AQA GCSE Combined Science - Trilogy | 8464

SPECIFICATION POINT 4.3.1.7

Vaccination

Mark schemes and examiner comments

Tier	**Foundation**
Question groups	**3**
Available paper years	**2019–2025**

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.

4.3.1.7 Vaccination

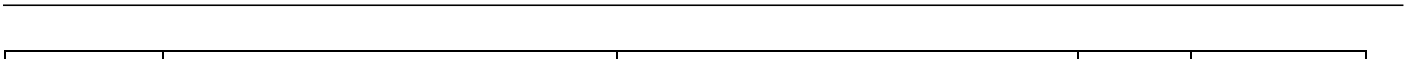
Answer 01 · Mark scheme June 2019 | 8464/B/1F | Original Q5

Question	Answers	Extra information	Mark	AO / Spec. Ref.
05.1	840 000 – 440 000 400 000	an answer of 400 000 scores 2 marks allow tolerance of +/- half a small square allow 840 – 440 = 400	1 1	AO2 4.3.1.5
05.2	2005 to 2010		1	AO3 4.3.1.5
05.3	any **one** from: • data not collected (for 2002) • only shows a trend line • not all deaths reported / recorded	allow no data plotted for 2002	1	AO3 4.3.1.5
05.4	protist		1	AO1 4.3.1.5
05.5	makes people immune **or** they do not develop the disease (so) fewer (infected) people to pass pathogen on (to mosquitos)	allow ecf from 05.4 allow correct description of immunity allow idea of disrupting life cycle of parasite	1 1	AO1 AO2 4.3.1.5
05.6	any **one** from: • (mosquito) nets / long clothing • prevent mosquitos breeding • insecticides • insect repellents • anti-malarial tablets • kill mosquitos	allow specific method e.g. drain swamps, release GM mosquitos allow DEET / mosquito band allow names e.g. Larium / Malarone allow antibiotics	1	AO1 4.3.1.5 4.3.1.7
Total			**8**	

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Answer 01 · Mark scheme

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Answer 02 · 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

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Answer 02 · Mark scheme

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

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

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Answer 02 · 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**

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Answer 03 · 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

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Answer 03 · 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		

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Answer 03 · Mark scheme

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**

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Answer 02 · 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.

Answer 02 · 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.

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Answer 03 · Examiner comments

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

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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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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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 ~~harm~~ 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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4.3.1.7 Vaccination

Answer 03 · Examiner comments

Contact us

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