

GCSE

Science B

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

General Certificate of Secondary Education

Mark Scheme for June 2014

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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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These are the annotations, (including abbreviations), including those used in scoris, which are used when marking

Annotation	Meaning
	Blank Page – this annotation must be used on all blank pages within an answer booklet (structured or unstructured) and on each page of an additional object where there is no candidate response.
	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
<u> </u>	= 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

Question	Answer	Marks	Guidance
1 a	iris (1)	1	allow correct answer ticked, circled or underlined in list if answer line is blank
b	refracted / focused (1) then one from (refracted) by the cornea / lens (1) (focused) on the retina or fovea / by lens (1)	2	allow bends not reflected / bounced second marking point can only be awarded if no contradiction e.g. focused by cornea (1) allow focused by lens (2) allow focused on the retina (2) allow rods and cones for retina if no other mark awarded allow passes through the pupil (1)
c	idea of judging how far away prey is (1)	1	allow to judge distance (1) ignore 3D vision ignore to focus on prey
	Total	4	

Question	Answer	Marks	Guidance
2 a i	the plant has bent / grown (1) towards the light (1)	2	<p>allow leaves are paler (1) but paler leaves because they did not get enough light (2) ignore plant moves</p> <p>allow explanation (has bent because) there was only light from one direction (1) ignore Sun but allow sunlight (1)</p> <p>allow higher level explanations, e.g. auxin causes the side closest to the light to grow slower / ora (2) e.g. plant is phototropic (2)</p> <p>ignore just plant has lack of light not the plant is dying</p>
a ii	hormones (1)	1	allow correct answer ticked, circled or underlined in list if answer line is blank
b	geotropism (1)	1	<p>allow geotropic / gravitropism / gravitropic (1) not negative geotropism not other references to gravity e.g. gravitational pull</p>
	Total	4	

Question	Answer	Marks	Guidance
3	<p>any two from:</p> <p>insulin level increases to lower blood sugar (1)</p> <p>increase because there is glucose / sugar / carbohydrates in the meals (1)</p> <p>insulin released from pancreas (1)</p> <p>idea of lag because takes time for glucose OR sugar to enter blood (1)</p> <p>fall because the insulin not needed when blood glucose or blood sugar levels fall / rise (1)</p>	2	<p>ignore (insulin) increases when eating meals / decreases after meals</p> <p>allow hormone responses are slow (1)</p> <p>ignore stops blood sugar levels increasing allow insulin levels rise because blood sugar levels rise</p> <p>allow goes up and down because blood glucose OR blood sugar levels never stay the same (1) allow higher level ideas about negative feedback causes the rise and fall (1)</p>
	Total	2	

Question	Answer	Marks	Guidance
4 a	<p>(nicotine) increases heart rate (1)</p> <p>carbon monoxide reduces 'oxygen-carrying' capacity of the blood / AW (1)</p> <p>but</p> <p>carbon monoxide reduces 'oxygen-carrying' capacity of the blood so heart rate increases (to compensate) (2)</p>	2	<p>allow heart has to work faster (1)</p> <p>but ignore heart has to work harder</p> <p>ignore make the blood pump faster</p> <p>allow carbon monoxide combines with haemoglobin so less oxygen carried (in blood)</p> <p>ignore just less oxygen carried round the body</p> <p>allow idea of smoking causes the narrowing or blocking of arteries (1)</p> <p>ignore smoking damages arteries</p> <p>not tar blocks arteries</p>

Question	Answer	Marks	Guidance
4 b	<p>[Level 3] Describes at least <u>two</u> patterns AND suggests more specific reason why less people smoke. Quality of written communication does not impede communication of the science at this level. (5 – 6 marks)</p> <p>[Level 2] Describes at least <u>two</u> patterns AND suggests a reason why less people smoke. Quality of written communication partly impedes communication of the science at this level. (3 – 4 marks)</p> <p>[Level 1] Describes a pattern OR suggests a reason why less people smoke. 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 E To reach Level 3, answer must refer to a <u>specific</u> reason why less people smoke Indicative scientific points at Level 3 may include: <i>patterns from level 2 plus specific reasons</i></p> <ul style="list-style-type: none"> • (more) aware that it may cause heart disease • (more) aware that it may cause named cancer e.g. lung or throat. oesophagus, mouth • (more) aware that it may cause emphysema • (more) aware that it may cause bronchitis • may affect them if they have asthma <p>Indicative scientific points for patterns may include:</p> <ul style="list-style-type: none"> • 25-34 year old have the highest percentage in 1980 • 20-24 year old have the highest percentage in 2008 • 50-59 year olds has the biggest drop • quotes data e.g. 35-49 drop by 20% • less people smoke in 2008 / more people smoked in 1980 • less over 60 smoke • change is greater for over 24 year olds <p>Indicative scientific points for reasons at Levels 1 & 2 may include:</p> <ul style="list-style-type: none"> • makes you unhealthy • causes cancer • don't want to die young • can kill you • people more aware of risks / risks highlighted on packet <p>Use the L1, L2, L3 annotations in Scoris; do not use ticks.</p>
Total		8	


Question	Answer	Marks	Guidance
5 a	55% (1)	1	
b	higher percentage of proteins (1) because teenagers are growing (1)	2	allow need more protein for growth (2) ignore other foodstuffs e.g. fats / carbohydrates
c	any two from: make you fat / put on weight / make you obese (1) (cause) heart disease / heart attack / heart failure (1) (cause) diabetes (1) (cause) breast cancer (1) (cause) arthritis (1) (cause) high blood pressure (1) (cause) blocked arteries / high cholesterol (1)	2	ignore just makes you unhealthy allow damage to the heart allow blocked blood vessels (1) allow plaque (1) ignore blood clot ignore stroke ignore thrombosis
d	idea of cheating / unfair to other athletes (1) idea of health issues (1)	2	e.g. dizziness / headaches / flushed skin / heart problems / chest pains / palpitations / sweating / vomiting / abdominal cramps / weight gain / dehydration / aggression allow just bad for your health / cause damage to your body (1)
	Total	7	

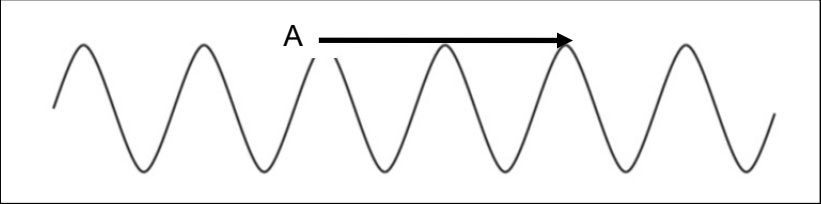
Question	Answer	Marks	Guidance
6 a	thermochromic (1)	1	allow correct answer ticked, circled or underlined in list if answer line is blank
b	A (1) idea of greatest percentage of solvent (1)	2	second mark is dependent on correct choice of A answer must be comparative
	Total	3	

Question	Answer	Marks	Guidance
7 a	ethanol + oxygen → carbon dioxide + water (1)	1	allow = instead of → not and / & / instead of + 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
b i	soot / carbon (1)	1	allow phonetic spelling ignore ash
b ii	any two from: soot produced (1) less energy or heat released (1) (poisonous) carbon monoxide produced (1)	2	ignore references to colour of flame
c	(no because) any two from: both fuels give same temperature rise (1) BUT smaller mass of ethanol burned (1) cost of fuel burned is less for ethanol (1)	2	marks are for explanation ignore yes ignore incorrect temperature rise answers must be comparative assume unqualified answer refers to butanol allow reverse arguments for butanol
	Total	6	

Question	Answer	Marks	Guidance
8 a	Gore-Tex® (1) idea that Gore-Tex® is waterproof <u>and</u> breathable (1)	2	allow Gore-Tex® can breathe ignore other factors
b i	will not decay / will not decompose (by bacterial action) (1)	1	allow does not rot / will not break down (1) ignore does not disintegrate / does not deteriorate / does not wear away / does not degrade / cannot be destroyed / does not corrode / does not dissolve
b ii	any two from: using a landfill site / bury underground / aw (1) idea of burning / incineration / combustion (1) recycling (1) cracking (1)	2	ignore reuse
	Total	5	

Question	Answer	Marks	Guidance								
9 a i	C (1)	1	more than one answer scores 0								
a ii	<table border="1"> <thead> <tr> <th>atom</th> <th>number</th> </tr> </thead> <tbody> <tr> <td>C</td> <td>2</td> </tr> <tr> <td>H</td> <td>4</td> </tr> <tr> <td>O</td> <td>2</td> </tr> </tbody> </table>	atom	number	C	2	H	4	O	2	2	all three correct scores (2) two correct scores (1) one correct scores (0)
atom	number										
C	2										
H	4										
O	2										
a iii	C (1)	1	more than one answer scores 0								
a iv	C ₂ H ₄ / H ₂ (1)	1	allow reactant indicated in equation (e.g. circled) if answer line is blank allow both reactants, however written, e.g. C ₂ H ₄ + H ₂ → H ₂								

Question	Answer	Marks	Guidance
<p> b</p>	<p>[Level 3] Answer describes the polymerisation of propene, including the conditions needed, and gives the name of the polymer made. Quality of written communication does not impede communication of the science at this level. (5 – 6 marks)</p> <p>[Level 2] Answer describes the polymerisation reaction of propene and gives the name of the polymer made OR names the polymer and gives at least one condition OR describes the polymerisation reaction and gives at least one condition OR gives both conditions needed Quality of written communication partly impedes communication of the science at this level. (3 – 4 marks)</p> <p>[Level 1] Answer attempts to describe the polymerisation reaction of propene OR gives the name of the polymer made OR gives one condition 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>	<p>6</p>	<p>This question is targeted at grades up to C</p> <p>Indicative scientific points at Level 3 must include:</p> <ul style="list-style-type: none"> • conditions needed are high pressure and a catalyst (ignore refs to temperature) <p>Indicative scientific points at Levels 1, 2 & 3 may include:</p> <ul style="list-style-type: none"> • propene is a small molecule / monomer • propene is an alkene (monomer molecule) • propene contains a double bond • double bond makes propene reactive • many monomer molecules join together • a large or long chain polymer molecule is made • reaction is a polymerisation reaction • double bond in propene is broken • reaction is an addition polymerisation reaction • polymer made is poly(propene) / polypropene <p>allow marks via equations and structures e.g.</p> $\left[\begin{array}{cc} \text{H} & \text{H} \\ & \\ -\text{C} & - & \text{C}- \\ & \\ \text{H} & \text{H} \end{array} \right]_n$ <p>implies many monomers and a polymer</p> <p>Use the L1, L2, L3 annotations in Scoris; do not use ticks.</p>
	Total	11	

Question	Answer	Marks	Guidance
10 a	arrow from A to position two wavelength away (1)	1	 <p data-bbox="1189 512 1917 576">allow line without the arrow / double headed arrow allow any arrow two wavelength long in either direction</p>
b i	3 (cm/s) (2) but if answer incorrect 2 x 1.5 (1)	2	allow $4 \div 2 \times 1.5$ (1) or 4×1.5 (1) or 6 (cm/s) (1)
ii	doubles / 6 (cm/s) (1)	1	allow ecf for numerical answers only from (b)(i) e.g. if (b)(i) is 6 cm/s then allow 12 cm/s (1) allow gets higher / gets faster / increases / aw (1) but answer must not contradict 10(b)(i)
c	no (no mark) idea that (all electromagnetic) waves travel at the same speed (in vacuum) (1)	1	if yes, 0 marks allow travel at 3×10^8 m/s (1)
Total		5	

Question	Answer	Marks	Guidance
11	<p>[Level 3] Makes one correct calculation that identifies safe time or SPF AND explains why dark skin allows longer safe time in the sun. Quality of written communication does not impede communication of the science at this level (5 – 6 marks)</p> <p>[Level 2] Makes one correct calculation that identifies safe time or SPF OR explains why dark skin allows longer safe time in the sun. Quality of written communication partly impedes communication of the science at this level (3 – 4 marks)</p> <p>[Level 1] identifies difference in skin colour as important 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>To reach Level 3 answer must refer to pigment or melanin</p> <p>Indicative scientific points at level 2 and 3 may include: Calculation</p> <ul style="list-style-type: none"> • Anton safe time - Bronzer 75 (minutes) / Toptan 225 (minutes) • Ben safe time - Bronzer 300 (minutes) / Toptan 900 (minutes) • Anton should use SPF 36 • Ben should use SPF 9 <p>Explanation</p> <ul style="list-style-type: none"> • dark skins contain more pigment / dark skins contain more melanin / ora • pigment or melanin absorbs UV / pigment or melanin stops UV <p>ignore pigment or melanin filters UV</p> <p>Indicative scientific points at level 1 may include:</p> <ul style="list-style-type: none"> • dark skin does not burn as much • dark skin can stay in sun longer • dark skin stops UV / dark skin blocks UV • lower spf needs reapplying <p>allow ora</p> <p>Use the L1, L2, L3 annotations in scoris; do not use ticks.</p>
	Total	6	

Question	Answer	Marks	Guidance
12 a	80 (°C) (1)	1	
b	<p>steeper gradient from 100°C (1)</p> <p>line levels out at 80°C (1)</p>	2	<p>allow steeper gradient reaches 80°C in less time than original graph if line does not start at 100°C(1)</p> <p>ignore any lines drawn after horizontal line at 80°C</p>
c	<p>any two from:</p> <p>(idea that bubble wrap) contains <u>trapped</u> air OR bubbles of air OR air pockets (1)</p> <p>air is a (good) insulator / air is a poor conductor (1)</p> <p>(air is trapped so) less convection (currents) (1)</p>	2	<p>ignore "it" traps air, if unqualified</p> <p>ignore air in the bubble wrap (stem of question)</p> <p>allow plastic / bubble wrap is a (good) insulator (1)</p> <p>allow less conduction (1)</p> <p>allow prevents OR stops heat loss by conduction OR convection (1)</p>
	Total	5	

Question	Answer	Marks	Guidance
13 a i	idea of detects OR senses person (1) but idea of detects OR senses (body) heat / infrared (from person) (2)	2	ignore sees the person ignore ideas of light reflecting / detecting movement
ii	idea of making sure it points at the person (walking towards the doors) / idea that the doors open (in time) before the person gets to the doors (1)	1	allow to make sure it detects OR senses the person / person's body / person's heat (1) ignore ideas of detecting movement allow converse arguments e.g. it might not detect the person (if at wrong angle) (1) ignore just so that doors open
b i	takes a shorter time to reach the sensor (1)	1	allow person gets in the way / hits the person (1) allow reflects or bounces (from the person) (1)
ii	any two from: idea that the results can be checked (1) idea that the results can be compared (1) to make other scientists aware of the work that has been done (1) allows other scientists to collect further evidence / so other scientists can develop the work (1) idea of recognition for work / improve career / become famous (1)	2	ignore other people or public ignore financial remuneration
	Total	6	

Question	Answer	Marks	Guidance
14 a	value in the range of 57 to 63 (%) (1)	1	
b	1700 (1) because has the lowest % loss (per km) / only has 51% loss (1)	2	allow ecf from (a) if answer to (a) is less than 51% allow loses the least signal (strength) (1)
	Total	3	

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