OCR
Oxford Cambridge and RSA

GCSE

Further Additional Science B

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

General Certificate of Secondary Education

Mark Scheme for June 2016

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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.

OCR will not enter into any discussion or correspondence in connection with this mark scheme.

1 Annotations used in scoris

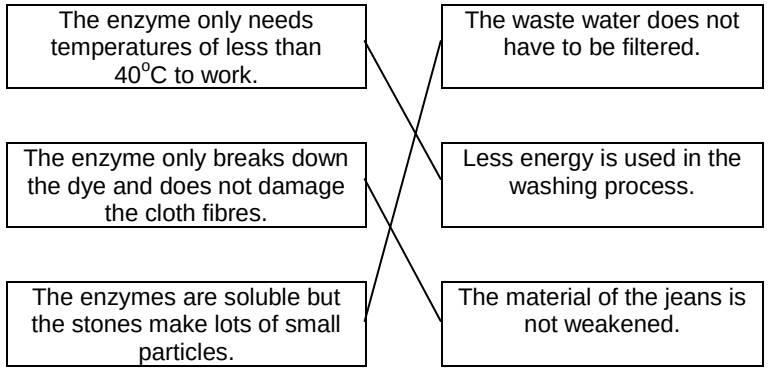
Annotation	Meaning
	correct response
	incorrect response
BOD	benefit of the doubt
NBOD	benefit of the doubt **not** given
ECF	error carried forward
^	information omitted
I	ignore
R	reject
CON	contradiction

2 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

Question	Answer	Marks	Guidance
1 a i	0.003 **mm** (1)	1	**allow** correct answer ticked, circled or underlined more than one circled (0)
ii	by budding ☐ by sexual reproduction ☐ by splitting into two (binary fission ☑ (1)	1	
b	**any three from:** gene inserted (1) **but** human growth hormone gene inserted (2) E.coli grown in fermenters (1) reproduces (very) **quickly** (1)	3	**ignore** references to enzymes **allow** DNA inserted (1)
		5	

Question	Answer	Marks	Guidance
2 a	idea that Calumet has a low(est) volume of water flowing down / ORA (1) calculation to show that Fox river is the higher polluter / 4472 v 706.8 micrograms (2)	3	 **allow** identifies Fox river as causing higher / the most pollution (1)
b i	decomposition (1)	1	**allow** correct answer ticked, circled or underlined more than one circled (0)
ii	carbon dioxide / methane (1)	1	**allow** hydrogen sulfide (1) **allow** correct formulae (1)
iii	phytoplankton grows faster(1) **more** light / minerals / warmer (1)	2	**allow** phytoplankton grows **more** (1) **allow** **more** heat / it is hotter(1) **but ignore** just 'heat' **allow** phytoplankton decompose or rot faster / **more** phytoplankton decompose or rot (1) **allow** bacteria reproduce or grow faster / bacteria reproduce or grow **more** (1) **ignore** just more bacteria or phytoplankton
iv	explosive (1)	1	**allow** may catch fire / cause fires (1)
		8	

Question	Answer	Marks	Guidance
3 a		1	
b	**any three from:** in gel beads / reagent sticks (1) uses alginate or calcium chloride solution (1) enzyme can easily be separated from product or waste water (1) so enzyme not wasted / not lost / can be reused (1)	3	**look for correct ideas on any of the answer lines** **allow** in alginate beads (2) **allow** does not contaminate product or waste water (1) **ignore** it is a continuous process **ignore** enzymes lasts longer **ignore** cost **ignore** references to temperature or pH
	Total	**4**	

Question	Answer	Marks	Guidance
4	**[Level 3]** Answer includes one comparison of the two hospitals **AND** explains why death rate changes in Semmelweis's hospital. Quality of written communication does not impede communication of the science at this level. (5 – 6 marks) **[Level 2]** Answer includes one comparison of the two hospitals **AND** describes change in death rate in Semmelweis's hospital. **OR** explains why death rate changes Semmelweis's hospital. Quality of written communication partly impedes communication of the science at this level. (3 – 4 marks) **[Level 1]** Answer includes one comparison of the two hospitals **OR** describes change in death rate in Semmelweis's hospital. describes change in death rate in one hospital 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 up to grade E** **Indicative scientific points about explanation:** • death rate increases because doctors transfer bacteria from dead bodies to women • death rate drops because washing hands kills the bacteria or removes bacteria from their hands. **allow** microbes / pathogens **but ignore** germs **Indicative scientific points about comparisons:** • similar death rates in both hospitals in any year up to 1823 **or** rates are **slightly** higher in Semmelweis's hospital in any year up to 1823 • after 1823 and before 1847 death rates are higher in Semmelweis's hospital (**allow** any named year in this range) • compares differences in death rates in a given year e.g. 1843 death rate in 5 other hospitals were 1% and Semmelweis's hospital was 16% • after 1847 death rates are similar again • death rate increases and decreases in Semmelweis's hospital but death rate does not change much in other hospitals **Indicative scientific points about description :** • death rate increases after doctors stating training • death rate drops after doctors started washing hands **Use the L1, L2, L3 annotations in Scoris. Do not use ticks.**

Question	Answer	Marks	Guidance
b	idea that he did his work before Pasteur (1) idea that Pasteur developed the germ theory (of disease) (1)	2	**allow** lived before Pasteur (1) **allow** did his work before germ theory was discovered (1) **allow** idea that Pasteur found out what causes diseases (1) **ignore** just reference to Pasteur showing that there are microbes in the air **ignore** references to other scientists
	Total	**8**	

Question	Answer	Marks	Guidance
5 a	more than one element / different elements (1) chemically joined / bonded (1)	2	**allow** contains 3 (different) elements (1) **allow** contains sodium and carbon and oxygen (1) **ignore** more than one atom **not** it is a mixture
b	3 (1) 6 (1)	2	
	Total	**4**	

Question	Answer	Marks	Guidance
6 a	because it contains oxygen / does not contain carbon and hydrogen **only** (1)	1	**allow** has O in the formula (1) **allow** C and H for carbon and hydrogen (1) **not** contains an oxygen **molecule** (in the formula) **not** is not a **mixture** of carbon and hydrogen only **not** does not contain carbon and hydrogen **molecules** or **compounds** only **not** does not contain carbon and hydro only
b	**any two from** any temperature between 25^{o}C and 50^{o}C or range (1) add water (1) lack of oxygen (1) use of yeast (1)	2	 **allow** room temperature (1) **ignore** warm / high / hot temperature **allow** anaerobic conditions (1)
	Total	**3**	

Question	Answer	Marks	Guidance
7 a	Birmingham(1)	1	
b	(no) **any three from** limescale / temporary hardness depends on the difference between results before and after (1) Birmingham has the least difference (between results before and after) / **only** deceases by 3 (1) Birmingham has the least amount of temporary hardness / limescale (1) Bristol forms the most limescale or temporary hardness / Bristol forms 56 / Bristol has the largest difference (1)	3	**ignore** units throughout **ignore** Birmingham does not have the most temporary hardness / limescale
	Total	**4**	

Question	Answer	Marks	Guidance
8 a	**sodium chloride =** sodium chlorine **magnesium bromide =** magnesium bromine (2)	2	all four correct (2) two or three correct (1) **allow** Na and Cl_2 Mg and Br_2 **not** Cl and Br
b	0.5 (g/min) (2) **But if answer incorrect** 25/5 **or** 5/10 or 5 (1)	2	
	Total	**4**	

Question	Answer	Marks	Guidance
9 a i	hydrogen (1)	1	**allow** H_2
a ii	hydrogen + oxygen → water(1)	1	**allow** $H_2 + O_2 \rightarrow H_2O$ (unbalanced) **allow** mix of correct formulae and words **allow** = instead of → **not** and or & instead of + **not** energy or heat in the equation
b	**any two from** release electricity (1) releases heat (1) releases energy (1) makes water (1) makes non polluting product (1) lightweight (1) compact (1) no moving parts (1)	2	**allow** makes power (1) **allow** does not cause pollution / less pollution (1) **allow** doesn't take up much room (1)
	Total	**4**	

Question	Answer	Marks	Guidance
10	**[Level 3]** Candidates gives a description of **both** methods that includes ideas about excluding **water** and **oxygen and** describes galvanising using ideas about **zinc** **AND** a full explanation of why zinc works. Quality of written communication does not impede communication of the science at this level. (5 – 6 marks) **[Level 2]** Candidates give a description of **both** methods that includes ideas about excluding **water** and **oxygen** and describes galvanising using ideas about **zinc** or a **more reactive metal** **OR** a full explanation of why galvanising works. Quality of written communication partly impedes communication of the science at this level. (3 – 4 marks) **[Level 1]** Candidates give a basic description for **one** method that may not mention **zinc** or **wate**r or **oxygen** **OR** states that air/oxygen or water needed for rusting. Quality of communication impedes communication of the science at this level. (1 – 2 marks) **[Level 0]** Insufficient or irrelevant science such as repeating the question. Answer not worthy of credit. (0 marks)	6	**This question is targeted up to grade C** **Indicative marking points include;** **Indicative scientific points about how galvanising works: that may be included :** **description** • iron covered with **zinc** or **more reactive metal** • **zinc** excludes oxygen and water from surface of iron • **zinc** stops iron reacting with water and oxygen **explanation** • **zinc** acts as sacrificial metal. • **zinc** is more reactive than iron **Indicative scientific points about how painting works that may be included :** **description** • (paint / zinc / galvanising) forms a barrier • excludes oxygen and water from surface of iron **Indicative scientific points about rusting that may be included :** • air or oxygen needed for rusting. • water is needed for rusting **Use the L1, L2, L3 annotations in Scoris. Do not use ticks.**
	Total	**6**	

Question	Answer	Marks	Guidance
11 a	(idea of) moving charges (carriers) (1) (idea of) electrons (1) **but** electrons move (2)	2	**allow** flow of charge (1) **allow** flow of electrons (2)
b	variable resistor (1)	1	**allow** correct answer ticked, circled or underlined in list if answer line is blank
c i	amps / amperes (1)	1	**if answer line blank allow correct answer in the table** **allow** coulombs per second (1) **ignore** just A
ii	$5.0 = \frac{2}{0.4}$ (2) **but if answer incorrect** identifies the current is 0.4 (1)	2	**allow** 2 = 5.0 x 0.4 (2)
iii	more current gives more resistance (1) temperature increase / gets hot / idea of more collisions (1)	2	**allow** less current gives less resistance (1)
	Total	**8**	

<table>
<tr><th>Question</th><th>Answer</th><th>Marks</th><th>Guidance</th></tr>
<tr><td>12 a</td><td>light intensity / brightness (1)</td><td>1</td><td>allow light level / amount of light / no light (1)
ignore just 'light'</td></tr>
<tr><td>b i</td><td>NOT (1)

warning circuit when temperature drops below a certain level /
light warning on a thermostat /
used to display temperature values on a refrigerator (1)</td><td>2</td><td>

allow any sensible suggestion to control something when cold (1)
ignore to check temperature
ignore just 'turns on when cold' / 'turns of when hot'</td></tr>
<tr><td>ii</td><td><table><tr><th>Input</th><th>output</th></tr><tr><td>0</td><td>1</td></tr><tr><td>1</td><td>0</td></tr></table> (1)</td><td>1</td><td>allow<table><tr><th>Input</th><th>output</th></tr><tr><td>1</td><td>0</td></tr><tr><td>0</td><td>1</td></tr></table>(1)</td></tr>
<tr><td>c</td><td>idea that (diodes) only allow current one way / AW (1)</td><td>1</td><td>ignore current flows the wrong way</td></tr>
<tr><td>d</td><td>idea of relay as a switch (1)

smaller current (in logic circuit) / ORA (1)</td><td>2</td><td>

allow the idea that a small current switches to a larger current scores (2)</td></tr>
<tr><td></td><td>Total</td><td>7</td><td></td></tr>
</table>

Question	Answer	Marks	Guidance
13 a	**D** (1)	1	**allow** correct answer ticked, circled or underlined if no answer on answer line
b	**A** (and) **B** (1)	1	both required in either order **allow** correct answer ticked, circled or underlined if no answer on answer line
	Total	**2**	

Question	Answer	Marks	Guidance
14 a	wire / coil has a magnetic field (1) interaction between fields (1)	2	**allow** wire / coil is magnetic (1) **ignore** magnets create magnetic field **allow** idea there is a force causing the movement (1) **allow** there are two magnetic fields (1)
b	**Level 3: (5 – 6 marks)** Answer recognises the effect of doubling the turns **and** that the effect of halving the current compensates for this. Quality of written communication does not impede communication of the science at this level. **Level 2: (3 – 4 marks)** Answer recognises the effect of more turns **and** the effect of reducing or increasing the current. Quality of written communication partly impedes communication of the science at this level. **Level 1: (1 – 2 marks)** Answer recognises the effect of more turns **or** changing the current. Quality of written communication impedes communication of the science at this level. **Level 0: (0 marks)** Insufficient or irrelevant science. Answer not worthy of credit.	6	**This question is targeted up to grade C** **Indicative scientific points may include:** **Level 3:** • doubling the number of turns doubles the speed • to keep the speed the same he must have halved the current • changes cancel each other out. **Level 2 or Level 1:** **Effect of changing the number of turns** • more turns = more speed **Effect of changing the current** • Matt must have reduced the current • reducing current = less speed • increasing current = more speed. **Use the L1, L2, L3 annotations in Scoris; do not use ticks.**
	Total	**8**	

Question	Answer	Marks	Guidance
15 a i	North America (1)	1	
ii	3.449 / 3.45 (1)	1	**allow** 3.4 but not 3.5
iii	**Garry:** 28.2 in North America v 15.9 in South America (1) **Susie:** S.A uses less biofuels, they provide a greater % of their energy than N.A. use provides (1) **but** N.A uses 1.27 (%) and S.A uses 2.79 (%)(2)	3	**allow** NA use 12.3 more (1) **allow** N.A = 1.273 (%) S.A = 2.789 (%) (2)
b	600 (1)	1	
c i	growing sugar beet is better (no mark) growing sugar beet = 40 unit saving (1) grassland takes up 30 units (1)	2	If answer states that grassland is better then zero marks sugar beet saves 10 units more than grassland takes in (2) **allow** answers that refer to greater than 10 saving due to the need to burn fossil fuels rather than biofuels.
ii	forests take up 170 (units per km^2) of carbon dioxide (1) grassland takes up 30 (units per km^2) of carbon dioxide (1) **BUT** forests take up 140 (units per km^2) more carbon dioxide than grasslands (2)	2	**allow** forests take up more / most carbon dioxide (1) **ignore** idea that there will be more carbon dioxide in atmosphere
		10	

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