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 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.

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

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	adding light ☐ adding oxygen ☐ adding sugar ✓ adding vinegar ✓ adding water ☐ (2)	2	**one mark** for each tick in the correct box if **one incorrect** box ticked maximum of **one** mark if **two or more incorrect** boxes ticked **no** marks for the question
b	compost (1)	1	**allow** other unambiguous indication, e.g. underlining more than one answer = 0 marks
c	bacteria (1) fungi (1)	2	**allow** microorganisms / microbes (1) **ignore** detritivores / worms **ignore** germs **allow** decomposers (1) if no other mark awarded
	Total	**5**	

Question	Answer	Marks	Guidance
2 a	**B** (1) **plus any two from** idea that its temperature range includes that of the glasshouse / AW (1) idea that its humidity range includes that of the glasshouse / AW (1) eats **highest** number of mites (1)	3	**If C or D chosen then award zero marks for the question** **ignore** just quoting of temperature figures; answer needs to refer to glasshouse **ignore** just quoting of humidity figures; answer needs to refer to glasshouse **allow A** (1) and idea that its temperature range includes that of the glasshouse / AW (1) ie **MAX 2 for A**
b	adding pesticides ☐ battery farming ☐ biological control ✓ crop rotation ☐ hydroponics ☐ (1)	1	

<table>
<tr><th>Question</th><th>Answer</th><th>Marks</th><th>Guidance</th></tr>
<tr><td>c</td><td>(organic farming methods:)

do not use (artificial) fertilisers (1)

do not use pesticides / insecticides (1)

do not use fungicides / herbicides (1)</td><td>2</td><td>assume unqualified answers refer to organic farming methods

allow do not use chemicals if fertilisers / pesticides / insecticides / fungicides / herbicides not mentioned (1)
not few or less fertilisers / pesticides / insecticides / fungicides / herbicides /

allow reverse arguments applying to intensive farming methods
allow intensive farming methods are trying to produce as much food from the land / animals / plants as possible / AW (1)

allow additional marking points:
are not trying to produce as much food from the land / animals / plants as possible / AW (1)
use animal manure / compost (1)
use crop rotation (1)
use weeding (1)
vary seed planting times (1)
use predator species (as pesticides) / biological control (1)

ignore references to cost</td></tr>
<tr><td>d</td><td><table><tr><th>Could be tested scientifically</th><th>Just an opinion</th></tr><tr><td>✓</td><td></td></tr><tr><td></td><td>✓</td></tr><tr><td>✓</td><td></td></tr><tr><td>✓</td><td></td></tr></table>
4 correct ticks (2)
2 or 3 correct ticks (1)</td><td>2</td><td>if both boxes on a line are ticked then do not credit the correct tick on that line</td></tr>
<tr><td></td><td>Total</td><td>8</td><td></td></tr>
</table>

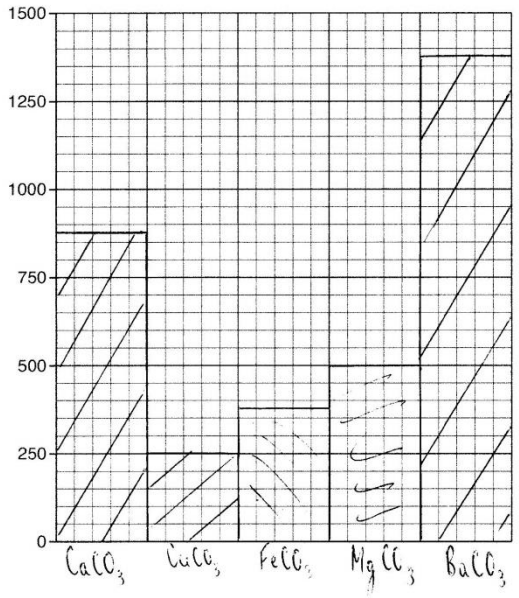
Question	Answer	Marks	Guidance
3	**Level 3** **Identifies parts of the plant involved in drooping** **AND** **identifies AND explains processes involved** Quality of written communication does not impede communication of the science at this level. (5 – 6 marks) **Level 2** **Identifies parts of the plant involved in drooping and links to a process or explanation** **OR** **identifies and explains a process involved in drooping** **OR** **identifies processes involved in drooping** Quality of written communication partly impedes communication of the science at this level. (3 – 4 marks) **Level 1** **Identifies a part of the plant involved in drooping** **OR** **identifies a process involved in drooping** **OR** **identifies that lack of water causes drooping / ORA** 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** **Processes involved:** • osmosis • turgor pressure • transpiration **Explanations**: • water moves by osmosis from an area of high water concentration (dilute) to an area of low water concentration (more concentrated) • wilting is caused by a lack of turgor pressure / cells are flaccid • turgor pressure inside cells is caused by water pressure acting against an inelastic cell wall / cells are turgid • transpiration is evaporation of water from the surface of a leaf (through stomata) • transpiration (stream) is the movement of water through the xylem • water travels up to the leaves through the xylem (vessels) **Parts of the plant:** • root (hairs) • xylem vessels • stomata • guard cells **Use the L1, L2, L3 annotations in RM Assessor; do not use ticks.**
	Total	**6**	

Question	Answer	Marks	Guidance
4 a	water / H_2O (1) all the minerals OR nitrate, phosphate and potassium (1)	2	 **allow** NPK (1) **ignore** fertiliser **ignore** other elements or compounds eg magnesium / CO_2
b	idea that **phosphate** needed for (normal) root growth (1) idea that **phosphate** needed for (normal) leaf colour / growth (1)	2	must make link to lack of phosphate if no other mark awarded, **allow** phosphate is needed for growth (of plant) (1) **allow higher level answers:** phosphate/phosphorous needed for DNA (1) phosphate/phosphorous needed for (cell) membranes (1)
c	(seedling in) test tube 1 / seedling 1 / normal solution (1) **plus any one from** has largest leaves / largest surface area of leaves (1) will absorb most light (1)	2	**allow** the tallest (1) **allow** idea that it has **all** the minerals or essential elements (1) **ignore** idea that it has **all** the nutrients **ignore** idea that it's the healthiest
	Total	**6**	

Question	Answer	Marks	Guidance
5 a	nucleus (1)	1	**A** **vllow** phonetic spelling
b	12 (1)	1	
c	24 (1)	1	
d	3 (1)	1	**ignore** 2.8.2
e	(atoms) having the same atomic number / same proton number / **atoms** of the same element (1) but different mass number / different number of nucleons / different number of neutrons (1)	2	 **ignore** different **relative** atomic mass
	Total	**6**	

Question	Answer	Marks	Guidance
6		2	**ignore yes / no**
	A is a chloride because it makes white (solid/ppt) (1)		**not** chloride because it makes white (solid/ppt) with silver nitrate and blue (solid) with sodium hydroxide **but** allow if blue (solid/ppt) with sodium hydroxide is linked to presence of copper
	B is not iron(III) since should give brown or rust (solid/ppt) / **B** contains iron(II) since it makes grey-green (solid/ppt) (1)		**not B** is not iron(III) since should go brown or rust with silver nitrate
			allow idea that conclusion for A is correct but conclusion for B is incorrect if no other mark scored (1)
	Total	**2**	

Question	Answer	Marks	Guidance
7 a i	copper carbonate → copper oxide + carbon dioxide (1)	1	**allow** = or ⇌ instead of arrow **not** and or & instead of + **allow** correct formulae instead of names – the equation does not have to be balanced. **allow** a mixture of names and **correct** formulae $CuCO_3 \rightarrow CuO + CO_2$
ii	(bubble through) lime water (1) goes milky / goes white (solid/ppt) (1)	2	**allow** calcium hydroxide (solution) **ignore** references to blowing air (through a straw) the second marking point is dependent on the correct reagent **allow** goes cloudy / goes misty

Question	Answer	Marks	Guidance
b	bar chart drawn or attempted (1) correct bars drawn or correct points plotted if line graph (1)	2	 **allow** ± ½ square **allow** bars / points in any correct order provided they are correctly labelled **BUT** if bars are not labelled assume the bars are in the order as in the question **allow** bars chart with or without gaps between the bars if line graph drawn points ignore any line joining points
	Total	**5**	

Question	Answer	Marks	Guidance
8	**Level 3** **Describes four physical properties of metals AND explains why iron or steel can be used to make saws** Quality of written communication does not impede communication of the science at this level. (5 – 6 marks) **Level 2** **Describes four physical properties of metals OR describes two physical properties of metals and attempts to explain why iron and steel are used to make saws** Quality of written communication partly impedes communication of the science at this level. (3 – 4 marks) **Level 1** **Describes two physical properties of metals OR attempts to explain why iron and steel are used to make saws** 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)		**This question is targeted at grades up to C.** **Indicative scientific points may include:** **Physical properties of metals** • good conductor of electricity • high boiling point • high melting point (**ignore** heat resistant) • high tensile strength / strong • malleable (**ignore** bendy / flexible) • lustrous / shiny • ductile / can be drawn into wires • sonorous **ignore** good conductor of heat / high density / hard (stem of question) **ignore** easy to shape or bend / durable / magnetic as properties **Explanation linked to use of iron or steel as a saw** • iron or steel is hard • iron or steel can be sharpened • iron is strong (so the saw won't break) **ignore** iron or steel is flexible **Use the L1, L2, L3 annotations in RM Assessor; do not use ticks.**
	Total	**6**	

Question	Answer	Marks	Guidance
9 a	silver (1)	1	**allow** Ag (1)
b	yes since it is in the middle or centre of the Periodic Table (1)	1	must have yes **and** explanation for the mark **allow** yes since it lies between Groups 2 and 3 in the Periodic Table (1) **allow** yes because it is not in a Group (1) **allow** yes because it lies between two named transition elements
	Total	**2**	

Question	Answer	Marks	Guidance
10 a	**chlorine** - kills microbes / sterilises water / making polymers or plastics e.g. PVC / making pesticides e.g. DDT (1) **iodine** – used to sterilise wounds (1)	2	**allow** used in **swimming** pools (1) **allow** (making) bleach (1) **ignore** idea of cleaning or purifying water **allow** used to sterilise medical instruments (1) **allow** used to test for starch (1) idea of used before surgery is insufficient
b	HC*l* (1) contains more than one atom and more than one element (1)	2	**allow** HC*l* ticked, circled or underlined in list if not referred to in answer (1) **allow** contains two **types** of atoms / contains hydrogen and chlorine atoms (1) **not** a mixture of atoms / elements or a mixture of hydrogen and chlorine
	Total	**4**	

Question	Answer	Marks	Guidance
11 a	measuring blood flow (1) scanning unborn babies (1)	2	**one mark** for each correct use if **one incorrect** use is ringed maximum of **one** mark if **two or more incorrect** uses are ringed **no** marks for the question
b i	**D** (1)	1	
ii	**C** (1)	1	
iii	**B** and **E** / **E** and **B** (1)	1	**both required**
c	**any two from:** ultrasound can't be heard (by humans) / ORA / AW (1) ultrasound is 20000 Hz / ultrasound is more than 20000 Hz / AW / ORA (1) ultrasound has a higher frequency / ORA (1) ultrasound has a shorter wavelength / ORA (1)	2	 **allow** ultrasound is above human threshold (1) **allow** humans can't hear above 20000Hz (2) **allow** 20 KHz for 20000 Hz
	Total	**7**	

Question	Answer	Marks	Guidance
12 a i	(called) **background** (radiation) (1) (radiation comes) from rocks / AW (1)	2	**ignore** from nuclear power stations **ignore** specific types of radiation eg alpha, beta, gamma **ignore** radon **allow** soil (1) **allow** cosmic rays (1) **ignore** outer space **ignore** (under)ground (stem of question)
ii	decay is random / radiation is random / AW (1)	1	**allow** decay varies / radiation or radioactivity varies (1) **but** 'readings vary' scores 0 **ignore idea that decay or radiation varies along the pipe**
iii	12 (1)	1	**ignore** units
b	**Level 3** **Sensible reference to a (radioactive) tracer in pipe** **AND** **an account of its radiation being tracked / use of a detector** **AND** **evidence of the use of data to make a valid conclusion.** Quality of written communication does not impede communication of the science at this level. (5 – 6 marks) **Level 2** **Sensible reference to a (radioactive) tracer in pipe** **OR** **an account of its radiation being tracked / use of a detector**	6	**This question is targeted up to grade C** **Indicative scientific points may include:** **Use of tracer** • tracer used / gamma use **Use of a detector** • idea of pipe / water / oil / radioactivity tracked (above ground / outside pipe) • idea of radiation from tracer or water or oil detected • idea of radiation passing through pipe / soil

	AND **evidence of the use of data to make a valid conclusion.** Quality of written communication partly impedes communication of the science at this level (3 – 4 marks) **Level 1** **Sensible reference to the simple use of a (radioactive) tracer** **OR** **sensible reference to the simple use of a detector** **OR** **evidence of the use of the data to make a valid conclusion** 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)		**Valid conclusion** • radiation peaks at 40 – 50m (**allow** 40 or 50m) • damage/ problem is at 40 – 50m (**allow** 40 or 50m) • falls to background after 50m • idea of radiation peaks where there is damage / problem **Use the L1, L2, L3 annotations in RM Assessor; do not use ticks.**
	Total	**10**	

Question	Answer	Marks	Guidance
13 a	idea of safety / idea of preventing electric shocks / protects the appliance (1)	1	**allow** higher level answers eg prevents electrical fires / prevents overheating (of the appliance or wires) / prevents more than 3A / prevents too much current / prevents too much power (1) **ignore** prevents too much electricity / to prevent explosion (1)
b	double insulated (1) does not need an earth wire / AW (1)	2	 **allow** does not need the green/yellow wire (1)
c	690 (1) **Units** – W / Watts (1)	2	 **allow** kW or (joules per second) ie J/s (1) 690 kW = 1 mark, but 0.69 kW = 2 marks
	Total	**5**	

Question	Answer	Marks	Guidance
14	(fuel used is) uranium (1) (source of) energy or heat or high temperatures (1) steam produced (1)	3	**MAX 2 marks if uranium not mentioned** **allow** higher level answers e.g. nuclear reaction / fission reaction (1) **but** nuclear reaction produces heat / fission reaction produces heat (2) water heated (by energy source) to produce steam (2) steam drives turbine (2) turbine turns generator (2)
	Total	**3**	

Question	Answer	Marks	Guidance
15 a i	lung (1)	1	
ii	2000 (2) but if 500 seen (ie correct reading from graph) (1)	2	
b	cells at the site of the tumour receive the same dose (1) (surrounding) tissue receives higher dose with method **A** (1)	2	**figures quoted from the diagram must be qualified** **allow** ORA: eg cells surrounding the tumour receive lower dose with method **B** (1) **allow** idea that **A** gives a wider spread of radiation **allow** in method **A** total amount of radiation is more (1) if no other mark awarded
c i	**any two from:** to make the results more reliable (1) so that any differences are more likely to show up (1) idea of eliminating any chance / random differences (1) idea that any differences will be significant (1)	2	**ignore** to make the results more accurate
ii	idea that each group had patients that were equally ill (1)	1	
iii	idea that method **B** results in more deaths (from diseases such as cancers elsewhere in the body) / ORA (1) smaller dose to surrounding area allows cells to spread / replicate / reproduce (1)	2	**ignore** just figures quoted from the table, unless comparative eg **allow** method **A** results in **only** 12 deaths **allow** method **A** is **more** successful (than method **B**)
	Total	**10**	

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