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INTERNATIONAL GCSE COMBINED SCIENCE 9204/BC

Paper 1 Biology Core

Mark scheme

November 2021

Version: 1.0 Final Mark Scheme



2 1 B Y 9 2 0 4 / B C / 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

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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	pumps blood around the body		1	AO1 3.2.2b

Question	Answers	Extra information	Mark	AO /Spec. Ref.
01.2	muscular tissue		1	AO1 3.2.2b

Question	Answers	Extra information	Mark	AO /Spec. Ref.
01.3	4		1	AO1 3.2.2c

Question	Answers	Extra information	Mark	AO /Spec. Ref.
01.4	to keep blood flowing in one direction		1	AO1 3.2.2d

Question	Answers	Extra information	Mark	AO /Spec. Ref.
01.5	veins		1	AO1 3.2.2f

Question	Answers	Extra information	Mark	AO /Spec. Ref.
01.6	defend the body against microorganisms		1	AO1 3.2.2.k / 3.4.6.c

Question	Answers	Extra information	Mark	AO /Spec. Ref.
01.7	any two from: (B has) <ul style="list-style-type: none"> • fewer red blood cells (than A) • more white blood cells (than A) • white blood cells look different (compared to A) • fewer platelets (than A) 	allow blood is more diluted for 1 mark if no other mark awarded.	2	AO3 3.2.2h

Question	Answers	Extra information	Mark	AO /Spec. Ref.
01.8	test at least three blood samples from the person. use different methods to test the blood of the person.		1 1	AO4 3.2.2h

Total			10	
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Question	Answers	Extra information	Mark	AO / Spec. Ref.																									
02.1	<table border="1"> <thead> <tr> <th rowspan="2">Characteristic</th> <th colspan="3">Variation caused by</th> </tr> <tr> <th>genes</th> <th>the environment</th> <th>both genes and the environment</th> </tr> </thead> <tbody> <tr> <td>Body mass</td> <td></td> <td></td> <td>✓</td> </tr> <tr> <td>Broken scale</td> <td></td> <td>✓</td> <td></td> </tr> <tr> <td>Long nose</td> <td>✓</td> <td></td> <td></td> </tr> <tr> <td>Scales made of protein</td> <td>✓</td> <td></td> <td></td> </tr> </tbody> </table>			Characteristic	Variation caused by			genes	the environment	both genes and the environment	Body mass			✓	Broken scale		✓		Long nose	✓			Scales made of protein	✓			3 marks for all correct 2 marks for 3 correct rows 1 mark for 2 correct rows	3	AO2 3.5.3.a / 3.6.1
	Characteristic	Variation caused by																											
		genes	the environment	both genes and the environment																									
	Body mass			✓																									
	Broken scale		✓																										
Long nose	✓																												
Scales made of protein	✓																												

Question	Answers	Extra information	Mark	AO / Spec. Ref.
02.2	innate		1	AO2 3.4.5.c

Question	Answers	Extra information	Mark	AO / Spec. Ref.
02.3	any two from: <ul style="list-style-type: none"> • long / sticky tongue easier to catch (insects for) food • scales for protection from predators • claws for digging • claws for climbing 		2	AO3 3.3.2.f

Question	Answers	Extra information	Mark	AO / Spec. Ref.
02.4	sniffer dogs can be trained / conditioned	allow dogs have a good sense of smell	1	AO1/2 3.4.5.d
	to detect / smell pangolins (hidden in burrows / trees / darkness)	allow to find pangolins (more successfully)	1	

Question	Answers	Extra information	Mark	AO / Spec. Ref.
03.1	diaphragm		1	AO1 3.2.4.a

Question	Answers	Extra information	Mark	AO / Spec. Ref.
03.2	bronchiole		1	AO1 3.2.4.a

Question	Answers	Extra information	Mark	AO / Spec. Ref.
03.3	oxygen	allow O ₂	1	AO1 3.2.4.a/c

Question	Answers	Extra information	Mark	AO / Spec. Ref.
03.4	any two from: <ul style="list-style-type: none"> • large surface area • thin (capillary / alveoli) walls • (supplied by) many blood capillaries / vessels 	allow there are many (alveoli) in the lungs allow good blood supply	2	AO1 3.1.5.i / 3.2.4.c

Question	Answers	Extra information	Mark	AO / Spec. Ref.
03.5	less oxygen / gas transported to the body / cells		1	AO2 3.2.5.a/b
	so less (aerobic) respiration		1	
	and less energy (released in the cells)		1	

Question	Answers	Extra information	Mark	AO / Spec. Ref.
03.6	age		1	AO3 3.2.5
	(biological) sex	allow gender allow other correct factors eg smoking	1	

Question	Answers	Extra information	Mark	AO / Spec. Ref.
03.7	200 (per 100 000) 200 × 5 = 1000		1 1	AO2 3.2.5
Total			12	

Question	Answers	Extra information	Mark	AO / Spec. Ref.
04.1	nucleus		1	AO1 3.5.3.c

Question	Answers	Extra information	Mark	AO / Spec. Ref.
04.2	4		1	AO2 3.5.2.f/g/h

Question	Answers	Extra information	Mark	AO / Spec. Ref.
04.3	alleles		1	AO1 3.5.3.e

Question	Answers	Extra information	Mark	AO / Spec. Ref.															
04.4	<table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td colspan="2"></td> <td colspan="2" style="text-align: center;">Female</td> </tr> <tr> <td colspan="2"></td> <td style="text-align: center;">N</td> <td style="text-align: center;">n</td> </tr> <tr> <td rowspan="2" style="vertical-align: middle;">Male</td> <td style="text-align: center;">N</td> <td style="text-align: center;">NN</td> <td style="text-align: center;">Nn</td> </tr> <tr> <td style="text-align: center;">n</td> <td style="text-align: center;">Nn</td> <td style="text-align: center;">nn</td> </tr> </table>			Female				N	n	Male	N	NN	Nn	n	Nn	nn	<p>1 mark for correct gamete</p> <p>1 mark for two correct offspring</p>	2	AO2 3.5.3.g
		Female																	
		N	n																
Male	N	NN	Nn																
	n	Nn	nn																

Question	Answers	Extra information	Mark	AO / Spec. Ref.
04.5	nn		1	AO2 3.5.3.f

Question	Answers	Extra information	Mark	AO / Spec. Ref.
04.6	$\frac{105}{25}$ (ratio =) 4.2(:1)	allow 4(:1)	1 1	AO2 3.5.3.e

Question	Answers	Extra information	Mark	AO / Spec. Ref.
04.7	due to chance	allow flies are not both heterozygous	1	AO3 3.5.3
Total			9	

Question	Answers	Extra information	Mark	AO / Spec. Ref.
05.1	(the) Sun	allow light	1	AO1 3.2.1.a

Question	Answers	Extra information	Mark	AO / Spec. Ref.
05.2	oxygen		1	AO1 3.2.1.a

Question	Answers	Extra information	Mark	AO / Spec. Ref.
05.3	any two from: <ul style="list-style-type: none"> • light intensity / availability • water • temperature • space between cabbages • nutrients • soil type • type of cabbage 	allow minerals / named mineral	2	AO4 3.2.1.c

Question	Answers	Extra information	Mark	AO / Spec. Ref.
05.4	cabbages grow faster / bigger (with extra carbon dioxide)		1	AO3 3.2.1.c

Question	Answers	Extra information	Mark	AO / Spec. Ref.
05.5	any two from <ul style="list-style-type: none"> • will extra profit (from bigger crops) cover the expense • is the effect the same for all crops • how much extra carbon dioxide is needed 	allow how much the carbon dioxide costs	2	AO3 3.2.1.c

Question	Answers	Extra information	Mark	AO / Spec. Ref.
05.6	(damaged roots so) less water absorbed so less photosynthesis so less growth OR less nitrate absorbed (1) so less protein synthesis (1) so less growth (1)	allow minerals / ions	1 1 1	AO2 3.1.5.i / 3.2.1.a/e
Total			10	

Question	Answers	Extra information	Mark	AO / Spec. Ref.
06.1	salty		1	AO2 3.3.2.e

Question	Answers	Extra information	Mark	AO / Spec. Ref.
06.2	a community of organisms adapted to particular conditions		1	AO1 3.3.1a

Question	Answers	Extra information	Mark	AO / Spec. Ref.
06.3	any one from: <ul style="list-style-type: none"> • water • a mate • their own territory / space to live 		1	AO1 3.3.2.c

Question	Answers	Extra information	Mark	AO / Spec. Ref.
06.4	$\frac{560 \times 2}{100}$ 11.2 (kg)		1	AO2 3.3.2.a
			1	

Question	Answers	Extra information	Mark	AO / Spec. Ref.
06.5	mites wolves bison grass	1 mark for the correct sequence, either way up 1 mark for grass at the bottom and mites at the top	2	AO2 3.3.1.c

Question	Answers	Extra information	Mark	AO / Spec. Ref.
06.6	any one from: <ul style="list-style-type: none"> • (bison) waste • faeces • respiration (of bison) • decomposition (of bison) after death 	allow used for movement	1	AO1 3.3.1.b / 3.3.3.a

Question	Answers	Extra information	Mark	AO / Spec. Ref.
06.7	adults surround the young bison		1	AO3 3.3.2.f
Total			9	

Question	Answers	Extra information	Mark	AO / Spec. Ref.
07.1	pathogens		1	AO1 3.4.6.a

Question	Answers	Extra information	Mark	AO / Spec. Ref.
07.2	bacteria		1	AO1 3.4.6.b

Question	Answers	Extra information	Mark	AO / Spec. Ref.
07.3	amino acids	this order only	1	AO1 3.5.3.k
	bases		1	

Question	Answers	Extra information	Mark	AO / Spec. Ref.
07.4	antibody A		1	AO2 3.4.6.d

Question	Answers	Extra information	Mark	AO / Spec. Ref.
07.5	dead / inactive forms	allow weakened / attenuated / modified	1	AO1 3.4.6.e
	of the (particular) bacteria / virus / pathogen		1	

Question	Answers	Extra information	Mark	AO / Spec. Ref.
07.6	any two from: <ul style="list-style-type: none"> • safety or side effects • effectiveness • dosage 	allow example allow to check it works	2	AO3 3.4.6.e

Question	Answers	Extra information	Mark	AO / Spec. Ref.
07.7	any one from: <ul style="list-style-type: none"> • antibiotics only affect bacteria (not viruses) • vaccines prevent disease but antibiotics treat disease • antibodies are produced as a result of vaccines (not as a result of antibiotics) • overuse of antibiotics may lead to development of resistant strains of bacteria (vaccines do not) 	allow vaccines are longer lasting or last for more than one infection	1	AO2 3.4.6.e/f/g

Total			10	
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Question	Answers	Extra information	Mark	AO / Spec. Ref.
08.1	thermoregulatory	this order only	1	AO1 3.4.3.a/b
	skin		1	

Question	Answers	Extra information	Mark	AO / Spec. Ref.
08.2	(more) sweating	allow vasodilation answers allow skin goes more red	1	AO2 3.4.3.d
	increase blood flow (to the skin)		1	

Question	Answers	Extra information	Mark	AO / Spec. Ref.
08.3	pancreas		1	AO1 3.4.4.b

Question	Answers	Extra information	Mark	AO / Spec. Ref.
08.4	they cannot control / lower blood glucose concentration		1	AO2 3.4.4.d/e
	or blood glucose concentration will stay too high because they do not produce (enough) insulin or because their body does not respond to insulin		1	

Question	Answers	Mark	AO / Spec. Ref.
08.5	Level 3: The plan would lead to the production of a valid outcome. All key steps are identified and logically sequenced.	5–6	AO4 3.4.4.d/e
	Level 2: The plan would not necessarily lead to a valid outcome. Most steps are identified, but the plan is not fully logically sequenced.	3–4	
	Level 1: The plan would not lead to a valid outcome. Some relevant steps are identified, but links are not made clear.	1–2	
	No relevant content.	0	
	Indicative content <ul style="list-style-type: none"> • same mass of each food sample • chop foods into comparatively small pieces • same volume (same number of drops) of Benedict's solution to each food sample • add test tube to beaker of water and heat • heat to same temperature • use thermometer to check temperature • leave each sample for the same time • compare colour with Table 2 to estimate glucose concentration • repeat at least twice Must have at least two controls		

Question	Answers	Extra information	Mark	AO / Spec. Ref.
08.6	any two from: <ul style="list-style-type: none"> • less painful • fewer side effects • no chance of wrong dose • less chance of infection • good diet has additional benefits to health • may forget to have injection 		2	AO3 3.4.4.e

Total			15	
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Question	Answers	Extra information	Mark	AO / Spec. Ref.
09.1	active transport		1	AO1
	building up proteins		1	3.2.5.f / 3.1.5.f

Question	Answers	Extra information	Mark	AO / Spec. Ref.
09.2	ethanol	allow C ₂ H ₆ O or CH ₃ CH ₂ OH or C ₂ H ₅ OH	1	AO1
	carbon dioxide	allow CO ₂	1	3.2.5.m

Question	Answers	Extra information	Mark	AO / Spec. Ref.
09.3	(x-axis label) time in hours		1	AO2
	(x-axis scale) correct scale	must be consistent with anaerobic conditions	1	3.1.5.b/g
	correct plotted points	allow 1 mark for 3 or 4 points plotted correctly	2	
	line of best fit		1	

Question	Answers	Extra information	Mark	AO / Spec. Ref.
09.4	275 – 220		1	AO2
	$\left(\frac{275 - 220}{5 - 2}\right) = 18.333$		1	3.1.5.g
	18		1	
	18 (arbitrary units per hour)			
	OR			
275 – 225 (1)				
$\left(\frac{275 - 225}{5 - 2}\right) = 16.6666$				
17 (arbitrary units per hour) (1)				

Question	Answers	Extra information	Mark	AO / Spec. Ref.
09.5	absorption of sulfate ions is faster when oxygen is present. plant roots do not need oxygen to absorb sulfate ions.		2	AO3 3.1.5.a/f/g
Total			14	