

INTERNATIONAL GCSE **BIOLOGY**

9201/2

Paper 2

Mark Scheme

November 2024

Version: 1.0 Final



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

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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.

Question	Answers	Extra information	Mark	AO / Spec. Ref.
01.1	A - trachea		1	AO1 3.2.5a
	B - alveolus		1	
	C - diaphragm		1	

Question	Answers	Extra information	Mark	AO / Spec. Ref.
01.2	by diffusion		1	AO1 3.1.5i 3.2.5c

Question	Answers	Extra information	Mark	AO / Spec. Ref.
01.3	50 - 10		1	AO2 3.2.5a 6.3.3
	40		1	

Question	Answers	Extra information	Mark	AO / Spec. Ref.
01.4	(before exercise) person 1 has a higher breathing rate	allow converse statements if clearly describing person 2	1	AO3 3.2.6g
	(after exercise) person 1 has a higher breathing rate	person 1 has a greater increase in breathing rate after exercise	1	
		person 1 's breathing rate increases less than person 2 's if no other mark awarded allow 1 mark for person 1 's breathing rate is always higher than person 2		

Question	Answers	Extra information	Mark	AO / Spec. Ref.
01.5	(muscles) need more oxygen or (body) needs to remove more carbon dioxide	idea of more only needed once for full marks	1	AO1 3.2.6 f, g,h
	(due to) more (aerobic) respiration		1	
	to release more energy	do not accept energy produced / made / created	1	
	for muscle contraction		1	
Total			12	

Question	Answers	Extra information	Mark	AO / Spec. Ref.
02.1	any two from • long / thick fur • small ears • short legs • more fat	allow it is white to camouflage in the snow	2	AO2 3.3.2f

Question	Answers	Extra information	Mark	AO / Spec. Ref.
02.2	Adaptation Eyes on the sides of the head Large feet do not accept if more than one line is drawn from an adaptation	How it helps the hare survive To detect predators to avoid being eaten To increase surface area to avoid sinking into soft ground To provide camouflage to avoid being seen	1 1	AO2 3.3.2f

Question	Answers	Extra information	Mark	AO / Spec. Ref.
02.3	food mates		1 1	AO1 3.3.2c

Question	Answers	Extra information	Mark	AO / Spec. Ref.
02.4	Biomass 40 kg → 500 kg → 11 000 kg →	(Arctic) fox (Arctic) hare Grass	1	AO2 3.3.1c

Question	Answers	Extra information	Mark	AO / Spec. Ref.
02.5	as grass which is not eaten		1	AO2 3.3.1b
	as waste from the arctic hare		1	

Question	Answers	Extra information	Mark	AO / Spec. Ref.
02.6	11000 - 40		1	AO2 3.3.1b 6.3.3
	10 960 (kg)		1	

Total			11	
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Question	Answers	Extra information	Mark	AO / Spec. Ref.
03.1	temperature of solution		1	AO4 3.2.4 b,c 6.2.3

Question	Answers	Extra information	Mark	AO / Spec. Ref.
03.2	volume of amylase solution		1	AO4 3.2.4 b,c 6.2.3
	volume of starch solution		1	

Question	Answers	Extra information	Mark	AO / Spec. Ref.
03.3	measuring cylinder		1	AO4 3.2.4 b,c 6.2.3

Question	Answers	Extra information	Mark	AO / Spec. Ref.
03.4	starch has been (completely) digested or starch has been (completely) broken down	ignore no starch present unqualified	1	AO4 3.2.4 b,c 6.2.3

Question	Answers	Extra information	Mark	AO / Spec. Ref.
03.5	6 (minutes)		1	AO3 3.2.4 b,c 6.2.3

Question	Answers	Extra information	Mark	AO / Spec. Ref.
03.6	suitable scale must be > half of graph		1	AO2 3.2.4 b,c 6.3.9
	all points plotted correctly	allow 1 mark for 3 or 4 correct plots allow a tolerance of $\pm\frac{1}{2}$ a small square	2	
	suitable line of best fit		1	

Question	Answers	Extra information	Mark	AO / Spec. Ref.
03.7	test the solution every 30 seconds		1	AO4 3.2.4 b,c 6.2.3

Question	Answers	Extra information	Mark	AO / Spec. Ref.
03.8	starch is not digested because enzyme / amylase has been <u>denatured</u> or starch is not digested because enzyme's / amylase's <u>active site</u> has changed shape	do not accept enzyme is killed	1	AO2 3.2.4 b,c 6.2.3

Total		12
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Question	Answers	Mark	AO/ Spec. Ref
04.1	Level 3: The method would lead to the production of a valid outcome. The key steps are identified and logically sequenced.	5–6	AO4 3.1.5 d, e 6.2.1
	Level 2: The method would not necessarily lead to a valid outcome. Most steps are identified, but the method is not fully logically sequenced.	3–4	
	Level 1: The method 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 Method steps • use at least 3 different temperatures • use a water bath • remove skin of potato • valid method of cutting potatoes eg cork borer • blot potato pieces to remove excess liquid (before measuring mass at start / end of investigation) • measure mass of potato pieces at start • place potato pieces in sugar solutions for a period of time • measure the mass of potato pieces after they have been in the sugar solution • calculate the change in the mass of the potato pieces • repeat experiment several (at least 3) times and calculate mean • calculate percentage change in mass Control variables • use the same volume of (sugar) solution • use the same concentration of solution • cut same size / shape potato pieces such as using a cork borer • leave potato pieces in the sugar solution for a specific length of time • same type / variety of potato or same potato For Level 3 the independent variable, the dependent variable and control variables, including sugar concentration, must be considered		

Question	Answers	Extra information	Mark	AO / Spec. Ref.
04.2	<u>water</u> moved into cells / potato	allow tissue for potato throughout	1	AO2 3.1.5 d, e 6.2.1
	by osmosis	allow by diffusion through a partially / selectively / semi permeable membrane	1	
	(because) the solution in the cells / potato was more concentrated than outside or (because) the solution in the cells / potato was less dilute than outside		1	
		allow correct references to water potential ignore reference to amount of water or salt		

Question	Answers	Extra information	Mark	AO / Spec. Ref.
04.3	0.16 (mol/dm ³)		1	AO3 3.1.5 d, e 6.2.1 6.3.11

Question	Answers	Extra information	Mark	AO / Spec. Ref.
04.4	$C_6H_{12}O_6 + 6O_2 \rightarrow 6H_2O + 6CO_2$		1	AO1 3.2.6 c

Question	Answers	Extra information	Mark	AO / Spec. Ref.
04.5	same / similar results (as without chemical X)	allow chemical X will have no effect on the results	1	AO3 3.2.6 c 3.1.5 d
	(because) osmosis does not require energy from respiration	do not accept energy produced, made or created	1	
Total			13	

Question	Answers	Extra information	Mark	AO / Spec. Ref.
05.1	prevent backflow (of blood) or ensure one-way flow	allow description of backflow	1	AO1 3.2.3h

Question	Answers	Extra information	Mark	AO / Spec. Ref.
05.2	any two from: • higher percentage of males than females needing valve replacement (after age 34) • greatest percentage of people / males / females needing valve replacement in age group 75 to 84 • higher percentage of people / males / females needing valve replacement as age increases • same percentage of males and females needing valve replacement before age 35 • biggest percentage difference between males and females is in 55 to 64 age group	allow answers in terms of numbers	2	AO3 3.2.3f

Question	Answers	Extra information	Mark	AO / Spec. Ref.
05.3	6.0 and 3.2	allow a tolerance of $\pm\frac{1}{2}$ a small square for 3.2	1	AO2 3.2.3f 6.3.3
	(6.0 - 3.2 =) 2.8	allow answer in range of 2.7 - 2.9	1	

Question	Answers	Extra information	Mark	AO / Spec. Ref.
05.4	any two from: • shortness of breath • chest pain • dizziness • tiredness / fatigue • increased heart rate • swelling of ankles • difficulty exercising	allow palpitations	2	AO3 3.2.3f

Question	Answers	Extra information	Mark	AO / Spec. Ref.
05.5	Level 3: A judgement, strongly linked and logically supported by a sufficient range of correct reasons, is given.		5-6	AO3 3.2.3 f, s
	Level 2: Some logically linked reasons are given. There may also be a simple judgement.		3-4	
	Level 1: Relevant points are made. They are not logically linked.		1-2	
	No relevant content		0	
	Indicative content Advantages of a biological valve: • reduced risk of blood clots • reduced risk of heart attack or stroke (due to blood clots) • reduced risk of bleeding • do not need to take anti (blood) clotting drugs • reduced risk of serious bleeds if in an accident • lower risk of rejection / immune reaction Disadvantages of a biological valve: • may be rejected • may not last for the person's lifetime as they will be a maximum of 80 when it needs replacing • may have to go through surgery more than once • risk of surgery increases with age and they will need surgery at 75 to 80 years • may have to take immunosuppressant drugs • need to find a donor with similar tissue type • have to wait for (suitable) donor For Level 3 , advantages and disadvantages must be considered.			

Total		13
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Question	Answers	Extra information	Mark	AO / Spec. Ref.
06.1	deforestation decreases and then increases		1	AO2 3.3.4c
	minimum deforestation rate was in 2012 or minimum deforestation rate was at a rate of 4000 square kilometres per year	allow other data quotes referring to area(s) of deforestation or time(s)	1	

Question	Answers	Extra information	Mark	AO / Spec. Ref.
06.2	any two from: • rise in sea level • melting of glaciers or melting of polar ice-caps • change in species distribution • change in animal migration patterns • more (severe) droughts / storms	allow flooding allow extinction of species allow desertification if no other mark awarded allow 1 mark for climate change	2	AO1 3.3.4d

Question	Answers	Extra information	Mark	AO / Spec. Ref.
06.3	required gene cut out from mustard plant (chromosome)		1	AO1 3.5.5 b, c
	(gene) inserted into a vector / plasmid / virus		1	
	vector / plasmid / virus with gene inserted into maize cells		1	
	reference to use of enzymes	do not accept incorrect enzymes	1	
	reference to transfer at an early stage of development		1	

Question	Answers	Extra information	Mark	AO / Spec. Ref.
06.4	$\frac{16}{100} \times 130 = 20.8$		1	AO2 3.5.5b 3.3.4c 6.3.15
	$660\,000\,000 \div 20.8$		1	
	31730769.2		1	
	$3.17(30769) \times 10^7$		1	
		allow 3.2×10^7		

Question	Answers	Extra information	Mark	AO / Spec. Ref.
06.5	any one from • (concerns about the possible) effects on (populations of) wild flowers / plants • (concerns about the possible) effects on (populations of) insects • (concerns about the possible) effects of eating GM crops on human health		1	AO1 3.5.5f

Total		14
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Question	Answers	Mark	AO/ Spec. Ref
07.1	antibiotic will stop bacteria making proteins	1	AO2 3.1.1a 3.4.7f
	(so) bacteria cannot divide / grow / replicate	1	

Question	Answers	Extra information	Mark	AO / Spec. Ref.
07.2	protective protein blocks / covers the antigens (on the surface of bacteria)		1	AO2 3.4.7f
	(so) antibiotic Y cannot attach (to kill the bacteria)		1	

Question	Answers	Extra information	Mark	AO / Spec. Ref.
07.3	3200		1	AO2 3.4.7f 6.3.11

Question	Answers	Extra information	Mark	AO / Spec. Ref.
07.4	0.8 (hours)	allow 0.75	1	AO2 3.4.7f 6.3.19

Question	Answers	Extra information	Mark	AO / Spec. Ref.
07.5	both reduce numbers (of living bacteria)		1	AO3 3.4.7f
	most rapidly during the first 2 hours for antibiotic A and first hour for antibiotic B		1	
	B reduces numbers more (than A)		1	
	numbers continue to (slowly) go down in A but stop decreasing in B after 4 hours		1	

Question	Answers	Extra information	Mark	AO / Spec. Ref.
07.6	decrease by more than 50% or decreases to 1300	allow decreases by 1900	1	AO2 3.4.7c, f
	(so) remaining bacteria can be destroyed by phagocytosis / antibodies		1	

Question	Answers	Extra information	Mark	AO / Spec. Ref.
07.7	to reduce exposure of bacteria to antibiotics (in animals)		1	AO3 3.4.7 h, i, j
	(because of) a greater risk of bacteria becoming antibiotic resistant through mutations		1	
	(and then) antibiotic resistant bacteria surviving and infecting humans	allow if too many bacteria develop resistant strains to all the antibiotics we currently have, scientists would need to develop new ones and this is very expensive if no other marks awarded allow 1 mark for antibiotics getting into meat eaten by humans or 1 mark for the antibiotics kill normal gut bacteria (in animals)	1	

Total		15
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