OCR
Oxford Cambridge and RSA

GCSE

Additional Science B

Unit **B722/01:** Modules B4, C4, P4 (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.

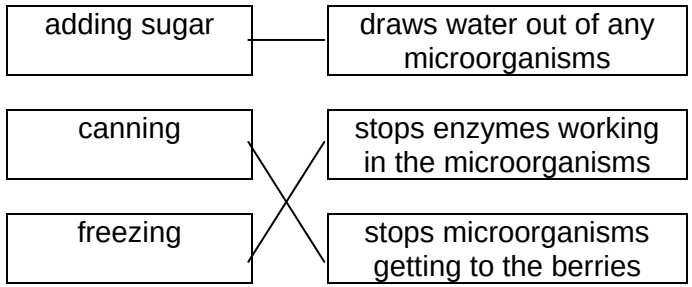
OCR will not enter into any discussion or correspondence in connection with this mark scheme.

Annotations

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.

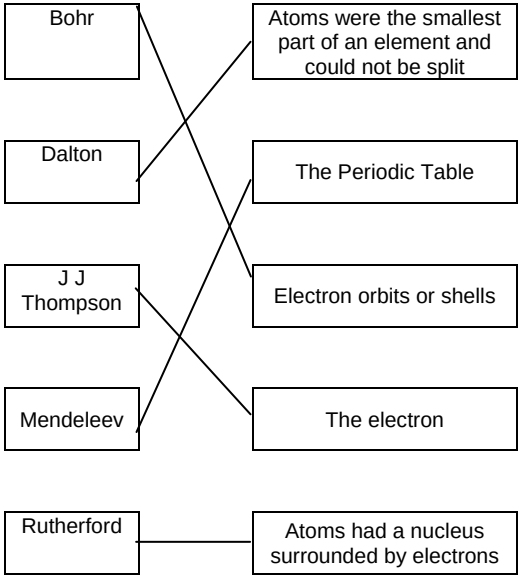
/	=	alternative and acceptable answers for the same marking point
(1)	=	separates marking points
allow	=	answers that can be accepted
not	=	answers which are not worthy of credit
reject	=	answers which are not worthy of credit
ignore	=	statements which are irrelevant
( )	=	words which are not essential 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

Question	Answer	Marks	Guidance
1 a	fertiliser (1)	1	
b	to stop them rotting / decaying / decomposing (1)	1	**allow** idea of stopping bacteria or fungi or microorganisms growing (1) **ignore** going bad / mouldy
c		2	all correct (2) one or two correct (1)
	Total	**4**	

Question	Answer	Marks	Guidance
2 a i	**Any two from:** they feed on them (1) use to build nests / habitat destroyed (1) use as cover (1) place to breed (1) shelter (1)	2	**allow** if no insects, no food for birds or bats / idea that food chain is broken (1) **allow** idea of insects or birds or bats live in trees (1) **allow** idea of protection from predators (1)
ii	idea that they feed on dead material (1)	1	**not** references to detritivores feeding
iii	**Any three from:** population is all (the organisms of) one species living in the same habitat (1) community is all the organisms / species / populations living in the same habitat (1) community is all the organisms living in the ash woodland (1) population is all the ash trees or horseshoe bats or thorn moths or woodpeckers (1)	3	**allow** all the same type of organism living in the same area (1) **not** the number of species need reference to same habitat or area at least once for marking points one or two
iv	lake (1)	1	**allow** correct answer ticked, circled or underlined in list if answer line is blank
b	leaves will not get any water / minerals (1) idea that photosynthesis will stop / they will not be able to make any food (1)	2	**allow** idea that leaves need water (to survive) (1) **allow** xylem transports water (1) **allow** idea that transpiration will stop **allow** idea that water is needed for photosynthesis
c	possible (1) because it is American ash (1)	2	**Mark independently** **allow** American ash indicated on the key (1)
	Total	**11**	

Question	Answer	Marks	Guidance
3 a	**any two from:** wild catch increased (at the start) (1) wild catch has now levelled off (after about 1990) (1) farmed fish is continuing to increase (1) farmed fish has increased much more since about 1980 (1) wild catch is higher than farmed fish (1) wild catch fluctuates (more than farmed fish catch) (1) total amount of fish eaten has increased (1)	2	**allow** wild catch is most commonly eaten / ora (1)
b	80 (million tons) (1)	1	**allow** 78 – 82 (1)
c	hydroponics: ; intensive: ✓ ; native: ; organic: (1)	1	
	Total	**4**	

Question	Answer	Marks	Guidance
4	**[Level 3]** **Answer includes an appreciation that photosynthesis is happening in the light or clear bottle** **AND** **photosynthesis produces oxygen** **AND** **respiration (in the dark bottle) decreases oxygen levels** Quality of written communication does not impede communication of the science at this level. (5 – 6 marks) **[Level 2]** **Answer includes an appreciation that photosynthesis is happening in the light or clear bottle** **OR** **photosynthesis or green plants produce oxygen** **OR** **respiration (in the dark bottle) decreases oxygen levels** Quality of written communication partly impedes communication of the science at this level. (3 – 4 marks) **[Level 1]** **Answer includes some understanding that the greenness is plants** **OR** **that (sun)light affects the amount of oxygen** **OR** **describe how oxygen level changes in both bottles** There may be limited use of specialist terms. 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 C** **Indicative scientific points at levels 2 & 3 may include:** • Photosynthesis needs light to occur • Photosynthesis or green plants releases oxygen • Respiration uses up oxygen **Indicative scientific points at level 1 may include:** • The green is due to plants • Oxygen increases when there is sunlight • Oxygen levels increase in clear bottle • Oxygen level in the dark bottle drops **Use L1, L2 and L3 annotations in RM Assessor; do not use ticks in this question.**
	Total	**6**	

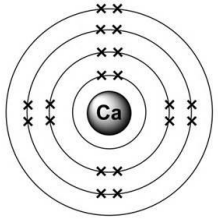
Question	Answer	Marks	Guidance
5 a		3	**all five** correct (3) **three or four** correct (2) **one or two** correct (1)
b	idea of more evidence / experiments showed that earlier theories were incorrect (1)	1	**allow** idea that more experiments have been carried out (1) **allow** better equipment or technology available (1) **allow** idea that more scientists looked at the evidence (1)
	Total	**4**	

Question	Answer	Marks	Guidance
6	**[Level 3]** **Clearly explains why O_2 is a molecule** **AND** **Clearly explains why CaO is a compound** **AND** **Constructs the correct balanced symbol equation** Quality of written communication does not impede communication of the science at this level (5 – 6 marks) **[Level 2]** **Clearly explains why O_2 is a molecule <u>and</u> clearly explains why CaO is a compound** **OR** **Constructs the correct balanced symbol equation** Quality of written communication partly impedes communication of the science at this level (3 – 4 marks) **[Level 1]** **Clearly explains why O_2 is a molecule** **OR** **Clearly explains why CaO is a compound** **OR** **Constructs the unbalanced symbol equation** 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 C.** **Indicative scientific points at level 3 must include:** • $2Ca + O_2 \rightarrow 2CaO$ or any other correct multiple **Relevant points at levels 1 and 2 could include** • CaO is a compound because it contains two elements chemically bonded • CaO is a compound because (formula) has more than one element chemically bonded • CaO is a compound because it contains calcium and oxygen chemically bonded • CaO is a compound because (formula) has two different symbols **not** CaO is a compound because it is a **mixture** of calcium and oxygen or two elements • O_2 has two **atoms** bonded together • O_2 has two oxygen **atoms** bonded together **not** O_2 is a molecule because it is one (type of) atom • Unbalanced symbol equation: eg $Ca + O_2 \rightarrow CaO$ ie symbols / formulae need to be correct **Use the L1, L2, L3 annotations in RM Assessor; do not use ticks.**
	Total	**6**	

Question	Answer	Marks	Guidance
7 a	(yes because) (potassium gives a) lilac flame (in the flame test) (1) (iodide because a) pale yellow precipitate (with silver nitrate) (1)	2	**no marks for just saying yes – marks are for explanation** **if no, 0 for question** **allow** result from test 2 shows that it contains potassium (1) **allow** result from test 5 shows that it contains iodide (1)
b	**any three from:** idea of use a (flame test) wire (1) dip wire into solution / dip wire into solid (1) put wire or substance into a (blue Bunsen) flame (1) observe the colour of the flame (1)	3	**marks can be awarded from a labelled diagram** **if heating in a test tube / beaker etc scores 0 for question** **allow** use a wooden splint / spray solution (1)
	Total	**5**	

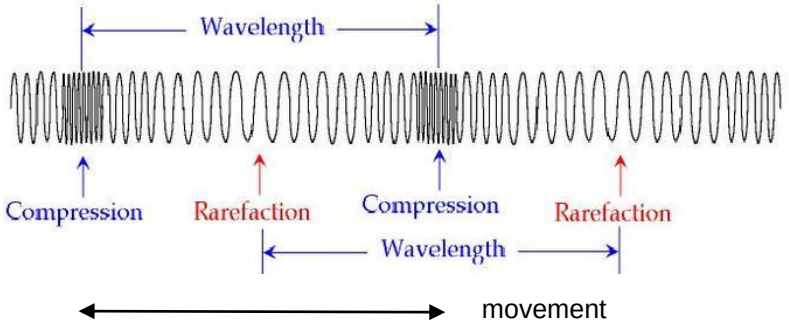
Question	Answer	Marks	Guidance
8 a	zinc oxide (1)	1	**allow** zinc oxide circled or underlined in the equation if answer line is blank
b	0.88 (g) (1) a gas escapes / carbon dioxide is made (1)	2	**unit not required** **not** the name of a wrong gas being evolved
c	3 (1)	1	**ignore** Zn, C and O / zinc, carbon and oxygen
	Total	**4**	

Question	Answer	Marks	Guidance
9 a	**any two from:** very reactive (1) reacts with oxygen / reacts with air (1) reacts with water (1)	2	 **allow** idea of preventing reaction with oxygen / air (1) **allow** idea of preventing reaction with water (1) **allow two marks** for reacts with moist air or with damp air **allow** they do not react with oil (1)
b	rubidium / caesium / francium (1)	1	**allow** Rb / Cs / Fr (1) **ignore** lithium / sodium / potassium
	Total	**3**	

Question	Answer	Marks	Guidance
10 a	20 (1)	1	
b	4 (1) idea that there are four sets of numbers (in the electronic structure) (1)	2	**allow** correct diagram showing electronic structure 
	Total	**3**	

Question	Answer	Marks	Guidance
11 a	positive **and** negative (1)	1	**both required for the mark** **allow either order**
b	 aluminium foil is not an insulator / aluminium is a conductor (1) (so) **balloon** does not becomes charged (1)	2	**Assume unqualified answer refers to the balloon** **allow** idea that aluminium cannot become charged (1) **allow** electrons do not transfer to or from the balloon (1)
c	**any one from:** defibrillator (1) (dust) precipitator (1) paint or crop **spraying** (1)	1	**allow** to jump start a heart / to remove dust from chimneys / electrostatic duster / printer / photocopier (1) **ignore** just painting
	Total	**4**	

Question	Answer	Marks	Guidance
12 a	2.5 (Ω) (2) **but if incorrect** $\frac{5}{2}$ (1)	2	
b	40 (cm) (2) **but if incorrect allow the idea of:** 2/5ths of 100 (1) **or** 0.05 ohms/cm (1)	2	
	Total	**4**	

Question	Answer	Marks	Guidance
13	**[Level 3]** **Correctly labels 3 features** **AND** **gives a similarity <u>and</u> a difference** Quality of written communication does not impede communication of the science at this level (5 – 6 marks) **[Level 2]** **Correctly labels 1 or 2 features** **AND** **gives a similarity <u>or</u> a difference** Quality of written communication partly impedes communication of the science at this level (3 – 4 marks) **[Level 1]** **Correctly labels 1 or 2 features** **OR** **gives a similarity <u>or</u> a difference** 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 may include:** **Similarities**: • coils vibrate / oscillate / move • both waves transfer energy **Differences**: • transverse (or Fig 13.1) up and down and longitudinal (or Fig 13.2) movement side to side • wavelength shorter (in longitudinal wave or Fig 13.2) / ora • transverse (or Fig 13.1) has crests / troughs or longitudinal (or Fig 13.2) has compressions / rarefactions **Features**: • wavelength **labelled** • movement **labelled** • compression **labelled** • rarefaction **labelled**  **Use the L1, L2, L3 annotations in RM Assessor; do not use ticks.**
	Total	**6**	

<table>
<tr><th>Question</th><th>Answer</th><th>Marks</th><th>Guidance</th></tr>
<tr><td>14 a</td><td>A (1)

idea that half-life is time to reduce count rate to half its original value /
idea that half-life is time taken to reduce to 3000 (1)

BUT idea that A reaches half its original value (3000) in a shorter time than the others (2)</td><td>3</td><td>If A not chosen, 0 for question

allow time for activity to halve / time for half the mass of isotope to decay / time for half the atoms or nuclei to decay (1)

ignore time to give out half the radiation / half of the time taken for the substance to decay
ignore time for half the atom or nucleus to decay
ignore just it has the shortest half-life (in stem of question)

allow detail from the graphs
eg reaches half original value
between 20 and 30 sec for A
40 and 50 sec for B
60 and 70 sec for C (1)
allow it has the steepest gradient at the start (1)

eg A’s activity halves in the shortest time (3)
ignore faster or quicker time</td></tr>
<tr><td>b</td><td>nucleus (1)</td><td>1</td><td>allow phonetic spelling (1)</td></tr>
<tr><td>c</td><td><table><tr><th>statement</th><th>opinion</th><th>fact …</th></tr><tr><td>… waste …</td><td></td><td>✓</td></tr><tr><td>… ionises …</td><td></td><td>✓</td></tr><tr><td>… better than …</td><td>✓</td><td></td></tr><tr><td>… eyesore …</td><td>✓</td><td></td></tr><tr><td>Uranium nuclei …</td><td></td><td>✓</td></tr></table>(2)</td><td>2</td><td>all correct (2)
3 or 4 correct scores (1)
0, 1 or 2 correct (0)

more than one tick on any row negates a mark</td></tr>
<tr><td></td><td>Total</td><td>6</td><td></td></tr>
</table>

Question	Answer	Marks	Guidance
15 a	Statement 1 - correct or Statement 2 – correct **AND** Statement 3 - incorrect (1)	3	
	(statement 1 and / or statement 2) – gamma can get through body (1)		**allow** idea that gamma can be detected outside the body (1)
	(statement 3) – radioactivity will reduce (over time) (1)		**allow** idea that drink / source has a short half-life (1) **allow** idea that they would not give the drink if it was dangerous (1)
b	**any two from:** similar wavelength / frequency (1) both electromagnetic (1) both ionising (1) same speed (1)	2	**allow** idea that both damage living cells (1) if no other mark awarded, **allow** idea that both penetrate skin (1)
	Total	**5**	

<table>
<tr><th>Question</th><th>Answer</th><th>Marks</th><th>Guidance</th></tr>
<tr><td>16 a i</td><td>October (1)

the energy in sugars drops most (in that month) / photosynthesis drops most (1)</td><td>2</td><td>Second marking point is dependent on the first

allow the graph drops most or rapidly in that month (1)</td></tr>
<tr><td>ii</td><td>1000 (kJ)</td><td>1</td><td></td></tr>
<tr><td>b i</td><td>any two from:
same month / time of the year / both in July (1)
same place / area of forest (1)
same area of tree (1)</td><td>2</td><td>ignore same brightness or intensity of sun

allow same environment / habitat (1)</td></tr>
<tr><td>ii</td><td>(No, it) trapped the same amount (1)

32 000 (1)</td><td>2</td><td>allow no, both trapped 32 000 for (2)

allow 32 000 written in table (1)</td></tr>
<tr><td>c</td><td>5(%) (2)

but, if answer incorrect

1600/32000 x 100 (1)</td><td>2</td><td>allow 0.05 (1)</td></tr>
<tr><td>d</td><td><table><tr><td>The evergreen tree has more efficient photosynthesis because it traps more light.</td><td></td></tr><tr><td>The evergreen tree has more efficient photosynthesis because it uses the trapped light more efficiently.</td><td></td></tr><tr><td>The deciduous tree has more efficient photosynthesis because it traps more light.</td><td></td></tr><tr><td>The deciduous tree has more efficient photosynthesis because it uses the trapped light more efficiently.</td><td>✓</td></tr></table></td><td>1</td><td>More than one tick scores 0</td></tr>
<tr><td></td><td>Total</td><td>10</td><td></td></tr>
</table>

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
Telephone: 01223 552552
Facsimile: 01223 552553