromine water ignore contains a bromine molecule allow C and H for carbon and hydrogen not does not contain carbon and hydrogen molecules only not does not contain hydro and carbon only
b	polymerisation (1)	1	allow correct answer ticked, circled or underlined in list if answer line is blank more than one answer scores zero
c	poly(bromoethene) / polybromoethene (1)	1	not poly on its own not poly(bromoethane) / polybromoethane
	Total	3	

Question	Answer	Marks	Guidance
6 a	<p>any two from:</p> <p>non-toxic (1)</p> <p>does not react with water (1)</p> <p>does not irritate skin (1)</p> <p>insoluble in water (1)</p>	2	<p>allow non-poisonous (1)</p> <p>allow idea of no allergic reaction (1)</p> <p>allow non-corrosive (1)</p> <p>allow isn't washed off easily (1)</p> <p>allow doesn't stain clothes / skin (1)</p> <p>ignore not harmful / is safe</p> <p>ignore colourless</p> <p>ignore must be a liquid</p>
b	(carboxylic) acid (1) (+ alcohol → ester + water)		<p>allow organic acid (1)</p> <p>not acid catalyst</p> <p>not any named acid other than a named carboxylic acid</p>
Total		3	

Question	Answer	Marks	Guidance
7 a	(yes because) carbon monoxide is made (in incomplete combustion) (1) carbon dioxide is not made (in incomplete combustion) (1) soot is produced / carbon is made (in incomplete combustion) (1)	3	marks are for explanation ignore no allow complete combustion produces carbon dioxide (1) allow idea that less energy is given out / only 1100J is given out (in incomplete combustion) (1)
b	(use) limewater / calcium hydroxide (1) then (which goes) cloudy (1)	2	The second marking point is dependent on the correct chemical ignore any reference to method ignore use of an indicator / litmus paper ignore reference to blowing through a straw allow goes milky / goes white (1) allow a white solid or white precipitate or white suspension is formed (1) ignore put out lighted splint
c	ethanol + oxygen → carbon dioxide + water	1	allow = or ⇒ instead of → not and / & / instead of + not '+ heat' in equation, but allow heat above arrow allow correct formulae but equation does not need to balance e.g. $C_2H_5OH + O_2 \rightarrow CO_2 + H_2O$ allow mix of correct formulae and words not eg ethanal/ethonal + oxygen → carbon dioxide + water
	Total	6	

Question	Answer	Marks	Guidance								
8 a	(fractional) distillation (1)	1	allow fractionation (1)								
b	propane (1)	1	allow correct answer ticked, circled or underlined in list if answer line is blank more than one answer scores 0								
c	<table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>atom</th> <th>number</th> </tr> </thead> <tbody> <tr> <td>C</td> <td>6</td> </tr> <tr> <td>H</td> <td>14</td> </tr> <tr> <td>O</td> <td>1</td> </tr> </tbody> </table> <p>all three correct scores (2) two correct scores (1) one correct scores (0)</p>	atom	number	C	6	H	14	O	1	2	
atom	number										
C	6										
H	14										
O	1										
d	<p>idea of (cracking converts) large (hydrocarbon) molecules or chains into smaller ones (that are more useful) (1)</p> <p>and any two conditions from</p> <p>catalyst / named catalyst e.g. zeolite or aluminium oxide (1)</p> <p>high temperature (1)</p> <p>high pressure (1)</p>	3	<p>allow breaks down hydrocarbons (1) allow higher level answers e.g. (cracking converts) large alkane molecules into smaller alkane / alkene molecules (1)</p> <p>allow catalyst even if linked with incorrect name (1)</p> <p>allow any temperature above 200°C (1) allow heat / hot (1) not warm</p> <p>allow any quoted pressure above atmospheric pressure (1) allow under pressure (1) ignore just pressure</p>								
	Total	7									

Question	Answer	Marks	Guidance
9	<p>Level 3 Explains why BOTH LDPE and HDPE are suitable for their uses, giving at least two relevant reasons for each plastic. Quality of written communication does not impede communication of the science at this level. (5 – 6 marks)</p> <p><i>Level 2</i> Explains why BOTH LDPE and HDPE are suitable for their uses, giving at least one relevant reason for each plastic OR Explains why EITHER LDPE or HDPE are suitable for their uses, giving at least two relevant reasons. Quality of written communication partly impedes communication of the science at this level. (3 – 4 marks)</p> <p>Level 1 Explains why EITHER LDPE or HDPE are suitable for their uses, giving one relevant reason. Quality of written communication impedes communication of the science at this level. (1 – 2 marks)</p> <p>Level 0 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>Indicative scientific points may include:</p> <p>LDPE is used for making plastic carrier bags because</p> <ul style="list-style-type: none"> • it has a low density (so will not be heavy to carry) • it is flexible (so will bend to accommodate shopping) • idea that it's strong (enough to hold the shopping) • idea that maximum useable temperature is above normal room temperature <p>HDPE is used for making water pipes because</p> <ul style="list-style-type: none"> • it has a low density (so doesn't require heavy lifting equipment to install) • it is strong (so will not break easily) • it is rigid (so pipe will not bend) • idea that its maximum useable temperature is above boiling water or above the temperature of any liquid that will flow through the pipe / pipes will not melt with hot water <p>ignore biodegradability</p> <p>ignore just quoting numerical data from the table eg LDPE has a density of 0.91 (g/cm³)</p> <p>Use the L1, L2, L3 annotations in Scoris. Do not use ticks.</p>
	Total	6	

Question	Answer	Marks	Guidance
10 a	<p>any two from:</p> <p>no wires (to connect to each other) / wires do not get tangled / no wires to trip over / AW (1)</p> <p>idea that (all) the devices are portable (1)</p> <p>devices can be in different parts of the house (1)</p>	2	<p>allow specific examples e.g. only need to plug in to recharge (1)</p> <p>allow idea that devices can be anywhere (in the world) (1)</p>
b	electromagnetic (radiation) (1)	1	<p>allow correct answer ticked, circled or underlined in list if answer line is blank</p> <p>more than one answer scores 0</p>
Total		3	

Question	Answer	Marks	Guidance
11 a	<p>Level 3 measurements AND results explained AND missing energy calculated Quality of written communication does not impede communication of the science at this level (5 – 6 marks)</p> <p>Level 2 measurements AND missing energy calculated OR measurements AND results explained OR missing energy calculated AND results explained Quality of written communication partly impedes communication of the science at this level (3 – 4 marks)</p> <p>Level 1 measurements OR results explained OR missing energy calculated Quality of written communication impedes communication of the science at this level (1 – 2 marks)</p> <p>Level 0 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>measurements may include:</p> <ul style="list-style-type: none"> • measure the mass of water / keep the mass of water the same for each experiment • measure temperature at the start • measure temperature at the end <p>all three measurements required for level 3</p> <p>results explained may include:</p> <ul style="list-style-type: none"> • greater temperature increase requires more energy • the energy decreases each time by 8400 (J) as go down table • a 10⁰C change changes the energy by 8400 (J) <p>allow any correct data quoted from the table</p> <p>ignore references to greater temperature increase producing more energy</p> <p>missing energy calculated</p> <ul style="list-style-type: none"> • missing result is 16800 (J) <p>result written in the table takes precedence over result written in the body of the answer if values are different</p> <p>Use the L1, L2, L3 annotations in Scoris. Do not use ticks.</p>

Question	Answer	Marks	Guidance
b i	<p>any two from</p> <p>idea of wrap (insulating) material around (the cup) (1)</p> <p>suitable named insulating material (1)</p> <p>use foil (to reflect heat) (1)</p> <p>put a lid on it / cover top of cup (1)</p>	2	<p>allow stand on insulating material (1)</p> <p>ignore put insulating material inside the cup</p> <p>ignore insulate the cup</p> <p>examples of named insulating material include bubble wrap / foam / paper / cardboard / wool / polystyrene</p> <p>ignore idea of using a cup made of a different material</p>
ii	no or reduced convection (currents) (1)	1	<p>allow the air cannot move / air is a (good) insulator / air is a poor conductor / air is trapped (1)</p> <p>allow reduces heat loss (1)</p> <p>ignore no heat loss</p> <p>not traps heat</p>
iii	<p>less time needed / quicker / faster (1)</p> <p>then any one from:</p> <p>less energy lost or less heat lost (1)</p> <p>(so) less energy needed or less heat needed (1)</p>	2	<p>allow less heat escapes (1)</p> <p>allow less convection / less conduction / less radiation (1)</p> <p>ignore no heat loss / no energy loss</p>
Total		11	

Question	Answer	Marks	Guidance
12 a	strong waves linked to high level of ozone (1) weak waves linked to low level of ozone (1) but stronger waves linked to more ozone or weaker waves linked to less ozone (2)	2	ignore ref to more or less long waves
b i	causes (skin) cancer / sunburn / premature (skin) aging (1) causes (eye) cataracts (1)	2	allow damage to (skin) cells / (idea of) mutation (1) ignore just 'skin damage' allow causes lens or eyes to go cloudy (1) allow causes damage to the retina (1) ignore just 'eye damage' ignore causes blindness
ii	any two from: use sunscreen / use suncream / use sunblock (1) wear clothes / wear hat (1) limit time in the sun / move to the shade (1)	2	allow use (high factor) SPF (1) allow avoid sunlight (1) allow wear sunglasses (1) allow avoid sun tanning beds (1)
	Total	6	

Question	Answer	Marks	Guidance
13 a	<p>any one from:</p> <p>idea of microwaves are longer (wavelength) / infrared radiation are shorter (wavelength) (1)</p> <p>idea of microwaves have a lower frequency / infrared radiation has a higher frequency (1)</p>	1	<p>allow microwaves have a bigger or higher wavelength / infrared radiation has a smaller wavelength (1)</p> <p>allow there are more infrared waves every second / ora (1)</p>
b	<p>true</p> <p>true</p> <p>false</p> <p>all three correct scores (2)</p> <p>two correct scores (1)</p> <p>one correct scores (0)</p>	2	
c	<p>C (1)</p> <p>optical fibres use (total internal) reflection / TIR and most cost effective (1)</p>	2	<p>B or D scores 0 for the question</p> <p>allow 45 (1)</p> <p>allow correct answer ticked, circled or underlined in list if answer line is blank</p> <p>more than one answer scores 0</p> <p>allow uses (total internal) reflection / TIR and cheaper (than A) / second cheapest / only costs £45 (per metre) (1)</p> <p>ignore cheap / cheapest, if unqualified</p> <p>if no other marks awarded allow A because of TIR (1)</p>
Total		5	

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