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INTERNATIONAL GCSE COMBINED SCIENCE 9204/BE

Paper 1 Biology Extension

Mark scheme

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2 3 6 Y 9 2 0 4 / B E / M S

Mark schemes are prepared by the Lead Assessment Writer and considered, together with the relevant questions, by a panel of subject teachers. This mark scheme includes any amendments made at the standardisation events which all associates participate in and is the scheme which was used by them in this examination. The standardisation process ensures that the mark scheme covers the students' responses to questions and that every associate understands and applies it in the same correct way. As preparation for standardisation each associate analyses a number of students' scripts. Alternative answers not already covered by the mark scheme are discussed and legislated for. If, after the standardisation process, associates encounter unusual answers which have not been raised they are required to refer these to the Lead Examiner.

It must be stressed that a mark scheme is a working document, in many cases further developed and expanded on the basis of students' reactions to a particular paper. Assumptions about future mark schemes on the basis of one year's document should be avoided; whilst the guiding principles of assessment remain constant, details will change, depending on the content of a particular examination paper.

Further copies of this mark scheme are available from [oxfordaqaexams.org.uk](https://www.oxfordaqaexams.org.uk)

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Level of response marking instructions

Level of response mark schemes are broken down into levels, each of which has a descriptor. The descriptor for the level shows the average performance for the level. There are marks in each level.

Before you apply the mark scheme to a student's answer read through the answer and annotate it (as instructed) to show the qualities that are being looked for. You can then apply the mark scheme.

Step 1 Determine a level

Start at the lowest level of the mark scheme and use it as a ladder to see whether the answer meets the descriptor for that level. The descriptor for the level indicates the different qualities that might be seen in the student's answer for that level. If it meets the lowest level then go to the next one and decide if it meets this level, and so on, until you have a match between the level descriptor and the answer. With practice and familiarity you will find that for better answers you will be able to quickly skip through the lower levels of the mark scheme.

When assigning a level you should look at the overall quality of the answer and not look to pick holes in small and specific parts of the answer where the student has not performed quite as well as the rest. If the answer covers different aspects of different levels of the mark scheme you should use a best fit approach for defining the level and then use the variability of the response to help decide the mark within the level, ie if the response is predominantly level 3 with a small amount of level 4 material it would be placed in level 3 but be awarded a mark near the top of the level because of the level 4 content.

Step 2 Determine a mark

Once you have assigned a level you need to decide on the mark. The descriptors on how to allocate marks can help with this. The exemplar materials used during standardisation will help. There will be an answer in the standardising materials which will correspond with each level of the mark scheme. This answer will have been awarded a mark by the Lead Examiner. You can compare the student's answer with the example to determine if it is the same standard, better or worse than the example. You can then use this to allocate a mark for the answer based on the Lead Examiner's mark on the example.

You may well need to read back through the answer as you apply the mark scheme to clarify points and assure yourself that the level and the mark are appropriate.

Indicative content in the mark scheme is provided as a guide for examiners. It is not intended to be exhaustive and you must credit other valid points. Students do not have to cover all of the points mentioned in the Indicative content to reach the highest level of the mark scheme.

An answer which contains nothing of relevance to the question must be awarded no marks.

Information to Examiners

1. General

The mark scheme for each question shows:

- the marks available for each part of the question
- the total marks available for the question
- the typical answer or answers which are expected
- extra information to help the Examiner make his or her judgement
- the Assessment Objectives, level of demand and specification content that each question is intended to cover.

The extra information is aligned to the appropriate answer in the left-hand part of the mark scheme and should only be applied to that item in the mark scheme.

At the beginning of a part of a question a reminder may be given, for example: where consequential marking needs to be considered in a calculation; or the answer may be on the diagram or at a different place on the script.

In general the right-hand side of the mark scheme is there to provide those extra details which confuse the main part of the mark scheme yet may be helpful in ensuring that marking is straightforward and consistent.

2. Emboldening and underlining

- 2.1** In a list of acceptable answers where more than one mark is available ‘any **two** from’ is used, with the number of marks emboldened. Each of the following bullet points is a potential mark.
- 2.2** A bold **and** is used to indicate that both parts of the answer are required to award the mark.
- 2.3** Alternative answers acceptable for a mark are indicated by the use of **or**. Different terms in the mark scheme are shown by a / ; eg allow smooth/free movement.
- 2.4** Any wording that is underlined is essential for the marking point to be awarded.

3. Marking points

3.1 Marking of lists

This applies to questions requiring a set number of responses, but for which students have provided extra responses. The general principle to be followed in such a situation is that ‘right + wrong = wrong’.

Each error/contradiction negates each correct response. So, if the number of errors/contradictions equals or exceeds the number of marks available for the question, no marks can be awarded.

However, responses considered to be neutral (indicated as * in example 1) are not penalised.

Example 1: What is the pH of an acidic solution?

[1 mark]

Student	Response	Marks awarded
1	green, 5	0
2	red*, 5	1
3	red*, 8	0

Example 2: Name two planets in the solar system.

[2 marks]

Student	Response	Marks awarded
1	Neptune, Mars, Moon	1
2	Neptune, Sun, Mars, Moon	0

3.2 Use of chemical symbols/formulae

If a student writes a chemical symbol/formula instead of a required chemical name, full credit can be given if the symbol/formula is correct and if, in the context of the question, such action is appropriate.

3.3 Marking procedure for calculations

Marks should be awarded for each stage of the calculation completed correctly, as students are instructed to show their working. Full marks can, however, be given for a correct numerical answer, without any working shown.

3.4 Interpretation of 'it'

Answers using the word 'it' should be given credit only if it is clear that the 'it' refers to the correct subject.

3.5 Errors carried forward

Any error in the answers to a structured question should be penalised once only.

Papers should be constructed in such a way that the number of times errors can be carried forward is kept to a minimum. Allowances for errors carried forward are most likely to be restricted to calculation questions and should be shown by the abbreviation ecf in the marking scheme.

3.6 Phonetic spelling

The phonetic spelling of correct scientific terminology should be credited **unless** there is a possible confusion with another technical term.

3.7 Brackets

(.....) are used to indicate information which is not essential for the mark to be awarded but is included to help the examiner identify the sense of the answer required.

3.8 Allow

In the mark scheme additional information, 'allow' is used to indicate creditworthy alternative answers.

3.9 Ignore

Ignore is used when the information given is irrelevant to the question or not enough to gain the marking point. Any further correct amplification could gain the marking point.

3.10 Do not accept

Do **not** accept means that this is a wrong answer which, even if the correct answer is given as well, will still mean that the mark is not awarded.

Question	Answers	Extra information	Mark	AO / Spec. Ref.
01.1	10 (mm)	allow a tolerance of +/- 0.5 mm	1	AO2 3.3.2.d 6.3.1
	3 (mm)	if no other mark awarded allow 1 mark for 1 cm and 0.3 cm	1	

Question	Answers	Extra information	Mark	AO / Spec. Ref.
01.2 Mark with 01.1	image length = 50 (mm)	allow a tolerance of +/- 2 mm allow ecf from 01.1	1	AO2 3.3.2.d 6.3.10
	$\frac{50}{10} = (\times) 5$		1	

Question	Answers	Extra information	Mark	AO / Spec. Ref.
01.3	any one similarity from: • both have antenna • both have segments • both have cercus	allow reference to relative size of legs	1	AO2 3.3.2.d
	any one difference from: • head / body shape • cercus shape • number of segments • number / arrangement / distribution of legs • length of antenna (compared to body size)		1	

Question	Answers	Extra information	Mark	AO / Spec. Ref.
01.4	(woodlice adapted to) damp / humid (conditions)		1	AO3 3.3.2.d
	(woodlice adapted to) dark (conditions)		1	

Question	Answers	Extra information	Mark	AO / Spec. Ref.
01.5	any two from: • (different) temperature • rain / damp • (different) humidity • wind speed • brightness of sunlight • (different) time of day • presence / absence of decaying leaves • (new) predator	allow 1 mark for weather /season if no other mark awarded	2	AO3 3.3.2.d

Question	Answers	Mark	AO / Spec. Ref.
01.6	Level 2: Scientifically relevant events are identified and given in detail to form an accurate account.	3–4	AO4 3.3.2.d
	Level 1: Scientifically relevant events are identified and simply stated but their relevance is not clear.	1–2	
	No relevant content.	0	
	Indicative content • at least 10 woodlice or large sample of woodlice to show preferences • black paper (secured with tape) over one / two sections to give dark conditions • water in one / two section to give humid conditions • four different conditions (light and dry; light and humid; dark and dry; dark and humid) • sections in base to separate different conditions • platform allows woodlice to move to appropriate position • platform allows variation in humidity • position of most woodlice indicates preferred conditions		

Total		14
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Question	Answers	Extra information	Mark	AO / Spec. Ref.
02.1	no nucleus		1	AO2 3.2.2.j
	so space for more haemoglobin	allow contains lots of haemoglobin alternative routes biconcave shape (1) so large surface area (1) OR large surface area (1) for rapid diffusion (of oxygen into the cell) (1)	1	

Question	Answers	Extra information	Mark	AO / Spec. Ref.
02.2	<u>oxyhaemoglobin</u>	allow HbO ₈	1	AO1 3.2.2.j

Question	Answers	Extra information	Mark	AO / Spec. Ref.
02.3	aerobic	do not accept anaerobic	1	AO1 3.2.5.a

Question	Answers	Extra information	Mark	AO / Spec. Ref.
02.4	no / less oxygen (transported) to (brain) cells		1	AO2 3.2.2.j
	so no / less (aerobic) respiration (in brain cells)		1	
	so brain cells do not have enough energy	do not accept energy made / produced / created	1	

Question	Answers	Extra information	Mark	AO / Spec. Ref.
02.5	a network (of fibres) forms	ignore scab allow a mesh (of fibres) forms	1	AO1 3.2.2.m
	blood cells are trapped	allow blood clots	1	

Question	Answers	Extra information	Mark	AO / Spec. Ref.
02.6	(female) 2 (male) 1		1	AO2 3.5.3.d

Question	Answers	Extra information	Mark	AO / Spec. Ref.
02.7	female could have another H allele (on the other X chromosome) males only have one X chromosome so cannot also have an H allele	allow heterozygous female (also) has H allow males have Y chromosome so only have one H / h allele	1 1	AO2 3.5.3.d/g

Total			12
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Question	Answers	Extra information	Mark	AO / Spec. Ref.
03.1	automatic	allow involuntary	1	AO1 3.4.1.c
	rapid		1	

Question	Answers	Extra information	Mark	AO / Spec. Ref.
03.2	protects (the body) from damage	allow to protect the body	1	AO2 3.4.1.d

Question	Answers	Extra information	Mark	AO / Spec. Ref.
03.3	(Y) relay	allow carries impulses between sensory and motor neurones	1	AO1/AO2 3.4.1.b/d
	(Y) carries impulse from X to Z		1	
	(Z) motor	allow carries impulses from spinal cord to muscle / effector allow carries impulses between relay neurone and effector	1	
	(Z) carries impulse from Y to muscle / effector		1	

Question	Answers	Extra information	Mark	AO / Spec. Ref.
03.4	(pancreas) detects blood glucose concentration		1	AO1 3.4.2.b/d 3.4.4.a/b/c
	when (blood glucose too) high (pancreas) releases insulin		1	
	(so insulin) lowers blood glucose by moving glucose into cells / liver	allow (insulin) causes glucose to be converted to glycogen	1	
	when (blood glucose too) low (pancreas) releases glucagon		1	
	(so glucagon) raises blood glucose by converting glycogen to glucose	allow (glucagon) releases glucose into the blood	1	
	therefore blood glucose concentration is kept relatively constant	allow idea of negative feedback	1	

Question	Answers	Extra information	Mark	AO / Spec. Ref.
03.5	any two from: • difficult to change eating habits or food preferences • lack of ability / motivation for exercise • difficulties related to medication		2	AO3 3.4.4.e

Total			15
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Question	Answers	Extra information	Mark	AO / Spec. Ref.
04.1	photosynthesis		1	AO2 3.3.3.e

Question	Answers	Extra information	Mark	AO / Spec. Ref.
04.2	protein or amino acids	allow example of protein	1	AO1 3.3.3.e
	lipids / fats	allow DNA	1	

Question	Answers	Extra information	Mark	AO / Spec. Ref.
04.3	less photosynthesis		1	AO2 3.3.3.e
	so less carbon dioxide removed	if no other mark awarded allow 1 mark for trees take in carbon dioxide for photosynthesis OR combustion of wood and fossil fuels releases carbon dioxide	1	

Question	Answers	Extra information	Mark	AO / Spec. Ref.
04.4	decomposition of trees	ignore references to fossil fuels	1	AO1 3.3.3.b/e
	(during decomposition) microorganisms gain carbon (compounds)		1	
	respiration of microorganisms		1	
	(respiration / microorganism) releases carbon dioxide		1	

Question	Answers	Mark	AO / Spec. Ref.
04.5	Level 2: A judgement strongly linked and logically supported by a sufficient range of correct reasons, is given.	3–4	AO3 3.3.3.d
	Level 1: Some logically linked reasons are given. There may also be a simple judgement.	1–2	
	No relevant content.	0	
	Indicative content • more crops so more carbon dioxide removed from atmosphere • carbon dioxide released from burning crops does not return to the atmosphere because it is stored • less burning of fossil fuels for power plants so less trapped carbon dioxide released from plants • plants not left to decompose so less carbon dioxide released from respiration of microorganisms • energy from crops is renewable energy • may be expensive to capture and store the carbon dioxide • possibility of incidents that release stored carbon dioxide • finding / choosing locations for crops / power stations / stores • less area devoted to food crops may lead to food shortages • as food crops are replaced by energy crops no change to carbon dioxide released		

Total		13
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Question	Answers	Extra information	Mark	AO / Spec. Ref.
05.1	intercostal muscles and diaphragm muscles <u>contract</u>		1	AO1 3.2.4.b
	(intercostal muscles contract) to pull ribcage up (and out)		1	
	(diaphragm muscles contract) to flatten diaphragm		1	
	causing thorax volume to increase	do not accept lungs for thorax once only	1	
	so pressure in thorax decreases		1	
	(pressure decreases) below air pressure		1	

Question	Answers	Extra information	Mark	AO / Spec. Ref.
05.2	volume of air in 1 breath = 0.5 dm ³		1	AO2 3.2.4.b 6.3.3/12
	(one breath takes) 9-4.5 = 4.5 (seconds)		1	
	60 ÷ 4.5 = 13.33 (breaths per minute)		1	
	V = 13.33 × 0.5 = 6.67 (dm ³)	allow correctly rounded answer to at least two significant figures	1	

Question	Answers	Extra information	Mark	AO / Spec. Ref.
05.3	(percentage of) oxygen would decrease and (percentage of) carbon dioxide would increase	allow correct reference to figures for oxygen and carbon dioxide ignore reference to nitrogen	1	AO2 3.2.5.g/h

Total			11
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Question	Answers	Extra information	Mark	AO / Spec. Ref.
06.1	root cells have no access to light	allow references to no light or dark underground	1	AO2 3.1.1.b 3.2.1.b
	so cannot carry out photosynthesis	allow so do not need to photosynthesise	1	

Question	Answers	Extra information	Mark	AO / Spec. Ref.
06.2	epidermal		1	AO2 3.1.1.d 3.1.4.a

Question	Answers	Extra information	Mark	AO / Spec. Ref.
06.3	protein / amino acids / DNA		1	AO2 3.2.1.e

Question	Answers	Extra information	Mark	AO / Spec. Ref.
06.4	(advantage) any one from: - improves soil condition / quality - longer lasting - may be obtained from farm animals or unwanted crops	ignore unpleasant smell allow minerals not washed away by rain	1	AO3 3.3.2.a 3.3.3.c
	(disadvantage) any one from: - specific minerals present is unknown - precise quantity of minerals present is unknown - needs time to decompose and release minerals	allow may not contain (enough) phosphate ions	1	

Question	Answers	Extra information	Mark	AO / Spec. Ref.
06.5	(means are) 144.6 and 164.6 mean / total with fertiliser is higher so does not support conclusion but there is an overlap in the number of seeds produced or plant without fertiliser produced highest number of seeds but also lowest number of seeds	allow (totals are) 723 and 823	1 1 1	AO2/AO3 3.2.1.e 3.3.2.a

Question	Answers	Extra information	Mark	AO / Spec. Ref.
06.6	any two from: • same type / age of plant • use the same fertiliser • same volume of fertiliser / water		2	AO4 3.3.2.a

Total			11
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Question	Answers	Extra information	Mark	AO / Spec. Ref.
07.1	any three from: • <u>meiosis</u> • copies of genetic material / DNA / chromosomes • cell divides twice to produce four new cells • each (new) cell has one set of chromosomes	allow haploid cells	3	AO1 3.5.2.f/g/h

Question	Answers	Extra information	Mark	AO / Spec. Ref.
07.2	(sexual reproduction) leads to variation and some offspring will be suited to the changes in the environment so (some offspring) will survive and pass on alleles for survival	allow so (some offspring) will survive and pass on genes for survival	1 1 1	AO1 / AO2 3.5.1 3.6.2b

Question	Answers	Extra information	Mark	AO / Spec. Ref.
07.3	cloning / asexual reproduction all genetic information from the chosen plant so desirable / same characteristics passed on to new plants		1 1 1	AO2 / AO3 3.5.1 3.5.5.a

Total			9
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Question	Answers	Extra information	Mark	AO / Spec. Ref.
08.1	ribosomes		1	AO2 3.1.1.a 3.2.3.b

Question	Answers	Extra information	Mark	AO / Spec. Ref.
08.2	(large molecules are) broken down into small molecules (insoluble molecules) broken down into soluble molecules	allow fat / protein / starch are broken down into small molecules large insoluble molecules broken down into small soluble molecules gains 2 marks	1 1	AO1 3.2.3.a/b

Question	Answers	Extra information	Mark	AO / Spec. Ref.
08.3	food contains different types of molecule so enzymes need a specific shape to fit / bind (a particular molecule) and parts of the digestive system have different pH or acidic / alkali conditions and different enzymes (are needed to) work at different pH's	allow food contains fat, protein and starch	1 1 1 1	AO2 3.2.3.b/c

Question	Answers	Extra information	Mark	AO / Spec. Ref.
08.4	use a water bath		1	AO4 3.2.3.c

Question	Answers	Extra information	Mark	AO / Spec. Ref.
08.5	4% = 16cm ³ and 3% = 12cm ³ and 2% = 8cm ³ and 1% = 4cm ³ 20 + 16 + 12 + 8 + 4 = 60 cm ³	ignore volume of water	1 1	AO4 3.2.3.b/c 6.3.3

Question	Answers	Extra information	Mark	AO / Spec. Ref.
08.6	(dependent) rate of glucose production (independent) concentration of starch (suspension)	allow glucose concentration	1 1	AO4 3.2.3.b

Question	Answers	Extra information	Mark	AO / Spec. Ref.
08.7	(levels off so) no increase in rate of glucose production (as concentration of starch suspension increases) because not enough enzyme / amylase to breakdown more starch so rate of glucose production is limited by the amount of enzyme / amylase	allow all enzyme active sites occupied	1 1 1	AO3 3.2.3.b

Total			15
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