

GCSE

Further Additional Science B

Unit **B762/01**: Modules B6, C6, P6 (Foundation Tier)

General Certificate of Secondary Education

Mark Scheme for June 2017

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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
BOD	benefit of the doubt
NBOD	benefit of the doubt not given
ECF	error carried forward
	information omitted
I	ignore
R	reject
CON	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

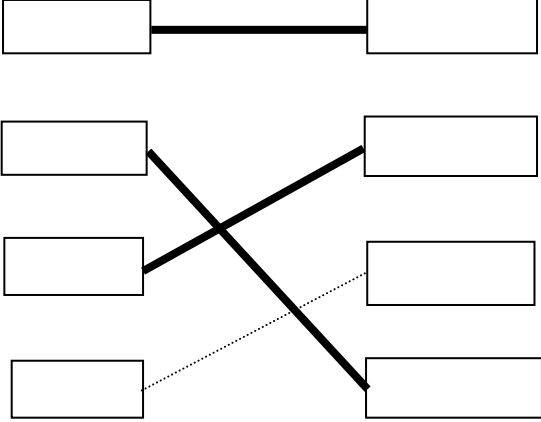
Question	Answer	Marks	Guidance
1 a	flagellum (1)	1	allow answer ringed, underlined or ticked more than one answer= 0
b	(viruses are) not living (1) smaller (1)	2	assume unqualified answer refers to viruses allow reverse arguments allow viruses cannot be treated with antibiotics (1) allow higher level answers: viruses have a protein coat (1) (only) reproduce inside living cells (1)
c	so viruses or pathogens do not go into the air (1) idea to avoid infecting someone else / so no one else breathes in viruses or pathogens(1)	2	allow bacteria for pathogen allow to stop spreading the viruses or pathogens(1) ignore to stop from spreading the cold or germs allow idea that it stops other people coming into contact with the viruses or pathogens(1) ignore just 'colds can be caught'
	Total	5	

Question	Answer	Marks	Guidance
2 a i	beetle (1)	1	
ii	nematode (worms) / springtails (1)	1	allow worms ignore earthworms
iii	nematode (worms) / springtails (1)	1	allow worms ignore earthworms
b i	improve soil structure (1) improve fertility (1)	2	ignore references to decay allow add nutrients / minerals / to the soil (1) ignore adds compost allow any two higher level answers: neutralise acid soil (1) mix up (soil) layers / mix up soil(1) improve aeration / increase the air content (1) improve drainage (1)
ii	decomposers / bacteria / fungi (1) break down / rot / decay / decompose (1)	2	ignore recycled ignore turns into compost
	Total	7	

Question	Answer	Marks	Guidance
3	<p>[Level 3] Description of how yeast reproduces AND a full description of fermentation AND suggests a reason for temperature. Quality of written communication does not impede communication of the science at this level. (5 – 6 marks)</p> <p>[Level 2] Description of how yeast reproduces AND a partial description of fermentation AND suggests a reason for temperature. Quality of written communication partly impedes communication of the science at this level. (3 – 4 marks)</p> <p>[Level 1] Description of how yeast reproduces OR a partial description of fermentation OR suggests a reason for temperature. 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</p> <p>Indicative scientific points may include:</p> <p>reproduction</p> <ul style="list-style-type: none"> • reproduces asexually • reproduces by budding ignore split in two <p>chemical reaction</p> <ul style="list-style-type: none"> • (beer production) involves fermentation or anaerobic respiration not aerobic respiration • breaks down or uses sugar or glucose or $C_6H_{12}O_6$ • in absence of oxygen / O_2 • produces alcohol / ethanol / C_2H_5OH • produces carbon dioxide / CO_2 <p>temperature between 20°C and 25°C</p> <ul style="list-style-type: none"> • best or optimum temperature to make beer • activity of yeast is at its highest / reproduce faster • idea that at higher temperatures enzymes denature <p>Use the L1, L2, L3 annotations in Scoris; do not use ticks.</p>
Total		6	

Question	Answer	Marks	Guidance										
4 a	number of new varieties approved for testing: increased up until 2002 (1) decreased after 2002 (1)	2	allow increased up until 1995 (1) 1 mark for description with no years										
b	Clare (1) because the graph is (only) about testing (1)	2	If name other than Clare then zero for question										
c i	resistance to pests and infections (1)	1	allow other unambiguous indication, e.g. underlining more than one answer = 0 marks										
ii	(totals add up to) 27(%) / (17 +1 + 4 + 5 =) 27(%) (1)	1	allow reference to all the resistance figures adding up to more than the herbicide tolerance / 24% allow idea that the total of the resistance figures is the largest percentage										
d	<table border="1" style="margin-left: auto; margin-right: auto;"> <tbody> <tr> <td>3</td> <td>cut open the DNA of a new plant</td> </tr> <tr> <td>(1)</td> <td>identify the desired gene in a plant</td> </tr> <tr> <td>4</td> <td>insert the desired gene into the DNA</td> </tr> <tr> <td>2</td> <td>remove the desired gene from the DNA</td> </tr> <tr> <td>(5)</td> <td>the desired gene works in the new plant</td> </tr> </tbody> </table> all correct (1)	3	cut open the DNA of a new plant	(1)	identify the desired gene in a plant	4	insert the desired gene into the DNA	2	remove the desired gene from the DNA	(5)	the desired gene works in the new plant	1	
3	cut open the DNA of a new plant												
(1)	identify the desired gene in a plant												
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(5)	the desired gene works in the new plant												
	Total	7											

Question	Answer	Marks	Guidance
5 a	<p>any two from:</p> <p>idea of non-polluting or harmless waste product (1)</p> <p>low mass (1)</p> <p>high efficiency (1)</p>	2	<p>ignore just data from table unless qualified</p> <p>allow product or water can be used for drinking (1)</p> <p>ignore just 'water is made'</p> <p>allow lightweight (1)</p> <p>allow only 30kg (1)</p> <p>ignore small / compact</p> <p>allow idea of good efficiency (1)</p>
b	<p>any two from:</p> <p>high (operating) temperature (1)</p> <p>low voltage produced (1)</p> <p>idea that hydrogen not easy to make / not cheap to make (1)</p>	2	<p>ignore just data from table unless qualified</p> <p>allow (operating) temperature above room temperature (1)</p> <p>allow only 0.9V(1)</p> <p>ignore not enough power</p> <p>allow hydrogen or oxygen must be transported with the spacecraft (1)</p> <p>ignore idea of heavy fuel</p>
c	<p>$2\text{H}_2 + \text{O}_2 \rightarrow 2\text{H}_2\text{O}$</p> <p>correct formulae (1)</p> <p>balancing - conditional on correct formulae (1)</p>	2	<p>allow any correct multiple including fractions e.g. $4\text{H}_2 + 2\text{O}_2 \rightarrow 4\text{H}_2\text{O}$ (2)</p> <p>allow = or \rightleftharpoons for arrow</p> <p>not 'and' or & for +</p> <p>allow one mark for correct balanced equation with minor errors in case, subscript and superscript e.g. $2\text{h}2 + \text{O}^2 \rightarrow 2\text{H}_2\text{o}$ (1)</p>
	Total	6	

Question	Answer	Marks	Guidance
6 a	<p>C and D (1)</p> <p>But</p> <p>C removes red paint and D removes green paint both without damaging the shirt (2)</p>	2	<p>Both need for mark</p> <p>allow C and D because they remove both paints or colours without damaging the shirt (2)</p>
b		2	<p>all three correct (2)</p> <p>one or two correct (1)</p>
c	<p>any two from:</p> <p>uses a solvent (1)</p> <p>that is not water (1)</p> <p>idea that removes stains that are insoluble in water (1)</p>	2	
Total		6	

Question	Answer	Marks	Guidance
7 a	liquid (1)	1	allow correct answer ticked , circled or underlined if answer line is blank
b	soap (1)	1	ignore detergent /washing up liquid
c	a mixture of two immiscible liquids (that do not separate) / one liquid suspended in another (1)	1	allow mixture (of tiny droplets) of oil and water (1) allow droplets of one liquid inside another (1)
Total		3	

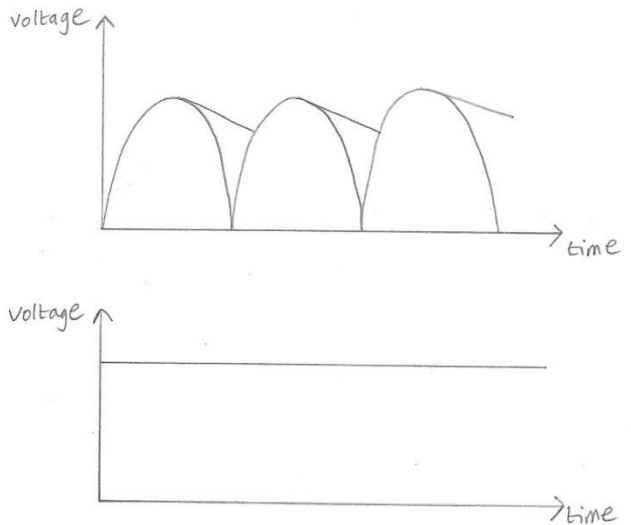
Question	Answer	Marks	Guidance
8 a	bubbles (of gas) / effervescence (1)	1	allow oxygen made (1)
b	<p>Reduce the time of the electrolysis. <input type="checkbox"/></p> <p>Increase the current passing through the copper sulfate solution. <input checked="" type="checkbox"/></p> <p>Use a different concentration of copper sulfate solution. <input type="checkbox"/></p> <p>Change the anode and cathode around. <input type="checkbox"/></p> <p>(1)</p>	1	two or more boxes ticked = 0 marks
c	lighted splint (1) THEN small explosion / 'pop' (1)	2	this mark is dependent on the correct test allow burns with a squeaky pop (2) allow one mark for squeaky pop test (1)
Total		4	

Question	Answer	Marks	Guidance
9	<p>Level 3 Applies knowledge to correctly rank all of the samples AND identifies, with explanations, the type of hardness in all three of the samples Quality of written communication does not impede communication of the science at this level. (5 – 6 marks)</p> <p>Level 2 Applies knowledge to correctly rank all of the samples AND identifies, with an explanation, the type of hardness in one of the samples OR Identifies, with explanations, the type of hardness in two of the samples OR Applies knowledge to correctly rank all of the samples in order of hardness with reasons Quality of written communication partly impedes communication of the science at this level. (3 – 4 marks)</p> <p>Level 1 Applies knowledge to correctly rank all of the samples OR Identifies the type of hardness in one of the samples OR Identifies the softest/hardest with a valid 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 grade C. Indicative scientific points may include:</p> <p>Order of hardness</p> <ul style="list-style-type: none"> • $B > A > C$ <p>Types of hardness</p> <ul style="list-style-type: none"> • sample A contains temporary hardness • sample B contains (only) permanent hardness • sample C contains temporary hardness <p>Explanation for type of hardness</p> <ul style="list-style-type: none"> • sample A completely softened by boiling / after boiling same volume of soap as distilled water / allow volume of soap decreases • sample B not softened by boiling / no change in volume of soap after boiling / allow volume of soap stays the same • sample C completely softened by boiling / after boiling same volume of soap as distilled water / allow volume of soap decreases <p>Reasons for order of hardness</p> <ul style="list-style-type: none"> • sample A in the middle as volume of soap added (before boiling) is less than B but more than C • sample B hardest as highest volume of soap needed (before boiling) • sample C softest as lowest volume of soap needed (before boiling) <p>Use the L1, L2, L3 annotations in Scoris; do not use ticks.</p>
		6	

Question	Answer	Marks	Guidance
10 a i	600 (Ω) (1)	1	
ii	decreases /goes down /reduces /AW (1)	1	
b i	A (1) it has the steepest gradient (at 2A) (1)	2	allow has the highest voltage / voltage is higher than B and C (1) ignore just voltage is higher allow (more) rapid increase in voltage (1)
ii	(Electrical resistance is) charge carriers / electrons (1) colliding with atoms / ions (in the conductor) (1)	2	
	Total	6	

Question	Answer	Marks	Guidance
11	<p>Level 3: 5-6 marks Three types and three uses of transformer correctly identified Quality of written communication does not impede communication of science at this level.</p> <p>Level 2: 3-4 marks All three transformers identified OR matched two transformer to their use without naming them OR One type identified with its correct use</p> <p>Quality of written communication partly impedes communication of science at this level.</p> <p>Level 1: 1-2 marks One type identified OR matched one transformer to its use without naming the transformer</p> <p>Quality of written communication impedes the communication of science at this level</p> <p>Level 0: 0 marks Insufficient or irrelevant science. Not worthy of credit.</p>	6	<p>This question is targeted up to grade E</p> <p>Indicative scientific points may include (but are not limited to) the following:</p> <p>Types</p> <p>A: Step up</p> <p>B: Step down</p> <p>C: Isolating</p> <p>Uses</p> <p>A: Power stations / national grid / power lines / allow pylons</p> <p>B: Phone chargers / radios / laptops / sub-stations / adapters / idea changing voltage before electricity enters homes / substations</p> <p>C: Shaver sockets</p> <p>Use the L1, L2, L3 annotations in Scoris; do not use ticks</p>
Total		6	

Question	Answer	Marks	Guidance
12 a	column C: 1, 1, 0, 0 (1) column D: 0, 1, 0, 0 (1)	2	
b	thermistor (1)	1	allow answer ringed, underlined or ticked more than one answer= 0
c i	A transistor is like a resistor (1) Transistors can be connected together to make thermistors (1)	2	ALLOW corrected answers A transistor is not like a resistor (1) Transistors cannot be connected together to make thermistors (1)
ii	any one from: A transistor is like a switch (1) Transistors can be connected together to make logic gates (1)	1	ignore corrected answers
d	5.1 (A) (1)	1	
	Total	7	

Question	Answer	Marks	Guidance
13 a	U _{1a} (1) R _{av} (1)	2	either order
b i	full-wave (rectification) (1)	1	
ii	correct sketch drawn, eg: 	1	allow any wave drawn with a smoother output than shown in question 4bi.
	Total	4	

Question	Answer	Marks	Guidance
14	movement of a magnet near a wire or coil(1) movement of a wire or coil near a magnet (1) OR the relative movement of a wire and magnet (2)	2	
	Total	2	

Question	Answer	Marks	Guidance
15 a i	bars drawn at 300(butter) and 400 (margarine) (1)	1	both needed for mark
a ii	<p>support – idea that eating more / > than 4g/16g of butter results in less men with heart disease /ora (1)</p> <p>not support – idea that eating less/<< than 4g of margarine results in less men with heart disease /ora(1)</p>	2	<p>ignore numbers quoted must be a comparison</p> <p>allow more men have heart disease eat margarine /ora (1)</p> <p>allow there is only data for men / no data for women (1)</p>
a iii	<p>29.5 (%) (2)</p> <p>but if incorrect or incomplete then</p> $\frac{295}{1000} \times 100 \quad (1)$	2	<p>allow 30 (%) (2)</p> <p>allow 29 (%) (1)</p>
b i	1970 (1)	1	allow 1968-1972 inclusive
b ii	<p>butter decreases (1)</p> <p>margarine increases then decreases (1)</p>	2	ignore just 'decrease in margarine' or 'increase in margarine'
b iii	<p>any two from:</p> <p>deaths increasing as levels of margarine increase (1)</p> <p>deaths decreasing as levels of margarine decrease (1)</p> <p>both were highest / at around the same time (1)</p>	2	

	when margarine levels low then deaths are low (1)		If no other marks allow both graphs are the same shape (1)
	Total	10	

OCR (Oxford Cambridge and RSA Examinations)
1 Hills Road
Cambridge
CB1 2EU

OCR Customer Contact Centre

Education and Learning

Telephone: 01223 553998

Facsimile: 01223 552627

Email: general.qualifications@ocr.org.uk

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Head office
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Facsimile: 01223 552553

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