AQA GCSE Combined Science - Trilogy | 8464

SPECIFICATION POINT 4.7.1.3

Biotic factors

Mark schemes and examiner comments

Tier	**Foundation**
Question groups	**10**
Available paper years	**2018–2025**

Using this booklet

1. Booklet answer numbers match the question booklet.
2. Use the original question number within marking tables.
3. Examiner comments are included where available.

Name: _____ **Date:** _____

Where a precise marking extract is unavailable, the full source document is included in an appendix. Any missing mark scheme is explicitly identified.

4.7.1.3 Biotic factors

Answer 01 · Mark scheme

June 2018 | 8464/B/1F | Original Q1

The full source mark scheme begins on page 31. Follow original question 1 in that document.

4.7.1.3 Biotic factors

Answer 02 · Mark scheme June 2018 | 8464/B/2F | Original Q6

Question	Answers	Extra information	Mark	AO / Spec. Ref.
06.1	<table><tr><th>Factor</th><th>Biotic</th><th>Abiotic</th></tr><tr><td>Diseases</td><td>✓</td><td></td></tr><tr><td>Herbivores</td><td>✓</td><td></td></tr><tr><td>Temp</td><td></td><td>✓</td></tr><tr><td>Water</td><td></td><td>✓</td></tr></table>	allow **1** mark for 2 or 3 correct	2	AO1 4.7.1.3 4.7.1.2
06.2	(leaves block light near tree so) more light (as you move outwards)	allow low light intensity under tree ignore Sun	1	AO2 4.7.2.1
	for photosynthesis	allow less photosynthesis under the tree	1	AO1 4.7.2.1 4.4.1.1 4.4.1.3
	(which) produces (more) glucose / proteins (for growth)	ignore growth ignore food allow molecules, cell components or other correct substances instead of proteins if no other mark awarded allow less water / ions / minerals / nutrients under the tree	1	AO1 4.7.2.1 4.4.1.1 4.4.1.3
06.3		in this order		AO1 4.7.2.1
	quadrat	correct spelling only	1	
	light meter	allow lux meter allow light intensity meter allow light data logger	1	
06.4	1.5(0) (m^2)	allow 15 000 cm^2	1	AO2 4.7.2.1

4.7.1.3 Biotic factors

Answer 02 · Mark scheme

Question	Answers	Extra information	Mark	AO / Spec. Ref.
06.5	to keep light (intensity) as similar as possible	allow the light (intensity) might change ignore references to temperature ignore weather ignore Sun	1	AO3 4.7.2.1
06.6	any **one** from: • repeat (investigation) around the tree • repeat (investigation) for other trees / areas • sample every one metre • count the number of each species present (rather than percentage cover)	allow repeat in different directions ignore repeats unqualified ignore repeat at different times / days / seasons ignore different size quadrat ignore random sampling	1	AO3 4.7.2.1
06.7	daisy		1	AO3 4.7.2.1
06.8	as light (intensity) increased so did the percentage / cover of plants up to 100% / maximum at 175 (arbitrary units)	ignore directly proportional ignore positive correlation unqualified ignore distance	1 1	AO3 4.7.2.1

4.7.1.3 Biotic factors

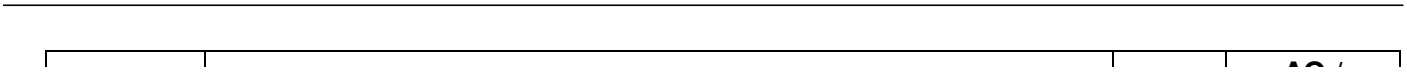
Answer 02 · Mark scheme

Question	Answers	Extra information	Mark	AO / Spec. Ref.
06.9	any pair from: • (lack of) water / rain (1) because the leaves are stopping the rain **or** because the roots of the tree are absorbing it (1) • (lack of) minerals / ions (1) because the tree (roots) have absorbed them (1) • temperature (1) because less thermal energy from the sun is reaching under the tree canopy (1)	ignore carbon dioxide do **not** accept oxygen allow soil moisture allow magnesium / nitrate / nutrients allow too cold / cooler allow 'heat' for thermal energy allow pH / acidity (1) because (some) fallen leaves are acidic (1)	2	AO2 4.7.2.1
Total			**15**	

4.7.1.3 Biotic factors

Answer 02 · Mark scheme

June 2018 | 8464/B/2F | Original Q6



4.7.1.3 Biotic factors

Answer 03 · Mark scheme

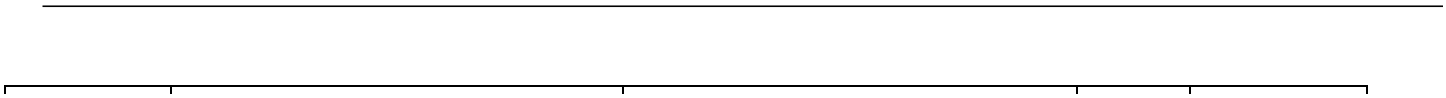
June 2019 | 8464/B/2F | Original Q2

Question	Answers	Extra information	Mark	AO / Spec. Ref.
02.1	description of any correct method to achieve randomness e.g. random number generator	ignore throwing quadrat / frame	1	AO3 4.7.2.1 10.2.7
02.2	frame / square	allow rectangle ignore internal squares / grid	1	AO1 4.7.2.1 10.2.7
02.3 mark with **2.4** and **2.5**	9(.0)		1	AO2 4.7.2.1 10.2.7
02.4 mark with **2.3** and **2.5**	15 000 (m^2)		1	AO2 4.7.2.1 10.2.7
02.5 mark with **2.3** and **2.4**	9.0 × 15 000 135 000	answer must be consistent with answers in questions **02.3** and **02.4**	1 1	AO2 4.7.2.1 10.2.7
02.6	any **two** from: • herbivores / animals • competing (with other plants) • (human) trampling / playing • (plant) disease / pathogen • mowing	allow being eaten	2	AO1 4.7.1.2 4.7.1.3
02.7	less light / water for photosynthesis **or** fewer ions / nitrates / minerals (1) so fewer proteins (1)	ignore Sun allow fewer magnesium (ions) allow less nutrients idea of fewer only needed once to gain both marks allow fewer ions / nitrates / minerals / nutrients so less growth for **2** marks	1 1	AO3 AO2 4.7.1.3 4.7.1.2
Total			**10**	

4.7.1.3 Biotic factors

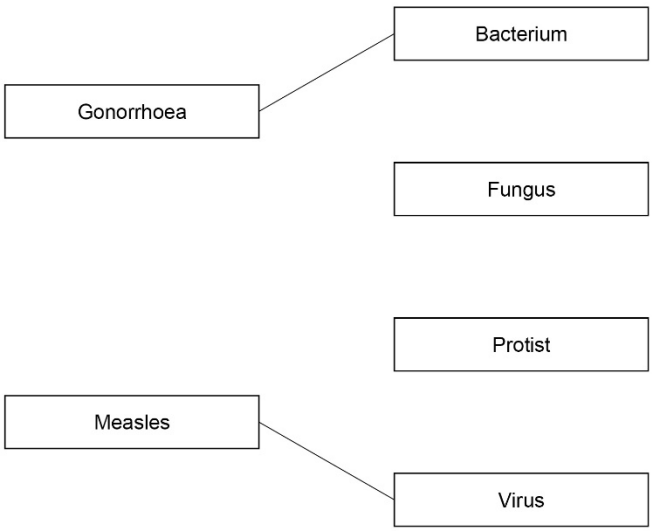
Answer 03 · Mark scheme

June 2019 | 8464/B/2F | Original Q2



4.7.1.3 Biotic factors

Answer 04 · Mark scheme

Question	Answers	Extra information	Mark	AO / Spec. Ref.
04.1	extra line(s) from a disease negates that mark  		1 1	AO1 4.3.1.2 4.3.1.3
04.2	any **two** from: • skin (acts as a barrier) • mucus in trachea / bronchi • mucus in nose • cilia (in trachea / bronchi / respiratory tract) • (hydrochloric) acid in stomach	ignore references to the immune response allow mucus in airways allow mucus unqualified if **neither** idea given ignore references to hairs allow scab forms (if you cut yourself) allow tears	2	AO1 4.3.1.6

4.7.1.3 Biotic factors

Answer 04 · Mark scheme

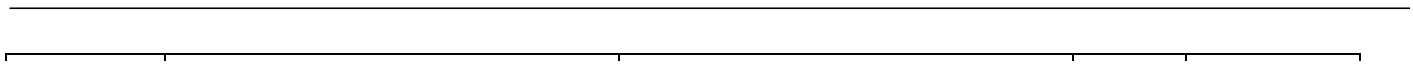
Question	Answers	Mark	AO / Spec. Ref.
04.3	**Level 2:** Scientifically relevant facts, events or processes are identified and given in detail to form an accurate account.	4-6	AO1 4.2.2.3 4.3.1.1 4.3.1.6
	Level 1: Facts, events or processes are identified and simply stated but their relevance is not clear.	1–3	
	No relevant content	0	
	Indicative content • white blood cells • detect / identify foreign antigens / cells / pathogens / bacteria • destroy / kill invading cells • phagocytes • engulf invading cells • digest / kill invading cells • produce antibodies • (antibodies) attach to invading cells • (antibodies) destroy / kill invading cells • (antibodies) make invading cells clump together • (so) phagocytes can engulf more cells / pathogens / bacteria • produce antitoxins • to destroy toxins • (so) less tissue damage • (therefore) don't feel as ill • produce memory cells • (so) immune response (to later exposure) is faster A description of the ways that white blood cells act is needed for Level 2.		

04.4	any **one** from: • HIV is a virus • antibiotics do **not** kill viruses • antibiotics (are used to) kill bacteria	allow HIV is **not** a bacterium	1	AO1 4.3.1.2 4.3.1.8
04.5	any **two** from: • avoid sexual intercourse • use a condom • do not share needles • use antiretroviral drugs • screen blood used for transfusions	ignore handwashing ignore social distancing allow practise safe sex ignore use protection unqualified ignore use contraception unqualified ignore use medication unqualified allow have regular checks / tests to see if you have HIV if no other marks awarded allow **1** mark for do not exchange body fluids	2	AO1 4.3.1.1 4.3.1.2
04.6	HIV damages the immune system		1	AO1 4.3.1.2
Total			**14**	

4.7.1.3 Biotic factors

Answer 04 · Mark scheme

November 2020 | 8464/B/1F | Original Q4



4.7.1.3 Biotic factors

Answer 05 · Mark scheme

November 2021 | 8464/B/2F | Original Q3

Question	Answers	Extra information	Mark	AO / Spec. Ref.
03.1	nut(s) → bird(s) → cat(s)	allow **1** mark for organisms in correct order (left to right) but arrows incorrect or missing allow **2** marks for cat(s) ← bird(s) ← nut(s) do **not** accept cat(s)bird(s) nut(s) do **not** accept cat(s) →bird(s) →nut(s)	2	AO2 4.7.2.1
03.2	answer must be consistent with food chain given in question **03.1**	if no answer to question **03.1** allow bird(s)	1	AO2 4.7.2.1
03.3	food pathogens		1 1	AO1 4.7.1.3
03.4	13.60 (mm)	allow 13.6 (mm)	1	AO2 4.6.2.2
03.5	structural		1	AO2 4.7.1.4
03.6	variation mutation reproduction generation	must be in this order	1 1 1 1	AO2 4.6.2.2

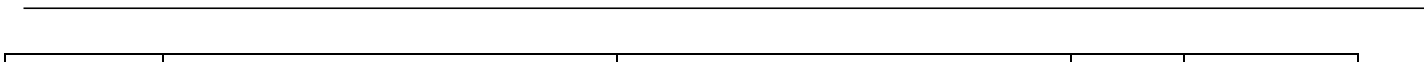
4.7.1.3 Biotic factors

03.7	birds have a shorter life cycle than humans		1	AO3 4.6.3.1 4.6.3.4
03.8	bacteria can become resistant to antibiotics		1	AO1 4.6.3.1 4.6.3.4
Total			**13**	

4.7.1.3 Biotic factors

Answer 05 · Mark scheme

November 2021 | 8464/B/2F | Original Q3



4.7.1.3 Biotic factors

Answer 06 · Mark scheme

June 2022 | 8464/B/1F | Original Q5

Question 5

Question	Answers	Extra information	Mark	AO / Spec. Ref.
05.1	both have a cell membrane both have cytoplasm		1 1	AO1 4.1.1.1

Question	Answers	Extra information	Mark	AO / Spec. Ref.
05.2	any **one** from: • fever • abdominal / stomach cramps	ignore vomiting / sickness / diarrhoea ignore feel unwell unqualified ignore rashes allow high temperature allow sweating / chills	1	AO1 4.3.1.3

Question	Answers	Extra information	Mark	AO / Spec. Ref.
05.3	penicillin	allow phonetic spelling	1	AO2 4.3.1.9

4.7.1.3 Biotic factors

Answer 06 · Mark scheme

Question	Answers	Extra information	Mark	AO / Spec. Ref.
05.4	any **one** from: • only a few bacteria killed so live bacteria continued to reproduce • time delay before antibiotic reached bacteria • time delay before antibiotic could kill bacteria	allow bacteria reproducing when course started allow takes time (for antibiotic) to travel through the body allow takes time (for antibiotic) to work	1	AO3 4.3.1.1 4.3.1.3 4.3.1.8

Question	Answers	Extra information	Mark	AO / Spec. Ref.
05.5	there were fewer toxins in the body than at day 0		1	AO2 4.3.1.1

Question	Answers	Extra information	Mark	AO / Spec. Ref.
05.6	to reduce / prevent resistant strains / bacteria developing **or** to reduce / prevent antibiotic resistance (in bacteria)	ignore references to bacteria becoming immune allow because they will get better without taking any antibiotics ignore body will fight the infection unqualified allow some infections are caused by viruses allow because they have been told not to by NHS / NICE	1	AO1 4.3.1.8

4.7.1.3 Biotic factors

Answer 06 · Mark scheme

June 2022 | 8464/B/1F | Original Q5

Question	Answers	Extra information	Mark	AO / Spec. Ref.
05.7	B		1	AO2 4.2.2.3 4.3.1.7

Question	Answers	Extra information	Mark	AO / Spec. Ref.
05.8	D		1	AO2 4.2.2.3

Total Question 5		**9**

4.7.1.3 Biotic factors

Answer 07 · Mark scheme

June 2023 | 8464/B/2F | Original Q3

Question 3

Question	Answers	Extra information	Mark	AO / Spec. Ref.
03.1	line approximately perpendicular to river	allow on either side of river ignore length of line do **not** accept a line parallel to the river	1	AO2 4.7.2.1 RPA7

Question	Answers	Extra information	Mark	AO / Spec. Ref.
03.2	quadrat		1	AO1 4.7.2.1 RPA7

Question	Answers	Extra information	Mark	AO / Spec. Ref.
03.3	6 / six	ignore calculation / range given if mean is clear	1	AO2 4.7.2.1 RPA7

Question	Answers	Extra information	Mark	AO / Spec. Ref.
03.4	increases		1	AO3 4.7.2.1 RPA7

Question	Answers	Extra information	Mark	AO / Spec. Ref.
03.5	to know the uncertainty of the mean		1	AO3 4.7.2.1 RPA7

4.7.1.3 Biotic factors

Answer 07 · Mark scheme

Question	Answers	Extra information	Mark	AO / Spec. Ref.
03.6	light intensity moisture levels		1 1	AO1 4.7.1.2 4.7.1.1

Question	Answers	Extra information	Mark	AO / Spec. Ref.
03.7	more / increased carbon dioxide (in air) **or** less carbon dioxide absorbed / used (by plants) (due to) less photosynthesis	 allow (due to) more decay / burning (of plants) allow **2** marks for less carbon dioxide used for photosynthesis if no other mark awarded allow **1** mark for carbon dioxide is used in photosynthesis	1 1	AO2 4.7.2.1 4.7.2.2 4.7.3.5

Total Question 3	9

4.7.1.3 Biotic factors

Answer 08 · Mark scheme

June 2025 | 8464/B/1F | Original Q6

Question 6

Question	Answers	Extra information	Mark	AO / Spec. Ref.
06.1	touch / contact (with contaminated surfaces / skin / blisters)	allow through droplets / air / coughs / sneezes ignore sexual intercourse	1	AO2 4.3.1.1

Question	Answers	Extra information	Mark	AO / Spec. Ref.
06.2	(chickenpox) is caused by a virus	allow antibiotics (only) treat bacterial infections allow chickenpox is not caused by bacteria ignore antibiotic resistance	1	AO2 4.3.1.8

Question	Answers	Extra information	Mark	AO / Spec. Ref.
06.3	inactive / dead / weakened (named) pathogen	allow inactive / dead / weakened virus / bacteria / fungi / microorganism allow proteins / antigens (from the pathogen) allow the mRNA (from the pathogen)	1	AO1 4.3.1.7

4.7.1.3 Biotic factors

Answer 08 · Mark scheme

Question	Answers	Extra information	Mark	AO / Spec. Ref.
06.4	(for) toxicity **or** check not poisonous / harmful	allow check for side-effects allow to check it is safe ignore to check it is not dangerous	1	AO1 4.3.1.9
	(for) efficacy **or** to see if it works		1	
	(for) dose **or** how much is needed		1	
		allow interaction with other drugs allow to find out when a booster vaccination would be needed allow to find out how long it offers protection against the pathogen for		

Question	Answers	Mark	AO / Spec. Ref.
06.5	**Level 3:** Relevant points (reasons / causes) are identified, given in detail and logically linked to form a clear account.	5–6	AO1 4.2.2.3 4.3.1.6 4.3.1.7
	Level 2: Relevant points (reasons / causes) are identified, and there are attempts at logical linking. The resulting account is not fully clear.	3–4	
	Level 1: Points are identified, and stated simply but their relevance is not clear and there is no attempt at logical linking.	1–2	
	No relevant content	0	
	Indicative content **how a vaccine works (primary):** • white blood cells stimulated / respond • (by) producing antibodies • (antibodies) are specific to microorganism / microbe / virus / chickenpox • (antibodies) bind with antigens • reference to memory cells **when chickenpox virus enters the body (secondary):** ○ virus / pathogen is destroyed faster / quickly ○ (because) production of correct antibodies ○ (because) antibodies are produced sooner ○ (because) rate of antibody production is faster ○ (because) more antibodies produced It is acceptable for students to refer to virus / chickenpox / microorganism / microbe for pathogen throughout For **Level 3** primary and secondary responses must be considered		

Total Question 6	**12**

4.7.1.3 Biotic factors

Answer 09 · Mark scheme

June 2025 | 8464/B/2F | Original Q3

Question 3

Question	Answers	Extra information	Mark	AO / Spec. Ref.
03.1	quadrat		1	AO1 4.7.2.1 RPA7

Question	Answers	Extra information	Mark	AO / Spec. Ref.
03.2	7 × 4 28 (%)	allow $\frac{7}{25}$ × 100 allow **1** mark for a correct calculation from an incorrect attempt at counting squares (in the range 5 to 10) covered by buttercups	1 1	AO3 AO2 4.7.2.1 RPA7

Question	Answers	Extra information	Mark	AO / Spec. Ref.
03.3	distance from the tree		1	AO2 4.7.2.1 RPA7

Question	Answers	Extra information	Mark	AO / Spec. Ref.
03.4	percentage cover is affected by number and size of individual plants		1	AO3 4.7.2.1 RPA7

4.7.1.3 Biotic factors

Answer 09 · Mark scheme

Question	Answers	Extra information	Mark	AO / Spec. Ref.
03.5	$\frac{12+8+4+12+4}{5}$ 8 (%)	allow $\frac{40}{5}$	1 1	AO2 4.7.2.1 RPA7

Question	Answers	Extra information	Mark	AO / Spec. Ref.
03.6	higher percentage cover 10 m from tree	allow ecf from question **03.5** with correct mathematical analysis of difference in incorrectly calculated mean allow converse if clearly referring to 1 m from tree **or** closer to the tree allow higher percentage cover further from tree allow more cover / buttercups further from tree allow cover is double further from tree allow twice as much / many further from tree	1	AO3 4.7.2.1 RPA7

4.7.1.3 Biotic factors

Answer 09 · Mark scheme

Question	Answers	Extra information	Mark	AO / Spec. Ref.
03.7	any **two** from: • light • temperature • water / moisture • type of soil • pH (of soil) • minerals / ions • oxygen in soil • wind (strength / direction) • herbicide • competition from other plants • herbivores / grazers (of buttercups) • (number of) pollinators • time of year • size of tree / roots / canopy • disease / pathogen (of buttercups)	allow shade **or** less / more light allow (tree) leaves drop and cover buttercups ignore Sun allow rain allow acidity / alkalinity (of soil) allow salts **or** named examples of ions, such as nitrate allow fertiliser(s) ignore nitrogen / nutrients allow weedkiller allow animals / insects eat / damage buttercups allow season ignore time unqualified ignore (availability of) space ignore carbon dioxide ignore weather / climate if no other mark awarded allow **1** mark for biotic **and** abiotic	2	AO2 4.7.1.2 4.7.2.1 4.7.1.3 RPA7

4.7.1.3 Biotic factors

Question	Answers	Extra information	Mark	AO / Spec. Ref.
03.8	any **two** from: • repeat at more distances **or** at another distance (from the tree) • repeat at each distance more (than 5) times • repeat for other trees • measure other (named) factor(s)	allow specific distances, between 0 m and 10 m or beyond 10 m allow repeat (at each distance) more than 5 times allow repeat at 1 m and 10 m more (than 5) times allow repeat the (whole) investigation ignore repeat 5 times	2	AO3 4.7.2.1 RPA7

Total Question 3	12

4.7.1.3 Biotic factors

Answer 10 · Mark scheme

June 2025 | 8464/B/2F | Original Q4

Question 4

Question	Answers	Extra information	Mark	AO / Spec. Ref.
04.1	any **one** from: • (skin / body / plesiosaur) decays • skin was not fossilised • not enough evidence • no-one has seen one • fossils are (usually) from bones	 allow (skin / body / plesiosaur) not preserved allow no evidence allow description such as no DNA or no photographs allow no-one was there (at the time)	1	AO2 4.6.3.2

Question	Answers	Extra information	Mark	AO / Spec. Ref.
04.2	(limbs / feet / legs / arms / hands are) flat(tened) / streamlined / paddle-like / wide	allow flippers / fins	1	AO2
	for swimming	allow for movement / propulsion / pushing (through water or out of water onto land) allow to hold on to mate allow to kill prey allow to fight / protect / defend	1	AO3 4.7.1.4

Question	Answers	Extra information	Mark	AO / Spec. Ref.
04.3	behavioural		1	AO2 4.7.1.4

Question	Answers	Extra information	Mark	AO / Spec. Ref.
04.4	200 (million years ago)	allow two hundred ignore addition of 'million years ago'	1	AO2 4.6.3.2

4.7.1.3 Biotic factors

Question	Answers	Extra information	Mark	AO / Spec. Ref.
04.5	130 **and** 180 50 (million years)	allow (one small square is 5 million years, so) 10 × 5 ignore addition of 'million years'	1 1	AO2 4.6.3.2

Question	Answers	Extra information	Mark	AO / Spec. Ref.
04.6	not all plesiosaur fossils have been discovered some plesiosaur fossils will have been destroyed		1 1	AO2 4.6.3.2 4.6.3.3

Question	Answers	Extra information	Mark	AO / Spec. Ref.
04.7	plesiosaur **B** existed before plesiosaur **C**		1	AO3 4.6.3.1 4.6.3.2

4.7.1.3 Biotic factors

Answer 10 · Mark scheme

Question	Answers	Extra information	Mark	AO / Spec. Ref.
04.8	any **two** from: • bacteria have a short life-cycle (so rapid evolution) • bacteria are continuing to evolve • can study the DNA of bacteria • bacteria are more easily available	allow converse if clearly referring to fossils allow evolution in bacteria is fast(er) allow (many) fossilised species are extinct allow not able to study DNA from fossils allow fossils do not contain DNA / chromosomes / genes / alleles allow many / some fossils have been destroyed allow there are gaps in the fossil record	2	AO3 4.6.3.1 4.6.3.2 4.6.3.4

Question	Answers	Extra information	Mark	AO / Spec. Ref.
04.9	(people with infections of antibiotic-resistant bacteria) cannot be treated (with those antibiotics)	allow (antibiotic-resistant) bacteria cannot be killed allow antibiotics will not work allow the infection may kill people allow development of new antibiotic(s) is costly / slow	1	AO3 4.6.3.4

Total Question 4	13

4.7.1.3 Biotic factors

AQA

GCSE
COMBINED SCIENCE: TRILOGY

8464/B/1F – BIOLOGY PAPER 1 FOUNDATION TIER

Mark scheme

8464

June 2018

Version/Stage: 1.0 Final

4.7.1.3 Biotic factors

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.

Further copies of this mark scheme are available from aqa.org.uk

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MARK SCHEME – GCSE COMBINED SCIENCE: TRILOGY – 8464/B/1F – JUNE 2018

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 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 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.

4.7.1.3 Biotic factors

MARK SCHEME – GCSE COMBINED SCIENCE: TRILOGY – 8464/B/1F – JUNE 2018

Question	Answers	Extra information	Mark	AO / Spec. Ref.
01.1	cell membrane	extra ticks negates marks	1	AO1 4.1.1.2
01.2	engulf pathogens produce antibodies produce antitoxins	extra ticks negates marks	1 1 1	AO1 4.2.2.3 4.3.1.6
01.3	2050 − 100 = 1950	an answer of 1950 scores **2** marks allow **1** mark for a correct subtraction of incorrect values	1 1	AO2 4.3.1.2
01.4	any **one** from: • (more) people vaccinated • (more) people immune • no new measles strain	ignore injections / treatments / medicines unqualified allow vaccine produced allow (more people given) MMR (vaccine) do **not** allow antibiotics ignore less people infected	1	AO2 4.3.1.1 4.3.1.2 4.3.1.7
01.5	any **one** from: • measles is (caused by) a virus • viruses cannot be killed / destroyed by antibiotics	allow measles is not caused by a bacterium allow antibiotics **only** kill / destroy bacteria ignore harmed / treated	1	AO1 4.3.1.1 4.3.1.8 4.3.1.2
01.6	any **one** from: • use of a barrier method of contraception • use of a condom • vaccination / immunisation • avoid sexual intercourse / contact	ignore use of diaphragm ignore use protection / safe sex do **not** accept less sexual intercourse / contact	1	AO1 4.3.1.3

4.7.1.3 Biotic factors

Question	Answers	Extra information	Mark	AO / Spec. Ref.
01.7	any **one** from: • size / shape/ type of paper disc • concentration of antibiotic • volume / amount of antibiotic • (incubation) time • (incubation) temperature	ignore paper disc unqualified allow strength / dosage of antibiotic allow 3 days ignore size of petri dish	1	AO2 4.3.1.8
01.8	to check that the disc / water did not have an effect **or** to make sure it was the antibiotic that had an effect	allow for comparison with the antibiotics allow as a (experimental) control do **not** accept as a control variable	1	AO3 4.3.1.8
01.9	(antibiotic) **A** any **one** from: • (antibiotic **A**) had the larg**est** clear area around it • (antibiotic **A**) killed the **most** bacteria	no marks if wrong antibiotic given	1 1	AO3 4.3.1.8
Total			**13**	

4.7.1.3 Biotic factors

MARK SCHEME – GCSE COMBINED SCIENCE: TRILOGY – 8464/B/1F – JUNE 2018

Question	Answers	Extra information	Mark	AO / Spec. Ref.
02.1	glucose oxygen	extra ticks negates marks	1 1	AO1 4.4.1.1
02.2	count the number of bubbles produced in 1 minute measure the volume of gas produced in 30 seconds	extra ticks negates marks	1 1	AO3 4.4.1.2
02.3	any **one** from: • to control the temperature • temperature affects the rate of photosynthesis	ignore reference to 'it' allow so pondweed / solution did not warm up allow correct description of effect of temperature on rate allow high temperatures denature enzymes ignore references to limiting factors	1	AO3 4.4.1.2
02.4	52		1	AO2 4.4.1.2
02.5	all points plotted correctly smooth curve drawn through all points	(where a bar chart has been plotted) allow **1** mark for all bars plotted correctly if points are plotted as well as bars, ignore bars allow ± ½ a square allow **1** mark for three points correctly plotted ignore extensions of line / curve unless inconsistent with line / curve drawn	2 1	AO2 4.4.1.2

4.7.1.3 Biotic factors

MARK SCHEME – GCSE COMBINED SCIENCE: TRILOGY – 8464/B/1F – JUNE 2018

Question	Answers	Extra information	Mark	AO / Spec. Ref.
02.6	any **one** from: • the nearer the light source to the pondweed the faster the rate of photosynthesis • the greater the light intensity the faster the rate of photosynthesis	allow converse statements for all marking points allow the nearer the light source to the pondweed the faster the bubbles produced allow the greater the light intensity the faster the bubbles produced allow the closer the light source the more the plant photosynthesises ignore more bubbles are produced with no reference to rate allow oxygen for bubbles do **not** accept carbon dioxide	1	AO3 4.4.1.2
Total			**10**	

4.7.1.3 Biotic factors

MARK SCHEME – GCSE COMBINED SCIENCE: TRILOGY – 8464/B/1F – JUNE 2018

Question	Answers	Extra information	Mark	AO / Spec. Ref.
03.1	any **one** from: • water on potato would increase mass • to control amount of water on potato	allow so only the mass of the potato is measured allow to remove water from outside of potato allow liquid / solution / sugar solution for water allow so you get the correct (starting) mass of the potato do **not** accept so that all the pieces of potato weighed the same	1	AO3 4.1.3.2
03.2	increase in mass increase in length	extra ticks negate marks	1 1	AO2 4.1.3.2
03.3	osmosis into lower	in this order only allow diffusion allow inside do **not** accept through allow low / more dilute / dilute	1 1 1	AO1 4.1.3.2 AO2 4.1.3.2 AO2 4.1.3.2
03.4	any **one** from: • the concentration (of sugar solution) in the cells is 0.4 (mol/dm^3) • the concentration (of sugar solution) in the cells is the same as the solution (in the tube)	allow reference to potato instead of cells	1	AO3 4.1.3.2

4.7.1.3 Biotic factors

Question	Answers	Extra information	Mark	AO / Spec. Ref.
03.5	any **two** from: • has (root) hairs • large surface / area • (root) hairs extend into soil • (root) hairs have thin walls	ignore references to active transport and mineral uptake allow root hair cells allow wide surface area allow (root) hairs are long / widespread	2	AO1 4.1.1.3 4.1.3.1 4.1.3.2
Total			**9**	

4.7.1.3 Biotic factors

MARK SCHEME – GCSE COMBINED SCIENCE: TRILOGY – 8464/B/1F – JUNE 2018

Question	Answers	Extra information	Mark	AO / Spec. Ref.
04.1		**max 2** marks if written in terms of heart rate		AO2 4.4.2.2
	breathing rate when walking is twice that at rest	allow breathing rate when walking is 12 (breaths / minute) more than at rest	1	
	breathing rate when jogging is 5 times that at rest	allow breathing rate when jogging is 48 (breaths / minute) more than at rest	1	
	breathing rate when jogging is 2.5 times that when walking	allow breathing rate when jogging is 36 (breaths / minute) more than when walking	1	
		allow for **1** mark if no other marks gained: breathing rate at rest is 12 (breaths per minute), breathing rate when walking is 24 (breaths per minute) and breathing rate when jogging is 60 (breaths per minute) **or** breathing rate increases with increasing activity		

4.7.1.3 Biotic factors

Question	Answers	Extra information	Mark	AO / Spec. Ref.
04.2	(breathing rate increases)	reference to more / faster required at least once for full marks		AO1 4.4.2.2
	to supply more oxygen / O_2 **or** to supply oxygen / O_2 faster	allow to remove more carbon dioxide / CO_2 **or** to remove carbon dioxide / CO_2 faster do **not** accept incorrectly written formulae	1	
	for (aerobic) respiration **or** to reduce anaerobic respiration **or** to reduce lactic acid build up		1	
	(so) that more energy is transferred / released **or** (because) more energy is required	do **not** accept used / produced / created or energy made	1	
04.3	right ventricle / side of the heart pumps (blood) to the lungs		1	AO1 4.2.2.2
	left ventricle / side of the heart pumps (blood) to the body		1	
		if no other marks scored allow **1** mark for one side pumps blood to the lungs and the other side pumps blood to the body		

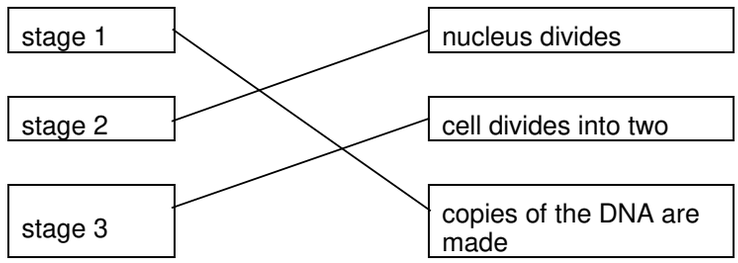
4.7.1.3 Biotic factors

MARK SCHEME – GCSE COMBINED SCIENCE: TRILOGY – 8464/B/1F – JUNE 2018

Question	Answers	Extra information	Mark	AO / Spec. Ref.
04.4	any **one** from: • (the left ventricle) has to pump blood further (than the right ventricle) • (the left ventricle) has to pump blood with a greater force (than the right ventricle) • (the left ventricle) has to pump blood at a higher pressure (than the right ventricle)	there must be a comparative statement allow (the left ventricle) has to pump blood all around the body allow (left ventricle) has to pump blood harder	1	AO2 4.2.2.2
04.5	any **one** from: • strengthens heart (muscle) • reduces chance of another heart attack • reduces / controls weight • improves circulation	ignore prevents / no heart attacks allow decreases chance of fatty deposits **or** fat building up (in arteries / blood vessels) allow reduces resting heart rate	1	AO2 4.2.2.2 4.2.2.6
Total			**10**	

4.7.1.3 Biotic factors

MARK SCHEME – GCSE COMBINED SCIENCE: TRILOGY – 8464/B/1F – JUNE 2018

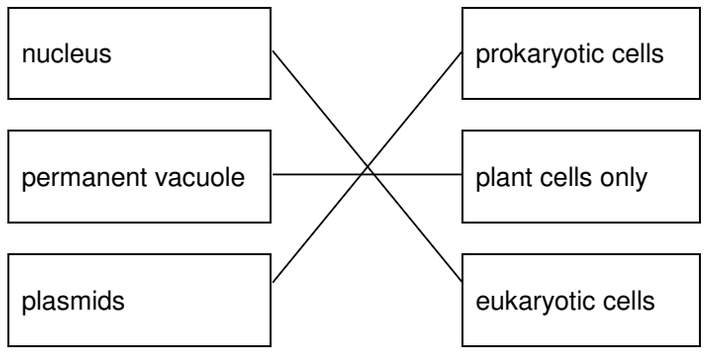
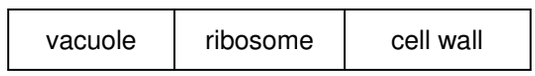
Question	Answers	Extra information	Mark	AO / Spec. Ref.
05.1	 allow **1** mark for 1 or 2 correct credit can be given where students have matched the boxes correctly, for example numbering the boxes		2	AO1 4.1.2.2
05.2	6 picograms		1	AO2 4.1.2.2
05.3	meristem cells in plants can differentiate throughout the life of the plant		1	AO1 4.1.2.3

MARK SCHEME – GCSE COMBINED SCIENCE: TRILOGY – 8464/B/1F – JUNE 2018

Question	Answers	Extra information	Mark	AO / Spec. Ref.
05.4	any **two** from: • may cure / treat diseases **or** cure medical conditions **or** produce replacement cells / tissues / organs • cells unlikely to be **rejected** by patient • cells / tissues of any type can be produced • many cells produced • cells produced could be used for research • would reduce waiting time for transplants	ignore references to cost ignore all reference to producing babies / IVF allow example eg diabetes / paralysis allow cells can be stored for future use ignore used in medical treatments ignore patient makes / grows cells / tissues / organs ignore same genetic information ignore differentiated into most types of cells	2	AO3 4.1.2.3 4.1.1.4 4.6.2.4
05.5	any **two** from: • (potential) life is killed / destroyed • shortage of donors / eggs • egg donation / collection has risks • do not yet know risks / side effects of the procedure on the patient • may transfer (viral) infection • poor success rate	ignore references to cost ignore unethical unqualified Ignore reference to religion / beliefs allow embryo is killed ignore embryo is destroyed ignore embryo is a life / becomes a baby ignore long term effects are not well understood allow may cause tumours / cancer allow in terms of viable egg / embryo / cell / tissue / organ production	2	AO3 4.1.2.3 4.1.1.4 4.6.2.4
Total			**8**	

4.7.1.3 Biotic factors

MARK SCHEME – GCSE COMBINED SCIENCE: TRILOGY – 8464/B/1F – JUNE 2018

Question	Answers	Extra information	Mark	AO / Spec. Ref.
06.1	 allow **1** mark for one or two correct links		2	AO1 4.1.1.1 4.1.1.2
06.2	 tick box takes precedence if no tick is given, look at both the figure and the circling of words in the table if writing is seen on the figure and in the table both must be correct		1	AO1 4.1.1.2
06.3	turn the (fine focusing) knob until the cells are in focus	allow focus it do **not** accept increase magnification ignore decrease magnification ignore clear ignore references to resolution / illumination ignore zoom in / out	1	AO2 4.1.1.2

4.7.1.3 Biotic factors

Question	Answers	Extra information	Mark	AO / Spec. Ref.
06.4	(rotate the) nosepiece / objective lens	allow change the (objective / eyepiece) lens	1	AO2 4.1.1.2
	to a higher power (lens)	allow (to) increase the magnification a comparator is required ignore change / adjust the magnification allow stronger or more powerful lens ignore references to resolution / illumination unqualified ignore zoom in / out ignore references to an electron microscope	1	

4.7.1.3 Biotic factors

Question	Answers	Extra information	Mark	AO / Spec. Ref.
06.5		an answer of 400 (×) scores **3** marks		AO2 4.1.1.2
	conversion of units: (112 mm →) 112 000 (µm) **or** (280 µm →) 0.28 (mm)		1	
	(magnification =) $\frac{112}{0.28}$ **or** (magnification =) $\frac{112\,000}{280}$	allow **1** mark for no conversion of units 112 / 280 **or** incorrect value from step 1 correctly substituted	1	
	400 (×)	do **not** accept if units are given	1	
		if no other mark scored allow **1** mark for: magnification = $\frac{\text{size of image}}{\text{size of real object}}$ a triangle with words or letters in is insufficient, as the correct rearrangement is needed		
Total			**9**	

4.7.1.3 Biotic factors

MARK SCHEME – GCSE COMBINED SCIENCE: TRILOGY – 8464/B/1F – JUNE 2018

Question	Answers	Extra information	Mark	AO / Spec. Ref.
07.1	is not caused by a pathogen / infective organism	allow not caused by a microorganism / microbe ignore not caused by infection ignore named pathogen unless bacteria, virus and fungus all mentioned	1	AO1 4.2.2.4 4.2.2.5 4.3.1.1 4.3
	(so) is not passed / spread (from person to person)	allow cannot be spread / caught allow is not infectious / contagious	1	AO2 4.2.2.4 4.2.2.5 4.3.1.1 4.3
07.2		allow 'it' for heart		AO1 4.2.2.4
	reduced / restricted / stopped blood flow	it does not matter where blood flow is restricted to – heart / body	1	
	(so) less oxygen reaches heart (muscle / cells)	must reference heart / it allow no oxygen reaches the heart (muscle / cells)	1	
	(so heart muscle / cells) cannot respire (enough) **or** (so heart muscle / cells) do not release (enough) energy	do **not** accept do not make / produce / create energy ignore references to breathing / suffocation ignore blood clots / blockages	1	

4.7.1.3 Biotic factors

Question	Answers	Mark	AO / Spec. Ref.
02.3	**Level 3:** Relevant points (factors / effects) are identified, given in detail and logically linked to form a clear account.	5–6	AO2
	Level 2: Relevant points (factors / effects) are identified and there are attempts at logical linking. The resulting account is not fully clear.	3–4	AO2 AO1
	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
	No relevant content	0	
	Indicative content **medical risk factors:** • high blood pressure • high cholesterol • diabetes • genetic factors • medications **lifestyle risk factors:** • smoking • obesity • lack of exercise • high fat / energy diet • eating insufficient fruit / vegetables • alcohol • high salt intake • exposure to air pollution • certain drugs / correct named drug **examples of links:** • smoking – high bp / cholesterol / fatty deposition • obesity – lack of exercise / high bp / cholesterol / fatty deposition / diabetes • exercise – obesity / bp /diabetes • diet – obesity / cholesterol / diabetes • alcohol – bp / cholesterol • high salt intake - high blood pressure • genetic factors – bp / cholesterol / diabetes / obesity • medication – can affect blood / blood vessels / metabolism the main discriminator is the quality of linking both lifestyle and medical factors are required for **level 3**		4.2.2.2 4.2.2.4 4.2.2.5 4.2.2.6
Total		**11**	

4.7.1.3 Biotic factors

Answer 05 · Examiner comments — November 2021 | 8464/B/2F | Original Q3

Question 3 (low demand)

Many students could not give the food chain. Some students obtained one mark out of two for having the organisms in the correct order, but used dashes or commas instead of arrows. More students could give the primary consumer in the food chain. Reading from the graph was generally answered well. Fewer students could complete the sentences about evolution.

Answer 06 · Examiner comments — June 2022 | 8464/B/1F | Original Q5

Question 5 (standard demand)

05.1 A quarter of students scored both marks for identifying the cell membrane and cytoplasm as structures that are found in both bacterial and animal cells. Just over three-quarters scored at least one mark. Two fifths of students incorrectly thought that both types of cell contained a nucleus.

05.2 One symptom of salmonella food poisoning was asked for, with students instructed not to refer to vomiting and diarrhoea. Almost half of the students were awarded the mark, usually for stomach ache or fever. Many described fever as having a high temperature or sweating, which were allowed. A few said 'nausea' which is equivalent to vomiting, and so was ignored. Many references to secondary symptoms of an infection were given, which could have applied to a wide range of infections. For example, tiredness, fatigue, headaches, dizziness, fainting or dehydration. These were all ignored. A primary symptom, such as those given in the specification, was needed.

05.3 36% of students said that penicillin was the first antibiotic developed. A wide range of phonetic spellings were accepted. The most common incorrect answers were the names of well-known painkillers. Quite a lot of students did not attempt the question.

05.4 A fifth of students scored this mark. Most correct responses referred to a time delay before the antibiotics became effective, or started working. A few students said the bacteria would be reproducing or multiplying. There was some confusion with antibodies, and incorrect references to bacteria fighting the antibiotics, or antibiotics fighting bacteria. Some thought that antibiotics make antibodies, whilst others said that the wrong antibiotic had been given.

05.5 Half of the students knew that a child will start to feel better after taking antibiotics for a few days because there will be fewer toxins in the body. Most other students thought the child had become resistant to the bacteria.

4.7.1.3 Biotic factors

Answer 06 · Examiner comments June 2022 | 8464/B/1F | Original Q5

05.6 15% of students scored the mark, usually for saying overuse of antibiotics could result in antibiotic resistance. Quite a lot of students said the patient or the antibiotic would become resistant, which was incorrect. A common mistake was to confuse immunity with resistance. Many students scored the mark for the idea that the person would get better without taking any antibiotics, which was allowed.

05.7 A third of students thought antibodies are produced by red blood cells, with slightly fewer selecting the correct drawing of the white blood cell. It could be that students were unfamiliar with drawings of blood components.

05.8 A third of students identified platelets as the part of the blood that starts the clotting process. Few selected plasma as their answer.

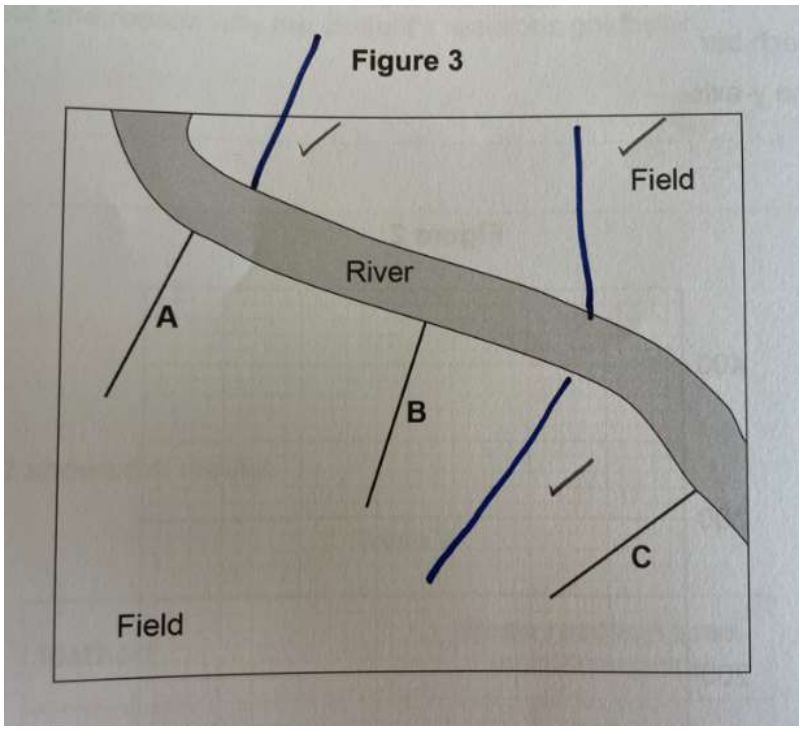
4.7.1.3 Biotic factors

Answer 07 · Examiner comments

June 2023 | 8464/B/2F | Original Q3

Question 3 (Low and Standard demand)

03.1 Many students could identify where to place a fourth transect for this investigation. Students could draw their transect either side of the river. Transects parallel to the river were incorrect. A significant number of students misunderstood the aim of the investigation and instead connected the existing three transects.



The three lines on the image above are examples that were acceptable for 'approximately perpendicular to river'. Note that we have ticked each line to indicate the lines have been drawn. The lines could be drawn by hand or with a ruler and could extend beyond the boundary of the image (as shown in the top left). Lines that extended well into, or across, the river were incorrect.

Answer 07 · Examiner comments

June 2023 | 8464/B/2F | Original Q3

03.2 The majority of students knew that a quadrat was required.

03.3 Most students could interpret the graph to state the correct mean. Some students attempted to calculate the mean of the mean at each distance, which was incorrect.

03.4 Due to the way the question was phrased, we assumed 'it' referred to the plant species. Many students could state that the mean number of plant species increased further from the river. This was expressed in a variety of ways. 'Wider range / diversity' or 'bigger / higher numbers' or 'bigger / higher mean' all gained the mark. A simpler response such as 'There are more' or 'We see more plants' was also sufficient for the mark.

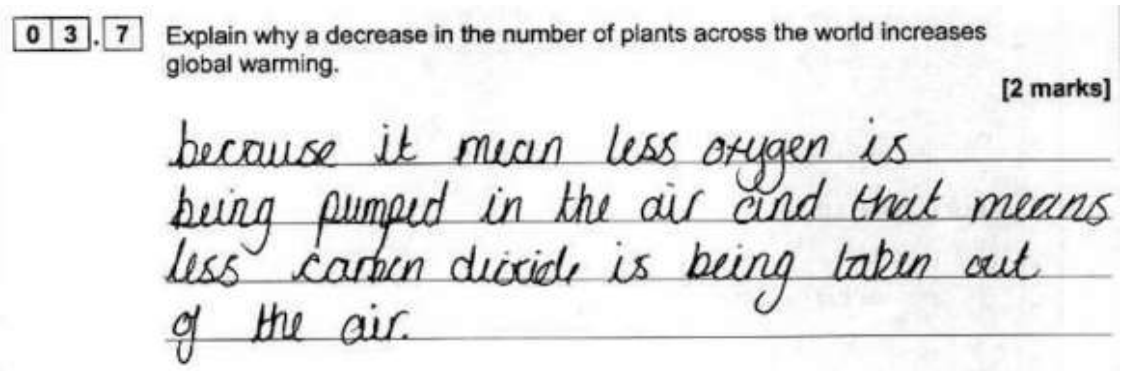
A significant number of students misunderstood the question and attempted to explain rather than describe the effect of moving away from the river.

03.5 40% of students could identify why it is useful to know the range of results.

03.6 50% of students could identify two abiotic factors from the list provided.

03.7 Some students could state that plants use carbon dioxide during photosynthesis. This was awarded 1 mark (in the absence of either marking point) but was insufficient to answer the question fully.

A common misconception was that global warming is linked to the oxygen concentration in the air. Incorrect references to ozone were also frequently seen. There were incorrect references to plants 'breathing' and respiration was sometimes stated as the process involved.


0 3 . 7 Explain why a decrease in the number of plants across the world increases global warming.

[2 marks]

because it mean less oxygen is being pumped in the air and that means less carbon dioxide is being taken out of the air.

Many students made an incorrect link between oxygen and global warming. Marking point 1 was awarded here but with no reference to photosynthesis, decay or burning marking point 2 could not be awarded.

Answer 08 · Examiner comments

Question 6 (Standard demand)

06.1 Many students, 83%, correctly identified one or both main transmission routes: direct contact and droplet spread for chickenpox.
Acceptable terms included 'physical contact', 'direct contact' or 'close contact'. Examples such as 'kissing' or 'high fives' were also credited, as they clearly indicated skin-to-skin or direct transmission.

However, some students used vague descriptions such as 'hugging' or 'playing together', which were not sufficient, as they did not clearly indicate direct contact. Similarly, statements like 'being near someone with chickenpox' or 'being in the same room' were too imprecise and did not gain credit.

A number of students correctly described airborne transmission via droplets, including references to coughing, sneezing, or spread through the air. These responses were awarded marks under the second valid transmission route.
Credit was also given for mention of contaminated surfaces, for example, shared towels or cups, as this reflects indirect contact with the virus.

06.2 Many students had the correct understanding that chickenpox is caused by a virus and were able to clearly state that antibiotics only work on bacteria, successfully achieving the marking point.
A number of misconceptions were seen such as:

- chickenpox is not caused by a virus
- chickenpox cannot be cured
- antibiotics only treat symptoms
- chickenpox is resistant to antibiotics.

Some students incorrectly believed that chickenpox affects the skin, and therefore antibiotics, which they assumed work inside the body, would not be effective.
Additionally, references to antibiotic resistance were not awarded unless clearly qualified with reference to bacteria, as resistance is irrelevant in the context of a viral infection.

06.3 Many students found this question challenging, 68% failed to gain credit, and a significant number left it blank. Where students did gain the mark, they clearly stated that the vaccine contains a dead or weakened pathogen, or used synonymous terms such as inactive, inert, or dormant pathogen.

A common mistake was stating that the vaccine contained 'the pathogen' or a 'small amount' of something, without any further qualification. These responses were too vague.

Another frequent error was referring to the vaccine containing the disease, or a 'dead version of the disease' which were insufficient for credit, as the mark specifically required mention of the pathogen or virus in a weakened or inactive state.

Some students used vague or incorrect terminology, such as suggesting the vaccine contained a treatment rather than a preparation to stimulate immunity.

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4.7.1.3 Biotic factors

Answer 08 · Examiner comments June 2025 | 8464/B/1F | Original Q6

06.4 Overall, this question was well answered. Most students recognised the importance of testing for toxicity and effectiveness. There was a good spread of responses, and many students were able to access at least one mark.

Responses that described 'allergic reactions' were accepted as equivalent to side effects. However, many students repeated the same idea by stating the drug is 'tested for side effects', 'to see if it is toxic' or 'to check it is safe', these are all based on the same idea and could only be credited once.

Correct responses concerned efficacy, or whether the drug works. Acceptable alternatives included efficient or effective. However, terms such as 'accurate' or 'reliable' were too vague and did not gain credit.

Only a fairly small number of students gained credit for making any mention of dose or quantity.

06.5 This extended response question required an explanation of the body's immune response, addressing both the primary and secondary responses. Students often showed a basic awareness of immune processes, few could explain them with sufficient detail, precision or sequencing to access higher levels. Less than 5% of students accessed Level 2 or higher.

A significant number of students struggled with this question. Most responses lacked a coherent structure and often contained confused language or a disordered sequence of events. The majority of students only accessed Level 1, most frequently by stating that white blood cells are involved in the response.

While some students correctly mentioned antibodies, this did not always gain credit unless it was clear that the antibodies were being produced. Some confusion was evident in responses that stated 'the vaccine contains antibodies', rather than triggering their production. Similarly, while a number of students mentioned 'memory cells', few were able to clearly explain their role or link this to the specificity of antibody production.

Very few students reached Level 2, and only a small number accessed Level 3. Those who did often described the role of white blood cells in the primary response, followed by clear references to the secondary immune response, such as 'faster production of complementary antibodies'. However, students who attempted to use comparative language often failed to apply it accurately or made vague claims such as the pathogen being 'fought off quickly'.

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4.7.1.3 Biotic factors

Answer 08 · Examiner comments June 2025 | 8464/B/1F | Original Q6

Many responses also focused too heavily on the contents of the vaccine rather than how the body responds, limiting their ability to move beyond Level 1.

0 6 . 5 Explain how a vaccine for chickenpox gives immunity against the disease.

You should refer to how the body responds to:

- the vaccine
- chickenpox pathogens that enter the body after vaccination.

[6 marks]

- the vaccine contains a dead/inactive pathogen.
- the body's first line of defense is the immune system.
- the ~~thymus~~ white blood cells will produce anti-bodies and anti-toxins
- the pathogen will be engulfed through phagocitus.
- Chicken pox pathogens that enter the body after then don't affect the human, due to the vaccine.

This response is representative of many seen in the cohort. The student successfully links the idea of white blood cells producing antibodies, showing an understanding of part of the primary immune response.

While the explanation demonstrates the connection between two key ideas, it is limited to content from the primary response only. As a result, the response meets the criteria for 3 marks.

This example highlights a common pattern where students understood the basic process but did not extend their answers to include secondary response features or additional detail needed to access higher levels.

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4.7.1.3 Biotic factors

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Contact us

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Answer 09 · Examiner comments

June 2025 | 8464/B/2F | Original Q3

Question 3 (Low and Standard demand)

03.1 80% of students could identify the equipment as a quadrat.

03.2 Some students counted all squares containing some buttercup plants and therefore reached a number of 10 small squares. They could gain one mark with a correct calculation of the final answer of 40, but only if appropriate working was shown. It is possible that this error indicates a lack of practical experience of Required Practical Activity 7 and the wide range of ways that abundance and distribution of a species can be sampled.

03.3 Two thirds of students could identify the independent variable.

03.4 Just over half of students identified the advantage of calculating percentage cover instead of counting the number of buttercup plants in an area.

03.5 Most students could calculate the mean. When only one mark was awarded, for correct working, but the final answer was incorrect, it appears calculator skills are the issue, with students putting all the numbers into the calculator at once and therefore only dividing the final number by 5. For example, 12 + 8 + 4 + 12 + 4 ÷ 5 = 36.8.

03.6 Nearly two thirds of students could give one conclusion from the results. Some students did not answer the question, and instead gave a reason for the results, such as 'more sunlight further from the tree'.

03.7 Students most frequently referred to water or rain or light. Some students gave light and shade, which were the same marking point, therefore only gained one mark.

03.8 Students struggled to suggest improvements to the method. Most students who did gain a mark gave bullet point 1 on the mark scheme for the idea of varying the distances more. Responses suggesting changing the method to throwing quadrats were surprisingly common. As has been included in previous examiner reports, throwing quadrats is never an appropriate method.

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Answer 10 · Examiner comments

Question 4 (Low and Standard demand)

04.1 Many students gave correct ideas about skin decaying, or a lack of evidence. Many students repeated the information provided and simply stated 'they are extinct'. Repeating information provided can never be given credit.

04.2 For marking point 1, students could either describe how structure A was adapted, such as 'wide' or 'paddle-like', or use a term such as fin or flipper.

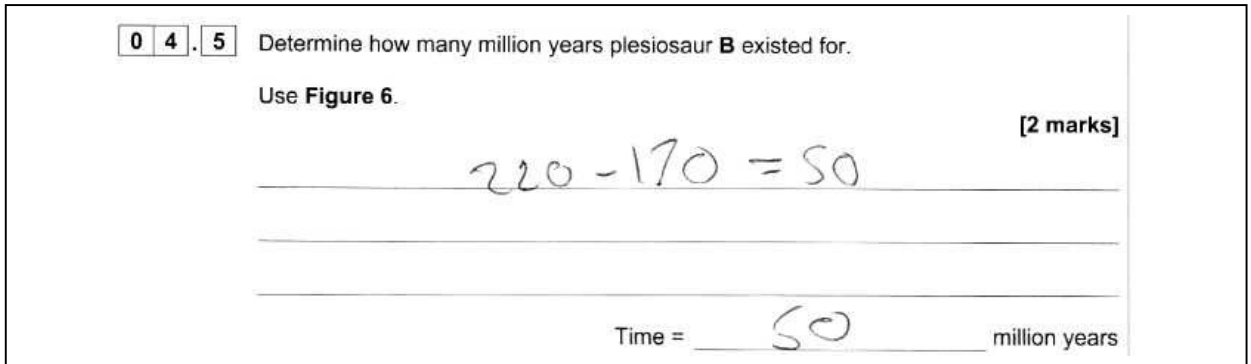
Marking point 2, for the explanation of how the structure would help the plesiosaur survive in the ocean, was more commonly seen than marking point 1.

A surprising number of students thought the label was directed at the neck. These responses could not gain credit.

04.3 Over 60% of students could identify the adaptation as behavioural.

04.4 Two thirds of student correctly interpreted the figure.

04.5 Many students made two correct readings and calculated the number of years correctly. Where errors were made, this was most often for misinterpreting the scale. 170 was frequently seen instead of 180.



0 4 . 5 Determine how many million years plesiosaur **B** existed for.

Use **Figure 6**.

[2 marks]

220 - 170 = 50

Time = 50 million years

This student took two incorrect readings from the figure, therefore gains no marks, despite the final answer given being the same as the mark scheme. They have clearly demonstrated that they reached the answer through an incorrect method.

04.6 Two thirds of students could identify two reasons why the exact date of extinction can only be estimated.

04.7 Almost 70% of students could select the correct statement as evidence.

04.8 The most common correct answer was that (some) fossils have been destroyed. Few students gained both marks.

04.9 Students had difficulty expressing their responses, and again, repeating information from the question was insufficient. Some students were too vague to gain credit, with responses such as 'it makes you ill'. Some misconceptions between antibiotic resistance and the term 'immunity' were seen and some students showed confusion over what was resistant, such as stating that the body is resistant.

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