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INTERNATIONAL GCSE

Biology

9201/1

Paper 1

Mark Scheme

June 2022

Version: 1.0 Final Mark Scheme



2 2 6 Y 9 2 0 1 1 / 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 (cell) membrane B cytoplasm		1 1	AO1 3.1.1a

Question	Answers	Extra information	Mark	AO / Spec. Ref.
01.2	DNA	allow deoxyribonucleic acid	1	AO1 3.5.3h

Question	Answers	Extra information	Mark	AO / Spec. Ref.
01.3	mitosis		1	AO1 3.5.2d

Question	Answers	Extra information	Mark	AO / Spec. Ref.
01.4	any two from: <ul style="list-style-type: none"> • (malignant) invade other tissues / parts of the body • (cells) can travel in the bloodstream • they form secondary tumours 	ignore reference to cells allow spread to other tissues / parts of the body	2	AO1 3.5.2n

Question	Answers	Extra information	Mark	AO / Spec. Ref.
01.5	any one from: <ul style="list-style-type: none"> • ionising radiation • asbestos • inheriting mutations in genes linked to formation of a tumour 	allow X-rays, UV rays and gamma rays, sunlight, sun do not allow chemical radiation allow named examples eg, BRCA1, p53 allow alcohol allow other correct carcinogens	1	AO1 3.5.2o

Question	Answers	Extra information	Mark	AO / Spec. Ref.
01.6	all three bars drawn to correct height	allow of \pm half a small square. allow 1 mark if two bars drawn to correct height.	2	AO2 3.5.2o 6.3.9

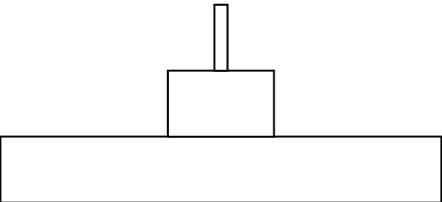
Question	Answers	Extra information	Mark	AO / Spec. Ref.
01.7	from (11 - 12) to (13 - 14)		1	AO3 3.5.2o

Question	Answers	Extra information	Mark	AO / Spec. Ref.
01.8	any one from: <ul style="list-style-type: none"> • better education about the risks of smoking • restrictions on advertising • warning on cigarette packaging • awareness of effects of smoking on unborn babies 	allow awareness of link between smoking and cancer allow other sensible suggestions for example laws about smoking or people have switched to e-cigarettes or the use of nicotine replacement products	1	AO3 3.5.2o

Total Question 01	11
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Question	Answers	Extra information	Mark	AO / Spec. Ref.
02.1	plants → mice → owl		1	AO3 3.3.1d

Question	Answers	Extra information	Mark	AO / Spec. Ref.
02.2	(less energy lost as) fewest stages / steps or shortest chain	allow fewer or shorter	1	AO2 3.3.1d

Question	Answers	Extra information	Mark	AO / Spec. Ref.
02.3		<p>_____ Fox _____</p> <p>_____ Rabbit _____</p> <p>_____ Plant _____</p>	1	AO2 3.3.1c

Question	Answers	Extra information	Mark	AO / Spec. Ref.
02.4	<p>A: photosynthesis</p> <p>B: respiration</p> <p>C: combustion / burning</p>	ignore anaerobic / aerobic	<p>1</p> <p>1</p> <p>1</p>	AO2 3.3.3e

Question	Answers	Extra information	Mark	AO / Spec. Ref.
02.5	any two from: <ul style="list-style-type: none"> • changes in the Earth's climate • rise in sea level • ice caps melting • changes in migration patterns of birds / animals • changes in the distribution of species 	allow correct examples of climate change eg storms, flooding, drought allow habitat destruction allow changes in the distribution of plants / animals allow reduce biodiversity or extinction	2	AO1 3.3.4d

Question	Answers	Extra information	Mark	AO / Spec. Ref.
02.6	cow = 17 sectors sheep = 2 sectors both labelled correctly	allow 1 mark if wrong number of sectors filled in but cow and sheep have been labelled with cow larger than sheep	1 1	AO2 3.3.4d 6.3.9

Question	Answers	Extra information	Mark	AO / Spec. Ref.
02.7	cows produce more / most / lots of methane methane is a greenhouse gas or methane can contribute to global warming		1 1	AO2 3.3.4d

Total Question 02	12
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Question	Answers	Extra information	Mark	AO / Spec. Ref.
03.1	stem root	allow in any order allow flower	2	AO1 3.1.4b

Question	Answers	Extra information	Mark	AO / Spec. Ref.
03.2	35°C		1	AO3 3.2.2d

Question	Answers	Extra information	Mark	AO / Spec. Ref.
03.3	guard cells		1	AO1 3.2.2e

Question	Answers	Extra information	Mark	AO / Spec. Ref.
03.4	to prevent / reduce water loss from the leaf	allow to block the stomata	1	AO4 3.2.2d

Question	Answers	Extra information	Mark	AO / Spec. Ref.
03.5	(A) only loses a very small amount of water		1	AO3 3.2.2d
	as all stomata are blocked		1	
	(C) loses more water than B		1	
	as there are more stomata on the lower surface of the leaf		1	

Question	Answers	Extra information	Mark	AO / Spec. Ref.
03.6	<p>(waxy cuticle) impermeable to water</p> <p>(so) reduces water loss by evaporation</p> <p>or</p> <p>(reduced leaves / spines) lower surface area</p> <p>(so) reduced loss of water by evaporation / transpiration</p> <p>or</p> <p>(roots) long</p> <p>(so) absorb water from deeper in the soil</p> <p>or</p> <p>(roots) widespread</p> <p>absorb water from a wider area of the soil</p> <p>or</p> <p>(size of plant above ground) small surface area</p> <p>(so) reduced water loss by evaporation</p> <p>or</p> <p>(spines) deter herbivores eating the cactus</p> <p>(so) retaining stored water</p>	<p>allow spines trap a layer of moist air (so) increases the humidity / decreases evaporation. or allow reduces diffusion gradient for water vapour</p> <p>allow increases surface area available for water absorption</p> <p>allow increases surface area available for water absorption</p> <p>do not allow SA:V</p>	<p>1</p> <p>1</p> <p>(1)</p> <p>(1)</p> <p>(1)</p> <p>(1)</p> <p>(1)</p> <p>(1)</p> <p>(1)</p> <p>(1)</p> <p>(1)</p> <p>(1)</p> <p>(1)</p>	<p>AO2 3.3.2d</p>
Total Question 03			11	

Question	Answers	Extra information	Mark	AO / Spec. Ref.
04.1	controls the passage of substances into and out of the cell	ignore allows / lets passage of substances	1	AO1 3.1.1a

Question	Answers	Extra information	Mark	AO / Spec. Ref.
04.2	ingest pathogen or phagocytosis	allow engulf ignore digest / hydrolyse / consume	1	AO1 3.4.7c
	produce antibodies		1	
	produce antitoxins (that counteract toxins released by pathogen)		1	

Question	Answers	Extra information	Mark	AO / Spec. Ref.
04.3	removes virus from hands (preventing it being transferred)	ignore kills viruses	1	AO2 3.4.7

Question	Answers	Extra information	Mark	AO / Spec. Ref.
04.4	any one from: <ul style="list-style-type: none"> • bury the dead as soon as possible • wear protective clothing when dealing with the dead / patients • isolate infected people • use of disinfectant prior or after contact with infected area • vaccination (prior to exposure to Ebola) • use of antiviral drugs 	allow incinerate / burn all contaminated clothing / materials allow hazmat suit ignore masks / gloves / PPE unqualified ignore social distancing ignore hand sanitiser	1	AO3 3.4.7

Question	Answers	Extra information	Mark	AO / Spec. Ref.
04.5	white blood cells and liver cells have the same (shaped) receptor	allow all other cells have a different shape of receptor	1	AO2 3.4.7

Question	Answers	Extra information	Mark	AO / Spec. Ref.
04.6	any one from: <ul style="list-style-type: none"> • haemorrhage (from blood vessels) or uncontrolled bleeding • cuts will not stop bleeding • bruise easily 	allow example of abnormal bleeding such as coughing blood or internal bleeding.	1	AO2 3.4.7

Question	Answers	Extra information	Mark	AO / Spec. Ref.
04.7	poisons / toxins are not detoxified / broken down or no detoxification occurs (in the liver) (so) poisons / toxins remain in the blood (and) circulate in the brain causing damage to cells	allow ammonia not made into urea	1	AO2 3.4.3c
		allow ammonia remains in blood	1	
		allow:	1	
		excessive blood loss / haemorrhage	(1)	
		or clotting factors not produced	(1)	
(so) less / insufficient blood to brain	(1)			
(and so) insufficient oxygen to brain leading to death of cells	(1)			

Total Question 04	11
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Question	Answers	Extra information	Mark	AO / Spec. Ref.
05.1	<p>Method of communication</p> <p>Chemical</p> <p>Sound</p> <p>Visual</p>	<p>Example</p> <p>colour markings on a bird</p> <p>a cat 'spraying' its territory with urine</p> <p>a bird chirping</p> <p>a cat licking another cat</p> <p>young bears play fighting</p>	3	AO2 3.4.6e

Question	Answers	Extra information	Mark	AO / Spec. Ref.
05.2	<p>any one from</p> <ul style="list-style-type: none"> • 31 • 32 • 33 	<p>allow any temperature above 30 and below 34 either as a single value or as a range</p> <p>do not allow 30 or 34 as part of a range</p>	1	AO3 3.4.6 6.3.5

Question	Answers	Extra information	Mark	AO / Spec. Ref.
05.3	<p>any one from</p> <ul style="list-style-type: none"> removal of large number of eggs could result in reduction in numbers of species / population incubation at some temperatures led to offspring not surviving removal of eggs distresses parents offspring may need to be killed to determine sex 	<p>allow correctly named temperatures</p> <p>allow some of the baby alligators would be killed</p>	1	AO4 3.4.6

Question	Answers	Extra information	Mark	AO / Spec. Ref.
05.4	<p>any two from:</p> <ul style="list-style-type: none"> test every degree instead of every two degrees use nests in the wild / vegetation instead of in the laboratory use the same nest location when collecting the eggs equal number of eggs in each group same species of alligator remove eggs from nest immediately <p>or</p> <p>remove eggs from nest at same time after laying</p>	<p>allow test at smaller intervals (of temperature)</p> <p>allow same age of eggs</p>	2	AO4 3.4.6

Question	Answers	Extra information	Mark	AO / Spec. Ref.
05.5	(decay involves) microorganisms / bacteria / decomposers		1	AO2 3.3.3b 3.2.6b
	(which) respire		1	
	(respiration) releases thermal energy (to the environment / eggs)	allow release heat do not accept energy produced / made / created	1	

Question	Answers	Extra information	Mark	AO / Spec. Ref.
05.6	any three from: <ul style="list-style-type: none"> • opening will reduce temperature if too hot by transferring heat to the outside air • opening will allow oxygen to enter (to aid decay) • closing will stop heat loss if nest is too cold <ul style="list-style-type: none"> • opening during day and closing at night will control normal temperature drop seen at night 	allow opening with enable heat to be lost if nest is too hot / warm allow closing will trap heat in nest or closing will maintain the temperature of the nest in cold weather ignore predators	3	AO3 3.3.3b 3.4.6

Total Question 05	13
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Question	Answers	Extra information	Mark	AO / Spec. Ref.
06.1	any two from <ul style="list-style-type: none"> • water content • <u>blood</u> glucose / sugar • ion content 	allow correct examples (Na ⁺) allow pH allow blood pressure allow oxygen allow carbon dioxide	2	AO1 3.4.2e

Question	Answers	Extra information	Mark	AO / Spec. Ref.
06.2	thermoregulatory (centre)	allow hypothalamus	1	AO1 3.4.4a

Question	Answers	Extra information	Mark	AO / Spec. Ref.
06.3	Level 3: Relevant points (reasons/causes) are identified, given in detail and logically linked to form a clear account.		5-6	AO1 3.4.4b,c,d
	Level 2: Relevant points (reasons/causes) are identified, and there are attempts at logical linking. The resulting account is not fully clear.		3-4	AO1 3.4.4b,c,d
	Level 1: Points are identified and stated simply, but their relevance is not clear and there is no attempt at logical linking.		1-2	AO1 3.4.4b,c,d
	No relevant content		0	
	<p>Indicative content</p> <ul style="list-style-type: none"> • receptors detect temperature of the blood / skin <p>Temperature too low</p> <ul style="list-style-type: none"> • blood vessels supplying skin (capillaries) constrict • vasoconstriction • (so) reduced blood flow through capillaries • (so) less energy is transferred from the skin to the environment • (skeletal) muscles contract (shiver) • contraction requires respiration • (which) transfers energy to warm the body • sweating stopped / reduced • reduced evaporation so less cooling of skin <p>Temperature too high</p> <ul style="list-style-type: none"> • blood vessels supplying skin (capillaries) dilate • vasodilation • increased blood flow through skin capillaries • (so) more energy is transferred from the skin to the environment • (increased) sweating • sweating cools the body as sweat evaporates from the skin <p>For level 3 both description and explanation of too high and too low are required.</p>			

Question	Answers	Extra information	Mark	AO / Spec. Ref.
06.4	respiration	ignore ref to aerobic or anaerobic	1	AO1 3.2.6f

Question	Answers	Extra information	Mark	AO / Spec. Ref.
06.5	$\frac{7.86 \times 10^{-3}}{1.40 \times 10^{-5}}$	allow an incorrectly calculated ratio correctly rounded to 3 significant figures	1	AO2 3.2.6f
	561.42871.....		1	
	561(:1)		1	

Question	Answers	Extra information	Mark	AO / Spec. Ref.
06.6	smaller surface area : volume means elephant will lose energy less quickly to the environment	allow does not require such a high metabolic rate to release energy ignore temperature / environment differences	1	AO2 3.2.6f
	(so) does not require such a high metabolic rate to generate (thermal) heat		1	

Total Question 06	15
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Question	Answers	Extra information	Mark	AO / Spec. Ref.
07.1	diaphragm contracts	ignore reference to intercostal muscles or ribs	1	AO1 3.2.5b
	(diaphragm) flattens or moves down	do not accept stretches / relaxes	1	
	(so) increase in volume of thorax / chest (cavity)	ignore lungs	1	
	(and) decrease in pressure of thorax / chest (cavity)	allow decrease of pressure in lungs	1	
	(pressure is) below that of the surrounding air	allow pressure outside is greater than pressure inside	1	

Question	Answers	Extra information	Mark	AO / Spec. Ref.
07.2	(these antibiotics) destroy the <u>cell wall</u> and body cells do not have cell walls		1	AO2 3.1.1c

Question	Answers	Extra information	Mark	AO / Spec. Ref.
07.3	(random) mutations occur in the bacteria	do not accept idea of bacteria mutating	1	AO1 3.4.7h
	mutated gene / allele gives bacteria resistance to antibiotic	ignore DNA, genetic material	1	
	resistant bacteria are not killed		1	
	(so) they reproduce and pass on the gene / allele / DNA (for resistance to next generation)		1	

Question	Answers	Extra information	Mark	AO / Spec. Ref.
07.4	MRSA killed around species B with gene, but not without the gene	allow MRSA bacteria only killed when gene for chemical is present	1	AO4 AO3 3.4.7
	(which shows that) it was the chemical (from the gene) killing MRSA	allow MRSA is not growing around species B with the gene, but MRSA is growing around species B without the gene	1	

Question	Answers	Extra information	Mark	AO / Spec. Ref.
07.5	in Group 1 (percentage of) MRSA decreased and (percentage of) species B increased		1	AO2 3.4.7
	in Group 2 the percentages remained at 50% or close to 50%	allow percentages did not change	1	

Question	Answers	Extra information	Mark	AO / Spec. Ref.
07.6	MRSA killed by chemical from species B so numbers decreased	allow MRSA killed by chemical from species B so no MRSA left / remains or all MRSA killed by chemical from species B	1	AO2 AO3 3.3.2
	(so) species B has less competition for nutrients/oxygen		1	
	species B reproduces (rapidly) so numbers increase		1	

Total Question 07	17
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