

OXFORD

INTERNATIONAL
AQA EXAMINATIONS

INTERNATIONAL GCSE

COMBINED SCIENCE DOUBLE AWARD BIOLOGY

9204/BE

PAPER 1 – EXTENSION TIER

Mark scheme

Specimen material

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 Assessment Writer.

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.

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.

Question 1

Question	Answers	Extra information	Mark
01.1	moist / damp warm		1 1
01.2	aerobic respiration is more efficient		1

MARK SCHEME – INTERNATIONAL GCSE COMBINED SCIENCE DOUBLE AWARD
BIOLOGY – EXTENSION TIER – SPECIMEN MATERIAL

Question	Answers	Extra information		Mark
01.3	Examiners should also refer to the information on page 3.			6
0 marks	Level 1 (1-2 marks)	Level 2 (3-4 marks)	Level 3 (5-6 marks)	
No relevant content.	For at least one process either the organism that carries it out or the carbon compound used or the carbon compound produced is described or for at least one organism either the carbon compound it uses or the carbon compound it produces is described or at least one process is named.	For some processes (at least one of which is named) either the organisms involved or the carbon compounds used or the carbon compounds produced are described.	For at least one named process an organism and either the carbon compound used for the process or the carbon compound produced by the process are described and for other processes (at least one of which is named) either the organism or the carbon compounds used or the carbon compounds produced are described (as in Level 2).	
Indicative content:				
<ul style="list-style-type: none"> • (green) plants photosynthesise • photosynthesis takes in carbon dioxide • (green) plants use carbon to make carbohydrate/protein/fat/organic compounds/named (eg enzymes/cellulose) • animals eat (green) plants (and other animals) • (green) plants respire • animals respire • respiration releases carbon dioxide • (green) plants and animals die • microorganisms decay/decompose/rot/break down/feed on dead organisms • microorganisms respire. 				
Total				9

Question 2

Question	Answers	Extra information	Mark
02.1	population became (geographically) isolated/separated from other species	allow references to adaptations to unique environmental conditions on the island	1
02.2	black rats introduced a new disease (which killed native rats) black rats out-competed the native rats		1 1
02.3	some rats become resistant due to (random) mutation and resistant rats survive/non-resistant rats die then resistant rats pass allele for resistance to offspring so frequency of resistant allele increases in population		1 1 1 1
Total			7

Question 3

Question	Answers	Extra information	Mark
03.1	(water through a) partially permeable membrane	allow semi/selectively permeable	1
	from dilute to (more) concentrated solution	allow from a high concentration of water to a low concentration (of water)	1
		allow from high water potential to low water potential	
	passive process	allow down a concentration gradient of water do not accept along a concentration gradient of water allow requires no energy	1
03.2	a group of cells with similar structure/function		1
03.3	(more) CO ₂ can enter the leaf (for photosynthesis)		1
03.4	0.1 × 0.1 = 0.01 (mm ²)		1
	200	allow 200 with no working shown for 2 marks	1
Total			8

Question 4

Question	Answers	Extra information		Mark
04.1	$6 \text{ CO}_2 + 6 \text{ H}_2\text{O} \rightarrow \text{C}_6\text{H}_{12}\text{O}_6 + 6 \text{ O}_2$	<p>1 mark for two correct formulae on LHS</p> <p>1 mark for two correct formulae on RHS</p> <p>do not allow energy on right hand side</p> <p>1 mark for correct balancing</p>		3
04.2	Examiners should also refer to the information on page 3.			6
0 marks	Level 1 (1-2 marks)	Level 2 (3-4 marks)	Level 3 (5-6 marks)	
No relevant content.	The method described is weak and could not be used to collect valid results. However it does show some understanding of the sequence of an investigation.	The method described includes either how the light intensity can be changed or how the results are collected. The overall method can have omissions or errors.	The method described could be easily followed and would enable valid results to be collected.	
<p>Indicative content:</p> <ul style="list-style-type: none"> • use of lamp to illuminate tube • use of ruler to measure distance from lamp to tube • same piece of pondweed/similar pieces of pondweed • at each of several distances from lamp or bulbs of different wattage at the same distance • number of bubbles counted/volume measured • for standard time • heat screen/description • repeat measurement at least 3 times at each distance • control variables eg temperature/ CO₂/water. 				

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Question	Answers	Extra information	Mark
04.3	the nearer/nearest the lamp, the greater/greatest the number of bubbles/volume		1
	or the higher the wattage/light intensity the greater the number of bubbles/volume number of bubbles levels off at higher light intensities		1
04.4	X axis labelled Temperature (in °C and		1
	Y axis labelled Volume (of oxygen given off in 1 hour in cm ³ and		
	suitable scale chosen		
	points plotted correctly to within ± 1mm	6 points correct = 2 marks 4 – 5 points correct = 1 mark 1 – 3 points correct = 0 marks	2
	suitable line of best fit drawn on graph		1
04.5	increase in temperature increases rate of photosynthesis so temperature limiting factor		1
	or (as an) increase in temperature increases energy of particles so therefore more successful collisions		1
04.6	temperature no longer limiting		1
	or some other factor is limiting light (limiting) or CO ₂ (limiting)		1
Total			19

Question 5

Question	Answers	Extra information	Mark
05.1	maintaining a constant internal environment		1
05.2	temperature optimum for enzymes/temperature on enzyme activity/ denatured orpH (1) effect on enzymes/denatured (1) orwater potential/blood glucose (1) effect of osmotic/blood glucose imbalance on cells (1)		1 1
05.3	any six from: <ul style="list-style-type: none"> • hypothalamus/ thermoregulatory centre/skin • receptors which detect temperature changes of blood • nerve impulses transmitted (from hypothalamus/brain) • results in vasoconstriction/constriction of blood vessels • diversion of blood to core/specified organ/less blood to skin; • muscular contraction/shivering • generates heat via respiration. 		6
05.4	larger surface area to volume ratio/less insulation (fat)		1
Total			10

Question 6

Question	Answers	Extra information	Mark
06.1	DNA		1
06.2	one copy of each (chromosome/chromatid/strand) to each offspring cell each offspring cell receives a complete set of/the same genetic material	ignore reference to gametes and fertilisation allow 'so offspring (cells) are identical'	1 1
06.3	meiosis	allow mieosis as the only alternative spelling	1
06.4	species A = 4 and species B = 8		1
06.5	sum of A + B from 06.4 eg 12		1
06.6	similarities between chromosomes or similarities between flowers described can breed/can sexually reproduce	 eg shape of petals/pattern on petals/colour/stamens allow can produce with each other/can produce offspring	1 1

MARK SCHEME – INTERNATIONAL GCSE COMBINED SCIENCE DOUBLE AWARD
BIOLOGY – EXTENSION TIER – SPECIMEN MATERIAL

Question	Answers	Extra information	Mark
06.7	<p>any two from:</p> <ul style="list-style-type: none"> • offspring contain 3 copies of each gene/of each chromosome/odd number of each of the chromosomes • some chromosomes unable to pair (in meiosis) • (viable) gametes not formed/some gametes with extra/too many genes/chromosomes <p style="text-align: center;">or</p> <p>some gametes with missing genes/chromosomes</p>		2
06.8	<p>any five from:</p> <p>Mitosis:</p> <ul style="list-style-type: none"> • produces genetically identical cells • for asexual reproduction, when in the snail • for growth/development of adult fluke/young flukes. <p>Meiosis:</p> <ul style="list-style-type: none"> • to produce gametes/for sexual reproduction, when in the cow • forms cells with a single set of chromosomes • leads to variation (in fluke population). 	<p>no mark for 'mitosis' or 'meiosis' statements must be linked to the appropriate type of cell division</p> <p>at least one mitosis and one meiosis statement must be linked to fluke life cycle for full marks</p> <p>allow reference to division of (fertilised) egg to form young flukes</p>	5
Total			15

Question 7

Question	Answers	Extra information	Mark
07.1	amino acids		1
07.2	rate of reaction increases then decreases		1
	peak at 30 to 31 °C/80 arbitrary units		1
07.3	(repeat the experiment) using more temperatures/intermediate values		1
	testing between 20 and 40 °C		1
07.4	(pH) 6		1
07.5	measure diameter/radius/area of clear zone		1
7.6	as a control		1
	to show that the enzyme causes the clear area/has the effect		1
7.7	enzyme will be denatured/destroyed	do not accept killed	1
Total			10

Question 8

Question	Answers	Extra information	Mark
08.1	suitable example eg plants absorbing ions, sugar absorbed from gut		1
	(transport) across the (cell) membrane	allow uses carrier protein	1
	against concentration gradient or from low to high concentration	allow 'up' concentration gradient do not accept 'along' or 'down' concentration gradient	1
	using energy (from) respiration	allow ATP do not accept energy produced/made	1
08.2	glucose	do not accept sugar	1
	lactic acid	accept correct balanced symbol equation	1
08.3	Description (oxygen uptake) decreases but has not returned to level before exercise		1
	or decreases at a decreasing rate (1)		
	Explanation build-up of lactic acid		1
	(lactic acid) needs to be oxidised or converted using oxygen		1
	oxygen debt		1
this takes time or extra oxygen		1	
08.4	(glucose) not completely oxidised/broken down	allow energy still remains in lactic acid	1
Total			12

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