OXFORD
INTERNATIONAL
AQA EXAMINATIONS

INTERNATIONAL GCSE
COMBINED SCIENCE
9204/BC

Paper 1 Biology Core

Mark scheme

June 2022

Version: 1.0 Final Mark Scheme

226Y9204/BC/MS

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

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 <u>not</u> 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	**A** stem **B** root		2	AO1 3.1.4.b
01.2	tissue		1	AO1 3.1.2.b
01.3	specialised cell		1	AO1 3.1.1.d
01.4	any **one** from: • absorbs light • photosynthesis • makes glucose	allow food/oxygen	1	AO2 3.2.1.b
01.5 mark with 01.6	60 (mm)	allow answer in range of 59 (mm) to 61 (mm)	1	AO2 3.1.1.b 6.3.1
01.6 mark with 01.5	$\frac{60}{750}$ **or** $\frac{(6 \times 10)}{750}$ 0.08 (mm)	must use answer from question **01.5** if no answer to question **01.5**, allow use of measurement in range of 59 (mm) to 61 (mm)	1 1	AO2 3.1.1.b 6.3.10
01.7	any **two** from: • cell wall • chloroplast • vacuole		2	AO2 3.1.1.a/b
Total			**10**	

Question	Answers	Extra information	Mark	AO/Spec. Ref.
02.1	glucose oxygen		1 1	AO1 3.2.5.b/c
02.2	any **two** from: • movement • (maintain) body temperature • make larger molecules • active transport	allow muscle contraction allow example of movement	2	AO1 3.2.5.f
02.3	lactic acid is produced no oxygen is used		1 1	AO1 3.2.5.i/j/k
02.4	thermometer		1	AO4 3.2.5
02.5	any **one** from: • minimise / stop energy loss (from the flask) • so the results are not affected by external temperature	allow minimise / stop heat loss	1	AO4 3.2.5
02.6	as a control	allow as a comparison	1	AO4 3.2.5
02.7	living seeds transfer energy to the environment		1	AO3 3.2.5
Total			**10**	

Question	Answers	Extra information	Mark	AO/Spec. Ref.
03.1	(radiation from) the Sun	allow sunlight / light	1	AO1 3.3.1.a
03.2 mark with 03.3	11(%)		1	AO2 3.3.1.b
03.3 mark with 03.2	$500 \times \frac{11}{100}$ 55 000 (J)	allow ecf from **03.2**	1 1	AO2 3.3.1.b 6.3.3
03.4	in waste materials		1	AO1 3.3.1.b
03.5	birds (carabid) beetles insects	in this order for **2** marks allow **1** mark for any 2 in correct sequence	2	AO2 3.3.1.c
03.6	(more carabid beetles so) fewer insects	allow insects are eaten by the carabid beetles	1	AO2 3.3.2.a
03.7	any **one** from: • to keep large / unwanted animals out • provide shelter from rain / sun • to prevent predators eating the beetles • more difficult for beetles to escape		1	AO4 3.3.2

Question	Answers	Extra information	Mark	AO/Spec. Ref.
03.8	any **three** from: • use several traps / repeats (each month) • leave trap(s) out for the same time period (each month) • place trap(s) in the same area of the field (each month) • count / record the number of beetles in the trap(s) (each month)		3	AO4 3.3.2.c
03.9	any **one** from: • warm • hot • long days	allow dry	1	AO3 3.3.2.d
Total			**13**	

Question	Answers	Extra information	Mark	AO/Spec. Ref.
04.1	osmosis / diffusion cell membrane	do **not** accept active transport	1 1	AO1 3.1.5.d
04.2	anomalous **or** much higher than other results (for **X**)	allow does not fit the pattern	1	AO2 3.1.5.e
04.3	as salt concentration increases volume of water decreases	allow negative correlation	1	AO2 3.1.5.e
04.4	**W** because more cells burst in **W** (than in **X**, **Y** or **Z**)	 allow because rate of water movement into cells was high (causing most to burst)	1 1	AO3 3.1.5.e
04.5	40 **or** all of them	allow 38 / 39 **or** almost all of them	1	AO3 3.1.5.e
04.6	$\frac{76}{3}$ 25.3(333…) 25		1 1 1	AO2 3.1.5.e 6.3.7
Total			**10**	

Question	Answers	Extra information	Mark	AO/Spec. Ref.
05.1	diffuses **or** moves down concentration gradient any **two** from: • (from) alveoli • into capillaries • through cell membrane(s) **or** through thin (alveoli / capillary) walls	 do **not** accept thin cell walls	1 2	AO1 3.2.4.a,c.
05.2	red (blood cells)	allow erythrocytes do **not** accept lymphocytes / monocytes / leukocytes	1	AO1 3.2.2.j
05.3	trachea bronchi bronchioles	in this order for **3** marks 2 in correct position for **2** marks if no other mark awarded allow **1** mark for correct selection	3	AO1 3.2.4.a
05.4	any **two** from: • as age increases peak flow increases • peak flow higher in boys (than in girls) • (peak flow has) faster increase in boys than in girls from 11/12 years • (peak flow begins to) plateau in girls from 13 years		2	AO3 3.2.4.a
05.5	390 (dm^3/min)	allow a tolerance of ± ½ small square	1	AO2 3.2.4.a 6.3.12

Question	Answers		Mark	AO/Spec. Ref.
05.6	any **two** from: • airway of person with asthma has narrower / smaller lumen (for air to pass through) • thicker wall (so narrow passage for airflow) • presence of mucus (blocking airway)	allow converse for airway of person without asthma	2	AO3 3.2.4.a
05.7	**Level 2:** Some logically linked reasons are given. There may also be a simple judgement.		3–4	AO3 3.2.4.a
	Level 1: Relevant points are made. They are not logically linked.		1–2	
	No relevant content		0	
	Indicative content treatment is effective because: • treatment increased peak flow • untreated below mean for 13-year-old boy • treated closer to mean than untreated • untreated has large daily fluctuations but treated daily fluctuations less • reference to immediate improvement in peak flow after start of treatment limitations: • reference to short term results • fluctuations continue after treatment • small sample For **level 2** must consider effectiveness and limitations			
Total			**16**	

<table>
<tr><th>Question</th><th>Answers</th><th>Extra information</th><th>Mark</th><th>AO/Spec. Ref.</th></tr>
<tr><td>06.1</td><td>
<table>
<tr><th rowspan="2">Variation</th><th colspan="3">Variation caused by</th></tr>
<tr><th>Genes only</th><th>Environment only</th><th>Both genes and environment</th></tr>
<tr><td>Blood group</td><td>✓</td><td></td><td></td></tr>
<tr><td>Broken wing</td><td></td><td>✓</td><td></td></tr>
<tr><td>Mass of bird</td><td></td><td></td><td>✓</td></tr>
</table>
2 marks for 3 correct, 1 mark for 1 or 2 correct
</td><td></td><td>2</td><td>AO2
3.6.1</td></tr>
<tr><td>06.2</td><td>changes that occur in an organism’s lifetime can be inherited</td><td></td><td>1</td><td>AO1
3.6.2.a</td></tr>
<tr><td>06.3</td><td>natural selection</td><td></td><td>1</td><td>AO1
3.6.2.a</td></tr>
<tr><td>06.4</td><td>R

same shape / type of beak as wren / image</td><td>

allow thin / narrow / pointed beak</td><td>1

1</td><td>AO2/AO3
3.6.2.b</td></tr>
<tr><td>06.5</td><td>
separated / isolated

characteristics

selected

(inter)breed</td><td>in this order

ignore passed on

</td><td>
1

1

1

1</td><td>AO1
3.6.2.c</td></tr>
<tr><td>Total</td><td></td><td></td><td>10</td><td></td></tr>
</table>

<table>
<tr><th>Question</th><th>Answers</th><th>Extra information</th><th>Mark</th><th>AO/Spec. Ref.</th></tr>
<tr><td>07.1</td><td>
<table>
<tr><th></th><th>fertilisation</th><th>meiosis</th><th>mitosis</th></tr>
<tr><td>A</td><td></td><td>✓</td><td></td></tr>
<tr><td>B</td><td>✓</td><td></td><td></td></tr>
<tr><td>C</td><td></td><td></td><td>✓</td></tr>
<tr><td>D</td><td></td><td></td><td>✓</td></tr>
</table>
</td><td></td><td>1
1
1
1</td><td>AO2
3.5.2.d,g,l</td></tr>
<tr><td>07.2</td><td>alleles</td><td>ignore recessive / dominant</td><td>1</td><td>AO1
3.5.2.b</td></tr>
<tr><td>07.3</td><td>4</td><td></td><td>1</td><td>AO2
3.5.4.a</td></tr>
<tr><td>07.4</td><td>neither A nor B have PKU

but one of their children / E has PKU</td><td>allow neither A nor B are affected

allow but one of their children / E is affected
ignore reference to person I

allow E has PKU but his parents do not for 2 marks</td><td>1

1</td><td>AO3
3.5.4.a</td></tr>
<tr><td>07.5</td><td>proteins are digested into amino acids

(so less protein) means less phenylalanine (is absorbed)</td><td>allow proteins contain amino acids or proteins contain phenylalanine</td><td>1

1</td><td>AO2
3.5.3.k
/3.2.3.c</td></tr>
<tr><td>Total</td><td></td><td></td><td>10</td><td></td></tr>
</table>

Question	Answers	Extra information	Mark	AO/Spec. Ref.
08.1	sound ear brain muscles	in this order allow spinal cord allow CNS ignore spine	 1 1 1 1	AO2 3.4.1.e 3.4.2.b,c,d
08.2	sensory neurone	 allow neuron **or** nerve cell	1 1	AO1 3.4.1.d
08.3	0.86 to 1.08 (s)	allow 1.08 to 0.86 (s)	1	AO2 3.4.1.a 6.3.11
08.4	any **two** from: • reaction time increases as age increases (for both groups) • reaction time is lower in (all of) the high education groups • the gap between the reaction of the two groups decreases with age	allow converse ignore positive correlation unqualified	2	AO2 3.4.1.a
08.5	as people get older the difference in reaction time gets less (between the two groups)	allow as age increases the reaction times of the groups get closer allow correct reference to figures from the graph	1	AO3 3.4.1.a
Total			**10**	

Question	Answers	Extra information	Mark	AO/Spec. Ref.
09.1	6 (divisions in 2 hours) 2^6 / 2 × 2 × 2 × 2 × 2 × 2 64	 allow correct calculation from incorrectly calculated number of divisions given	1 1 1	AO2 3.4.6.b 6.3.10
09.2	shape / colour / transparency / texture / shiny / dull	allow size of colony in controlled conditions	1	AO3 3.4.6
09.3	any **three** from: • use sterile Petri dish **or** use sterile agar • use sterile wire loop • sterilise / boil nutrient agar (before adding bacteria) • position lid to prevent bacteria falling into bottle / Petri dish (during transfer) • secure lid onto Petri dish (after transfer)	if neither mark awarded, allow 1 mark for use sterile equipment / apparatus allow only lift one side of the lid (during transfer) ignore references to PPE / gloves	3	AO4 3.4.6
09.4	20 to 25 (°C) (under 25 °C) to discourage growth of pathogenic bacteria **OR** 25 to 40 (°C) (1) (25 to 40 °C) bacteria grow at a fast / optimum rate (1)	allow any temperature in this range allow any temperature in this range allow this is the optimum temperature for enzyme action	1 1	AO4 3.4.6 3.3.3.b

Question	Answers	Extra information	Mark	AO/Spec. Ref.
09.5	(individual) colonies are separated (so) characteristics visible (to identify bacteria)	allow bacteria are separated allow named examples of characteristics allow so you can pick off bacteria from individual colonies to identify them under a microscope for **2** marks	1 1	AO3 3.4.6
Total			**11**	