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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
	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	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	**[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) **[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) **[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) **[Level 0]** Insufficient or irrelevant science. Answer not worthy of credit. (0 marks)	6	**This question is targeted at grades up to E** **Indicative scientific points may include:** **reproduction** • reproduces asexually • reproduces by budding **ignore** split in two **chemical reaction** • (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 **temperature between 20^0C and 25^0C** • best or optimum temperature to make beer • activity of yeast is at its highest / reproduce faster • idea that at **higher** temperatures **enzymes** denature **Use the L1, L2, L3 annotations in Scoris; do not use ticks.**
	Total	**6**	

<table>
<tr><th>Question</th><th>Answer</th><th>Marks</th><th>Guidance</th></tr>
<tr><td>4 a</td><td>number of new varieties approved for testing:

increased up until 2002 (1)
decreased after 2002 (1)</td><td>2</td><td>

allow increased up until 1995 (1)

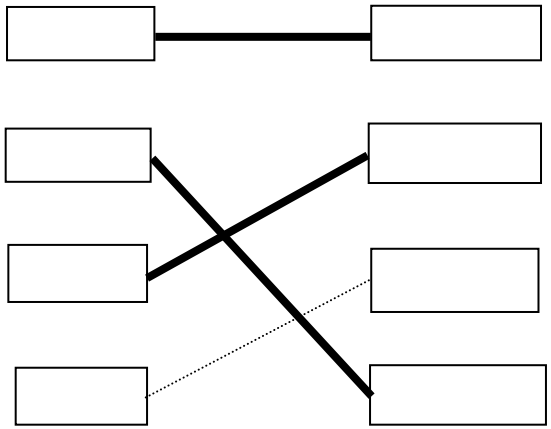
1 mark for description with no years</td></tr>
<tr><td>b</td><td>Clare (1)

because the graph is (only) about testing (1)</td><td>2</td><td>If name other than Clare then zero for question</td></tr>
<tr><td>c i</td><td>resistance to pests and infections (1)</td><td>1</td><td>allow other unambiguous indication, e.g. underlining
more than one answer = 0 marks</td></tr>
<tr><td>ii</td><td>(totals add up to) 27(%) /

(17 +1 + 4 + 5 =) 27(%) (1)</td><td>1</td><td>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</td></tr>
<tr><td>d</td><td><table><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></table>
all correct (1)</td><td>1</td><td></td></tr>
<tr><td></td><td>Total</td><td>7</td><td></td></tr>
</table>

Question	Answer	Marks	Guidance
5 a	**any two from:** idea of non-polluting or harmless waste product (1) low mass (1) high efficiency (1)	2	**ignore** just data from table unless qualified **allow** product or water can be used for drinking (1) **ignore** just 'water is made' **allow** lightweight (1) **allow only** 30kg (1) **ignore** small / compact **allow** idea of good efficiency (1)
b	**any two from:** high (operating) temperature (1) low voltage produced (1) idea that hydrogen not easy to make / not cheap to make (1)	2	**ignore** just data from table unless qualified **allow (**operating) temperature above room temperature (1) **allow only** 0.9V(1) **ignore** not enough power **allow** hydrogen or oxygen must be transported with the spacecraft (1) **ignore** idea of heavy fuel
c	$2H_2 + O_2 \rightarrow 2H_2O$ correct formulae (1) balancing - conditional on correct formulae (1)	2	**allow** any correct multiple including fractions e.g. $4H_2 + 2O_2 \rightarrow 4H_2O$ (2) **allow** = or ⇌ for arrow **not** 'and' or & for + **allow** one mark for correct balanced equation with minor errors in case, subscript and superscript e.g. 2h2 + $O^2 \rightarrow 2H_2o$ (1)
	Total	**6**	

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

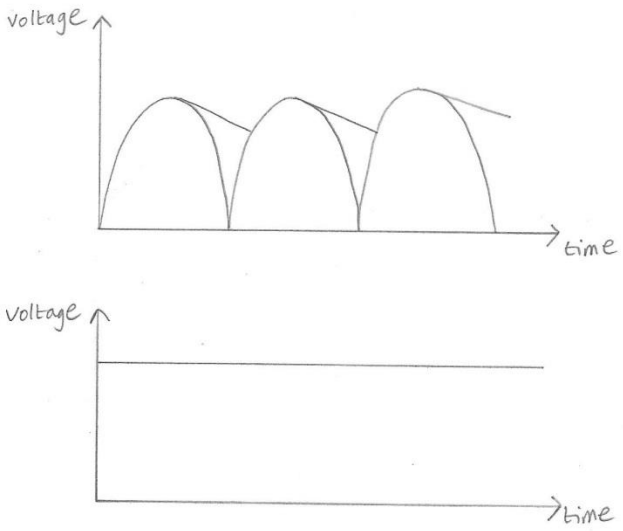
Question	Answer	Marks	Guidance
8 a	bubbles (of gas) / effervescence (1)	1	**allow** oxygen made (1)
b	Reduce the time of the electrolysis. ☐ Increase the current passing through the copper sulfate solution. ☑ Use a different concentration of copper sulfate solution. ☐ Change the anode and cathode around. ☐ (1)	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	**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) **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) **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) **Level 0** Insufficient or irrelevant science. Answer not worthy of credit. (0 marks)	6	**This question is targeted at grades up to grade C.** **Indicative scientific points may include:** **Order of hardness** • **B** > **A** > **C** **Types of hardness** • sample **A** contains temporary hardness • sample **B** contains (only) permanent hardness • sample **C** contains temporary hardness **Explanation for type of hardness** • 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 **Reasons for order of hardness** • 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) **Use the L1, L2, L3 annotations in Scoris; do not use ticks.**
		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	**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. **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 Quality of written communication partly impedes communication of science at this level. **Level 1: 1-2 marks** One type identified **OR** matched one transformer to its use without naming the transformer Quality of written communication impedes the communication of science at this level **Level 0: 0 marks** Insufficient or irrelevant science. Not worthy of credit.	6	This question is targeted up to grade E Indicative scientific points may include (but are not limited to) the following: **Types** **A**: Step up **B**: Step down **C**: Isolating **Uses** **A**: Power stations / national grid / power lines / **allow** pylons **B**: Phone chargers / radios / laptops / sub-stations / adapters / idea changing voltage before electricity enters homes / substations **C**: Shaver sockets **Use the L1, L2, L3 annotations in Scoris; do not use ticks**
	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	Ula (1) Rav (1)	2	either order
b i	full-wave (rectification) (1)	1	
ii	correct sketch drawn, eg:  (1)	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	support – idea that eating **more / >** than 4g/16g of butter results in less men with heart disease /ora (1) not support – idea that eating **less/<** than 4g of margarine results in less men with heart disease /ora(1)	2	**ignore numbers quoted must be a comparison** **allow** more men have heart disease eat margarine /ora (1) **allow** there is **only** data for men / no data for women (1)
a iii	29.5 (%) (2) **but if incorrect or incomplete then** $\frac{295}{1000} \times 100$ (1)	2	**allow** 30 (%) (2) **allow** 29 (%) (1)
b i	1970 (1)	1	**allow** 1968-1972 inclusive
b ii	butter decreases (1) margarine increases then decreases (1)	2	**ignore just** 'decrease in margarine' or 'increase in margarine'
b iii	**any two from:** deaths increasing as levels of margarine increase (1) deaths decreasing as levels of margarine decrease (1) both were highest / at around the same time (1)	**2**	

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

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