GCSE

BIOLOGY

8461/1F

Paper 1 Foundation Tier

Mark scheme

June 2019

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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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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 / ; e.g. 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 error / 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.

4. Level of response marking instructions

Extended response questions are marked on level of response mark schemes.

- 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 two 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.

When assigning a level you should look at the overall quality of the answer. Do **not** look to penalise 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.

Use the variability of the response to help decide the mark within the level, ie if the response is predominantly level 2 with a small amount of level 3 material it would be placed in level 2 but be awarded a mark near the top of the level because of the level 3 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.

You should ignore any irrelevant points made. However, full marks can be awarded only if there are no incorrect statements that contradict a correct response.

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	rice		1	4.2.2.1 AO3
01.2	25 (%)	allow an answer between 23 and 27 (%) ignore ¼ / 0.25	1	4.2.2.1 AO2
01.3	(beans) contain all (four) food groups	allow converse for chicken allow chicken contains no / less carbohydrate **or** beans contain carbohydrate allow beans contain more nutrients ignore references to water / fat / protein	1	4.2.2.1 AO3
01.4	amylase		1	4.2.2.1 AO1
01.5	Benedict's reagent		1	4.2.2.1 AO1
01.6	(brick) red / green / yellow / orange / brown		1	4.2.2.1 AO1
01.7	C		1	4.2.2.1 AO3
01.8	small intestine	allow ileum ignore intestine unqualified do **not** accept large intestine / duodenum	1	4.1.3.3 4.2.2.1 AO1
01.9	active transport osmosis		1 1	4.1.3.2 4.1.3.3 AO1 AO1
Total			**10**	

Question	Answers	Extra information	Mark	AO / Spec. Ref.
02.1	the movement of particles from a high concentration to a low concentration		1	4.1.3.1 AO1
02.2	(gills) have (many) projections (for) large(r) surface / area **or** (gills) are on the outside of the body (1) for good access to water (1)	allow description of projections allow have lots of / five gills	1 1	4.1.3.1 AO2
02.3	differentiation		1	4.1.2.3 AO1
02.4	mitosis	do **not** accept meiosis	1	4.1.2.2 AO1
02.5	hair		1	4.1.2.2 4.1.2.3 AO1
02.6	axolotls are cheap to feed axolotls are easy to breed		1 1	4.1.2.3 AO3
02.7	D		1	4.2.2.2 AO1
02.8	trachea	allow windpipe allow cartilage (ring)	1	4.2.2.2 AO1
02.9	pulmonary artery		1	4.2.2.2 AO1
Total			**11**	

Question	Answers	Extra information	Mark	AO / Spec. Ref.
03.1	epidermis palisade mesophyll xylem	 allow palisade / mesophyll	3	4.2.3.2 4.2.3.1 AO1
03.2	guard cells		1	4.2.3.2 4.2.3.1 AO1
03.3	to let carbon dioxide into the leaf		1	4.2.3.2 AO1
03.4	by evaporation		1	4.2.3.2 AO1
03.5	 evidence of correct graph readings (5 and 1) 4 (cm^3)	an answer of 4 (cm^3) scores **2** marks allow in range 4.8 to 5.2 and 0.8 to 1.2 allow correct subtraction from their graph readings allow their calculated value from readings in the range 4.6 to 5.4 and 0.6 to 1.4	 1 1	4.2.3.2 AO2
03.6	plant **A** has more leaves		1	4.2.3.2 AO3
03.7	any **one** from: (the new room was) • windier • warmer • drier / less humid • brighter	answers must be comparative allow sunnier ignore more sun	1	4.2.3.2 AO2

Question	Answers	Extra information	Mark	AO / Spec. Ref.
03.8	any **one** from: • spikes / points / thorns / sharp • poisonous / toxic • brightly coloured berries • leaves are tough / leathery **or** leaves are hard to chew	ignore reference to predators eating holly allow unpleasant taste	1	AO2 4.3.3.2
Total			**11**	

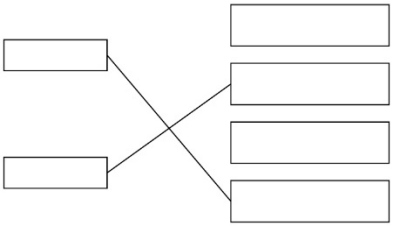
Question	Answers	Extra information	Mark	AO / Spec. Ref.
04.1	temperature volume of yeast and water		1 1	4.4.2.1 AO3
04.2	28		1	4.4.2.1 AO2
04.3	carbon dioxide		1	4.4.2.1 AO2
04.4	the greater the mass of sugar, the greater the volume of foam / gas produced	allow reference to weight / amount of sugar allow reference to amount of foam / gas allow positive correlation ignore names of gases ignore directly proportional	1	4.4.2.1 AO3
04.5	no respiration occurs **or** sugar / glucose is needed for respiration	ignore no reaction occurs	1	4.4.2.1 AO2
04.6	for comparison / to compare **or** to check that no other factor / variable is influencing the results **or** to ensure validity	allow as a control (experiment) allow as a base line do **not** accept as a control variable allow answers in the context of the investigation e.g. to prove that the results obtained were due to the sugar (and nothing else) ignore fair test / accuracy	1	4.4.2.1 AO2
04.7	(it) stops the oxygen / air getting in / through	ignore (it) stops the oxygen / air getting out ignore gases unqualified	1	4.4.2.1 AO2

Question	Answers	Extra information	Mark	AO / Spec. Ref.
04.8	ethanol		1	4.4.2.1 AO1
Total			**9**	

Question	Answers	Extra information	Mark	AO / Spec. Ref.
05.1	gonorrhoea		1	4.3.1.3 AO1
05.2	the bacteria are resistant to the antibiotics		1	4.3.1.3 AO2
05.3	abstain from sex(ual intercourse) **or** wash hands after touching penis / urinating / using the toilet	allow abstinence ignore wash hands unqualified	1	4.3.1.1 4.3.1.3 AO2
05.4	**Level 2:** Scientifically relevant features are identified; the way(s) in which they are similar / different is made clear and (where appropriate) the magnitude of the similarity / difference is noted.		4–6	4.1.1.6 AO3 x3 AO2 x3
	Level 1: Relevant features are identified and differences noted.		1–3	
	No relevant content		0	
	Indicative Content: **qualitative statements** • **3** works best on **A** • **1** works best on **B** • **2** works best on **C** • **1** is least effective on **A** • **3** is least effective on **B** • **3** is least effective **or** has no effect on **C** **quantitative statements** • **1** kills more of **B** and **C** compared to **A** • **2** kills more of **C** than **A** / **B** • **3** kills more of **A** than **B** and **C** • **2** kills the same amount of **A** and **B** • **2** and **3** killed similar amounts of **B** • **C** are resistant to **3** • only **2** worked well on all of the bacteria • for **A**, **3** works best, **2** is next and **1** is least effective • for **B**, **1** works best, **2** is next and **3** is least effective • for **C**, **2** works best, **1** is next and **3** is least effective for **level 2** reference to qualitative and quantitative statements is required			

Question	Answers	Extra information	Mark	AO / Spec. Ref.
05.5	sample **E**		1	4.1.1.6 AO2
05.6	$\frac{15 + 12 + 13 + 16}{4}$ **or** $\frac{56}{4}$ 14	an answer of 14 scores **2** marks	1 1	4.1.1.6 AO2
05.7	(area = 0.1 × 0.1 =) 0.01 (volume = 0.01 × 0.01 =) 0.0001 (number = $\frac{14}{0.0001}$ =) 140 000	an answer of 140 000 scores **3** marks an incorrect answer for one step does not prevent allocation of marks for subsequent steps allow 1×10^{-2} allow 1×10^{-4} allow ecf from question **05.6** allow 1.4×10^{5} do **not** accept 14×10^{4}	1 1 1	4.1.1.6 AO2
05.8	Q		1	4.1.1.6 AO2
05.9	(bacteria) could make humans ill **or** (bacteria) could kill humans **or** (bacteria) could release toxins	allow reverse argument allow (bacteria) cause infection / disease allow (bacteria) cause appropriately named disease ignore harmful	1	4.3.1.1 AO2
Total			**17**	

Question	Answers	Extra information	Mark	AO / Spec. Ref.
06.1	circulatory / circulation (system)	allow cardiovascular (system) ignore blood (system) ignore cardiorespiratory system	1	4.2.2.2 4.2.1 AO1
06.2	any valve ringed 	allow more than one valve separately ringed	1	4.2.2.2 AO1
06.3	prevent backflow (of blood) **or** ensure one-way flow	allow correct description of backflow allow maintains (correct) direction of blood	1	4.2.2.2 4.2.2.4 AO1
06.4	vein	allow correctly named veins	1	4.2.2.2 AO1
06.5	any **two** from: (referring to mechanical valves) • long lasting **or** durable **or** does not break / tear **or** does not wear out • do not need to go into hospital / surgery again • no ethical issues (surrounding use of living / animal tissue) • no risk of rejection • no need for anti-rejection / immunosuppressant drugs • no risk of transmission of disease	allow reliable allow less likely to need a replacement (after 5 years) ignore no need for a replacement	2	4.2.2.4 AO3

Question	Answers	Extra information	Mark	AO / Spec.Ref.
06.6	no need to take anti-clotting medication	allow can't hear a pig valve allow can get a better fit with a pig valve allow less leaky with a pig valve allow less likely to get a heart attack / stroke ignore will not get blood clots (around the valve)	1	4.2.2.4 AO3
06.7		an additional line from a medical condition negates the mark	2	4.2.2.2 AO1
Total			**9**	

Question	Answers	Extra information	Mark	AO / Spec. Ref.
07.1	controls the (activities of the) cell	allow contains genetic information / genes / DNA / chromosomes do **not** accept brain do **not** accept controls substances entering / leaving the cell	1	4.1.1.2 AO1
07.2	red blood cell / RBC **or** bacteria / prokaryote **or** xylem (cell)	allow erythrocyte ignore blood cell unqualified ignore platelets allow named examples of bacteria do **not** accept virus	1	4.2.2.3 4.1.1.1 AO1
07.3	cell shape is similar to cell in **Figure 12 and** nucleus present any **two** features correctly identified and labelled: • nucleus • (cell) membrane • cytoplasm • mitochondria / mitochondrion • ribosome(s)	ignore shading do **not** accept a cell wall drawn allow cell wall if drawn and correctly labelled do **not** accept other plant sub-cellular structures	1 1	4.1.1.2 AO2 8.2.1 AO1
07.4	any **one** from: • (cellulose cell) wall • chloroplast • (permanent) vacuole	ignore chlorophyll allow starch grain	1	4.1.1.2 AO1

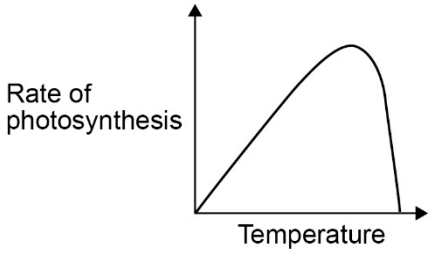
Question	Answers	Extra information	Mark	AO / Spec. Ref.
07.5		an answer of (×) 400 scores **3** marks an answer of (×) 40 scores **2** marks		4.1.1.5 AO2
	24 (mm) **or** 2.4 (cm)	allow in range 23 to 25 (mm) **or** in range 2.3 to 2.5 (cm)	1	
	$\frac{24}{0.06}$ **or** $\frac{2.4}{0.06}$	allow correct calculation from their measurement of **X** to **Y** in the range 2.3 cm to 3.5 cm **or** 23 mm to 35 mm	1	
	(×) 400	allow correct magnification derived from their measurement in **mm** ignore rounding errors	1	
07.6	high(er) magnification	ignore bigger / zoom	1	4.1.1.5 AO1
	high(er) resolution **or** high(er) resolving power	allow see more detail	1	
		if neither mark awarded allow **1** mark for see smaller objects **or** see smaller sub-cellular structures		
		allow 3D image		
Total			**10**	

Question	Answers	Extra information	Mark	AO / Spec. Ref.
08.1	a protist		1	4.3.1.5 AO1
08.2	lower percentage of people with malaria when using (mosquito) nets	allow converse if clearly describing people who do not use (mosquito) nets allow fewer people with malaria when using (mosquito) nets allow **only** 1.2% of people with malaria when using (mosquito) nets ignore reference to data from table unqualified do **not** accept incorrectly calculated figures	1	4.3.1.5 AO3
08.3	any **one** from: • some people who use (mosquito) nets have malaria • data from only one area / part of Africa • size of group too small **or** sample size too small **or** only 476 people • only 50 people did not use (mosquito) nets **or** uneven group sizes (nets vs. no nets) • no other information about people considered • people may have lied about using (mosquito) nets	allow people can get malaria when they are not sleeping allow correlation does not imply causation allow examples of information not considered e.g. age, other medical issues such as sickle cell, whether taking anti-malarial medication, vaccination ignore ref to other factors unqualified	1	4.3.1.5 AO3
08.4	any value between 88 – 91	allow decimal values	1	4.3.1.5 AO2

Question	Answers	Extra information	Mark	AO / Spec. Ref.
08.5	any **one** from: • improved health care	allow examples of improved health care such as **more / cheaper / new** treatments / vaccinations / antibiotics	1	4.2.2.5 4.3.1.5 AO2
	• use of mosquito control methods	allow descriptions such as spraying of insecticides / repellent **or** draining water holes **or** preventing mosquitoes from breeding		
	• changing behaviour to avoid being bitten (by mosquitoes)	allow descriptions such as wear long clothing **or** avoid going out at dusk		

Question	Answers	Extra information	Mark	AO / Spec. Ref.
08.6	**Level 2:** Scientifically relevant facts, events or processes are identified and given in detail to form an accurate account.		4–6	4.3.1.6 4.3.1.7 AO1
	Level 1: Facts, events or processes are identified and simply stated but their relevance is not clear.		1–3	
	No relevant content		0	
	Indicative content ***prevents pathogens from entering*** **skin** • tough / dry / dead outer layer • skin acts as a barrier • sebum / oil on (surface of) skin • sebum / oil repels pathogens • scabs form over cuts **or** scabs form a barrier • platelets are involved in forming clots / scab **stomach** • contains (hydrochloric) acid • (HCl) kills bacteria • in food **or** in swallowed mucus **eyes** • produce tears • contains enzymes to kill bacteria • tears are antiseptic **breathing system** • trachea / bronchi / nose produce mucus • mucus is sticky • (mucus) traps bacteria • (mucus) carried away by cilia ***defends itself against pathogens inside the body*** • immune system / white blood cells (WBCs) • WBCs engulf pathogens • antitoxins are produced • (antitoxins) neutralise toxins / poisons (produced by pathogen) • antibodies are produced • (antibodies) help destroy pathogens • memory cells (are formed) • (memory cells give a) more rapid response if pathogen re-enters a **level 2** response should refer to body defence **and** the immune system			
Total			**11**	

Question	Answers	Extra information	Mark	AO / Spec. Ref.
09.1	LHS: carbon dioxide **and** water RHS: glucose	words take precedence over symbols allow correct symbols (ignore balancing) in any order do **not** accept starch ignore carbohydrates / sugar	1 1	4.4.1.1 AO1
09.2	power output of bulb		1	4.4.1.2 AO2
09.3	any **two** from: • repeat **and** calculate a mean **or** repeat **and** to eliminate anomalies • control the (water) temperature • control the concentration of carbon dioxide • control the distance of the bulb from the pondweed • control the mass / length / species / age of the pondweed • give pondweed time to equilibrate	ignore do a control experiment unqualified allow a method of controlling (water) temperature allow a method of controlling carbon dioxide concentration allow use the same piece of pondweed allow do experiment with the bulb off / in the dark	2	4.4.1.2 AO3
09.4	3.3 (cm^3/hour)		1	4.4.1.2 AO2

Question	Answers	Extra information	Mark	AO / Spec. Ref.
09.5	correct scale **and** axis labelled	max **3** marks for bar chart	1	4.4.1.2 AO2
	all points plotted correctly	allow points plotted to within ± ½ small square allow 3 or 4 correct plots for **1** mark allow correct plot from incorrect value calculated in question **09.4**	2	
	correct curved line of best fit	ignore line extended beyond 60 / 250 (W) ignore line joined point to point with straight lines	1	
09.6	correct answer from their line drawn on **Figure 15**	allow ± ½ small square tolerance allow 1.8 / 1.9 if no line of best fit or incorrect graph is drawn	1	4.4.1.2 AO2
09.7			1	4.4.1.2 AO2
Total			**12**	