AQA GCSE Biology | 8461

SPECIFICATION POINT 4.6.3.7

Resistant bacteria

Mark schemes and examiner comments

Tier	**Higher**
Question groups	**16**
Available paper years	**2007–2024**

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.

4.6.3.7 Resistant bacteria

Answer 01 · Mark scheme

March 2007 | BLY1A | Original Q1 | Legacy

One	**A**	ear	**4**
	B	eye	**2**
	C	nose	**3**
	D	skin	**1**

Answer 02 · Mark scheme

June 2007 | BLY1H | Original Q4 | Legacy

The full source mark scheme begins on page 17. Follow original question 4 in that document.

Answer 03 · Mark scheme

November 2007 | BLY1A | Original Q9 | Legacy

Nine	**3**	**2**	**1**	**3**

4.6.3.7 Resistant bacteria

Answer 04 · Mark scheme

June 2008 | BLY1H | Original Q4 | Legacy

question	answers	extra information	mark
4(a)	(bacteria) produce toxins / poisons (viruses) damage / kills cells **or** toxins released from cell		1 1
4(b)	any **two** from: • viruses live inside cells • viruses inaccessible to drug • drug would damage body cells / tissue		2
4(c)	any **four** from: • overuse of antibiotics • bacteria mutate • antibiotics kill non-resistant strains **or** idea of selection • reduced competition • resistant bacteria reproduce	do **not** allow antibiotic causes mutation	4
Total			**8**

4.6.3.7 Resistant bacteria

Answer 04 · Mark scheme June 2008 | BLY1H | Original Q4 | Legacy

COMPONENT NUMBER: BLY1H

COMPONENT NAME: Science B / Biology

STATUS: Final

DATE: June 2008

Answer 05 · Mark scheme November 2008 | BLY1AP | Original Q4 | Legacy

Four	3	1	3	3

Answer 06 · Mark scheme March 2009 | BLY1AP | Original Q3 | Legacy

Three	2	3	3	3

Answer 07 · Mark scheme June 2009 | BLY1AP | Original Q6 | Legacy

Six	1	4	1	4

Answer 08 · Mark scheme March 2010 | BLY1AP | Original Q6 | Legacy

Six	4	3	4	4

Answer 09 · Mark scheme March 2011 | BLY1AP | Original Q7 | Legacy

Seven	4	4	4	2

Answer 10 · Mark scheme June 2011 | BLY1AP | Original Q5 | Legacy

Five	1	3	1	4

Answer 11 · Mark scheme November 2011 | BLY1AP | Original Q4 | Legacy

Four	1	1	1	3

4.6.3.7 Resistant bacteria

Answer 12 · Mark scheme

June 2012 | BL1HP | Original Q5 | Legacy

Question 5

question	answers	extra information	mark
5 (a)(i)	dead / inactive / weakened	allow antigen / protein ignore ref to other components ignore small amount	1
	pathogen / bacterium / virus / microorganism	ignore germs / disease	1
5 (a)(ii)		antigen / antibiotic instead of antibody = max 2	
	white blood cells produce / release antibodies	accept lymphocytes / leucocytes / memory cells produce antibodies do **not** accept phagocytes	1
	antibodies produced quickly		1
	(these) antibodies destroy the pathogen	allow kill do **not** accept antibodies engulf pathogens	1
5 (b)(i)	(live) bacteria still in body	ignore numbers	1
	would reproduce	ignore mutation / growth	1
5 (b)(ii)	antibiotics / treatment ineffective **or** resistant pathogens survive	accept resistant out compete non-resistant	1
	these reproduce		1
	population of resistant pathogens increases	allow (resistant pathogens reproduce) rapidly	1
Total			**10**

4.6.3.7 Resistant bacteria

Answer 12 · Mark scheme

June 2012 | BL1HP | Original Q5 | Legacy

BL1HP

4.6.3.7 Resistant bacteria

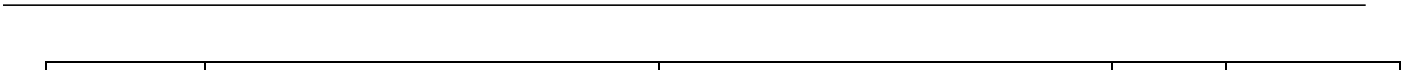
Answer 13 · Mark scheme June 2015 | BL1HP | Original Q4 | Legacy

Question	Answers	Extra information	Mark	AO / Spec. Ref.
4(a)	microorganism / bacteria / virus / fungus that causes (infectious) disease		1	AO1 1.1.2a
4(b)	reduce / stop use of (current) antibiotics (reduce / stop use) for non-serious / mild / viral infections	allow ensure course is completed allow use of variety of antibiotics	1 1	AO1 1.1.2j/k/ 1.8.1f
4(c)(i)	40 °C		1	AO2 1.1.2o
4(c)(ii)	any **one** from: • microorganisms grow / reproduce / work / act faster • results / product acquired sooner		1	AO1 1.1.2o
Total			**5**	

4.6.3.7 Resistant bacteria

Answer 13 · Mark scheme

June 2015 | BL1HP | Original Q4 | Legacy



4.6.3.7 Resistant bacteria

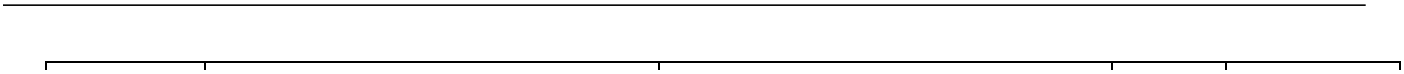
Answer 14 · Mark scheme June 2017 | BL1HP | Original Q6 | Legacy

Question	Answers	Extra information	Mark	AO / Spec. Ref.
6(a)(i)	bacteria (in vaccine) are dead / inactive / weakened	allow converse for bacteria that cause the disease, if clear allow bacteria in vaccine are attenuated allow idea that only antigen from bacteria is in vaccine	1	AO1 1.1.2l
6(a)(ii)	for vaccinated person: idea that white blood cells have previously encountered (TB) bacteria so are ready to produce antibodies rapidly / immediately	allow converse for non-vaccinated person allow ref to memory cells allow idea of specificity of antibodies / white blood cells	1 1	AO2/3 1.1.2l
6(b)(i)	(most / all) non-resistant bacteria killed (by antibiotic) resistant bacteria reproduce so offspring are resistant	allow converse allow resistance allele passed on	1 1 1	AO1/2 1.1.2j
6(b)(ii)	infection is mild / non-serious (not using antibiotic) reduces (rate of) development of resistant strains	allow not life-threatening allow might be viral (1) and antibiotics do not kill viruses (1)	1 1	AO1/2 1.1.2i
Total			**8**	

4.6.3.7 Resistant bacteria

Answer 14 · Mark scheme

June 2017 | BL1HP | Original Q6 | Legacy



4.6.3.7 Resistant bacteria

Answer 15 · Mark scheme

June 2023 | 8461/1H | Original Q3

Question 3

Question	Answers	Extra information	Mark	AO / Spec Ref.
03.1	(bacteria) release / produce toxins	allow (bacteria) release / produce poisons ignore toxins unqualified	1	AO1 4.3.1.3 4.3.1.1

Question	Answers	Mark	AO / Spec Ref.
03.2	**Level 2**: Relevant points (reasons / causes) are identified, given in detail and logically linked to form a clear account.	3-4	AO2
	Level 1: Relevant points (reasons / causes) are identified, and there are attempts at logical linking. The resulting account is not fully clear.	1-2	AO1 4.3.1.3 4.3.1.7
	No relevant content	0	
	Indicative content: *Vaccination of animal* • (animal's) white blood cells / lymphocytes produce antibodies (against *Salmonella* / vaccine / antigens) • antibodies are specific / complementary / correct to *Salmonella* / antigens • (specific) antibodies bind to *Salmonella* / antigens *Secondary response in animal* • if infected (specific) antibodies are produced quickly **or** in large numbers • (so) white blood cells **or** antibodies would kill (live) *Salmonella* • (so) fewer / no bacteria / pathogens / *Salmonella* in animals **or** in animal products (meat / milk / eggs) *Prevention of food poisoning in humans* • (so) fewer / no bacteria / pathogens / *Salmonella* eaten **or** in (named) food • (so) number of bacteria never reaches a high enough level for infection to develop • (so) fewer toxins produced (in humans). For **Level 2** students must link immune response in animals to prevention of an outbreak in humans.		

4.6.3.7 Resistant bacteria

Answer 15 · Mark scheme

June 2023 | 8461/1H | Original Q3

Question	Answers	Extra information	Mark	AO / Spec Ref.
03.3	any **two** from: • disinfect hands / work surface • sterilise Petri dish **or** culture medium (before use) • pass inoculating loop / forceps through a flame (before use) • work near a flame **or** work in a fume cupboard • tilt lid (of Petri dish) when placing discs on agar (to minimise contact with air / breath) • secure lid of Petri dish with adhesive tape	allow alternative descriptions of sterilising equipment such as UV light ignore clean / wash surfaces / hands / equipment allow sterilise agar (before use) ignore sterilise equipment allow example of other method to minimise contact with air / breath ignore store dish upside-down	2	AO1 4.1.1.6 RPA2

Question	Answers	Extra information	Mark	AO / Spec Ref.
03.4	(37 °C) 37 °C is human / body temperature *Salmonella* / bacteria grows best / better at 37 °C (25 °C) 25 °C reduces / prevents the growth of bacteria that are harmful to humans / students	 allow (so) bacteria grow best / better at human body temperature allow because it is too low for growth of human pathogens	 1 1 1	AO2 4.1.1.6 4.3.1.3 RPA2

4.6.3.7 Resistant bacteria

Answer 15 · Mark scheme

Question	Answers	Extra information	Mark	AO / Spec Ref.
03.5	(acts as a) control	allow for comparison allow to show that the results are not due to the paper disc allow to show that the results are due to the antibiotic ignore to show the effect / effectiveness of the antibiotic do **not** accept as a control variable	1	AO2 4.1.1.6 RPA2

Question	Answers	Extra information	Mark	AO / Spec Ref.
03.6	(they) killed the most bacteria	allow prevented most bacteria growing / replicating allow largest zone of inhibition (of bacteria) ignore largest clear area unqualified ignore antibiotic **B** killed the most bacteria	1	AO2 4.1.1.6 RPA2

Question	Answers	Extra information	Mark	AO / Spec Ref.
03.7	measure the diameter / radius of each clear area **or** calculate / measure the area of each clear area	allow measure the diameter / radius of each region where the bacteria are killed allow calculate the area of each region where the bacteria are killed	1	AO3 4.1.1.6 RPA2

4.6.3.7 Resistant bacteria

Answer 15 · Mark scheme

Question	Answers	Extra information	Mark	AO / Spec Ref.
03.8	bacteria must be resistant (to antibiotic **B**)	do **not** accept bacteria must be immune	1	AO3 4.3.1.8

Question	Answers	Extra information	Mark	AO / Spec Ref.
03.9	water enters the (bacterial) cell		1	AO2 4.3.1.8 4.1.3.2 4.1.1.1
	(water enters) by osmosis	allow (water enters) by diffusion through a partially / selectively / semi permeable membrane do **not** accept if description of concentrations is incorrect	1	
	(so) damaged / incomplete / no cell wall cannot withstand pressure (of water)	allow (so remaining) cell membrane cannot stretch further	1	

Total Question 3	17

4.6.3.7 Resistant bacteria

Answer 16 · Mark scheme

June 2024 | 8461/1H | Original Q6

Question 6

Question	Answers	Extra information	Mark	AO / Spec Ref.
06.1	penicillin	allow other named antibiotics ignore penicillium	1	AO1 4.3.1.3 4.3.1.8

Question	Answers	Extra information	Mark	AO / Spec Ref.
06.2	the bacterium is killed (by antibiotic **C**)	allow there is a zone of inhibition (around antibiotic **C**)	1	AO2 4.3.1.8 4.1.1.6 RPA2
	if the bacterium was resistant, bacteria would be right up to the (edge of the) antibiotic disc	allow resistance means that the bacterium is not killed (by antibiotic(s)) allow if the bacterium was resistant there would be no zone of inhibition ignore no white area	1	

Question	Answers	Extra information	Mark	AO / Spec Ref.
06.3	any **two** from: • current / available antibiotics do not kill (certain) bacteria • diseases become more common **or** there will be some diseases that cannot be cured / treated • new antibiotics need to be developed which takes time / money	allow current / available antibiotics have no effect on (certain) bacteria ignore more people become ill allow some diseases become more difficult to treat	2	AO2 4.3.1.8

Question	Answers	Extra information	Mark	AO / Spec Ref.
06.4	viruses **only** exist / reproduce inside (living) cells	allow viruses **need** (living) cells to exist / reproduce allow viruses exist / reproduce inside (living) cells **and** agar is not made of cells ignore names of cell types	1	AO2 4.3.1.8 4.3.1.1

4.6.3.7 Resistant bacteria

Answer 16 · Mark scheme

Question	Answers	Extra information	Mark	AO / Spec Ref.
06.5	(these) drugs (can) damage (body) cells / tissues **or** it is hard to get (these) drugs into (living) cells	allow viruses often / frequently mutate (giving resistance to these drugs)	1	AO1 4.3.1.8

Question	Answers	Extra information	Mark	AO / Spec Ref.
06.6	AIDS		1	AO1 4.3.1.2

Total Question 6	8

4.6.3.7 Resistant bacteria

Version 1.0: 0707

ASSESSMENT and QUALIFICATIONS ALLIANCE

General Certificate of Secondary Education

Science B 4462 / Biology 4411

BLY1H Unit Biology 1

Mark Scheme

2007 examination - June series

4.6.3.7 Resistant bacteria

Mark schemes are prepared by the Principal Examiner and considered, together with the relevant questions, by a panel of subject teachers. This mark scheme includes any amendments made at the standardisation meeting attended by all examiners and is the scheme which was used by them in this examination. The standardisation meeting ensures that the mark scheme covers the candidates' responses to questions and that every examiner understands and applies it in the same correct way. As preparation for the standardisation meeting each examiner analyses a number of candidates' scripts: alternative answers not already covered by the mark scheme are discussed at the meeting and legislated for. If, after this meeting, examiners encounter unusual answers which have not been discussed at the meeting they are required to refer these to the Principal Examiner.

It must be stressed that a mark scheme is a working document, in many cases further developed and expanded on the basis of candidates' 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 to download from the AQA Website: www.aqa.org.uk

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Dr Michael Cresswell, Director General.

4.6.3.7 Resistant bacteria

MARK SCHEME

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 and help to delineate what is acceptable or not worthy of credit or, in discursive answers, to give an overview of the area in which a mark or marks may be awarded.

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

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 lines 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.)

3. Marking points

3.1 Marking of lists

This applies to questions requiring a set number of responses, but for which candidates 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.

4.6.3.7 Resistant bacteria

Example 1: What is the pH of an acidic solution? (1 mark)

Candidate	Response	Marks awarded
1	4,8	0
2	green, 5	0
3	red*, 5	1
4	red*, 8	0

Example 2: Name two planets in the solar system. (2 marks)

Candidate	Response	Marks awarded
1	Pluto, Mars, Moon	1
2	Pluto, Sun, Mars, Moon	0

3.2 Use of chemical symbols / formulae

If a candidate 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

Full marks can be given for a correct numerical answer, as shown in the column 'answers', without any working shown.

However if the answer is incorrect, mark(s) can be gained by correct substitution / working and this is shown in the 'extra information' column;

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 are 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 e.c.f. 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 Unexpected Correct Answers not in the Mark Scheme

The Examiner should use professional judgement to award credit where a candidate has given an unexpected correct answer which is not covered by the mark scheme. The Examiner should consult with the Team Leader to confirm the judgement. The Team Leader should pass this answer on to the Principal Examiner with a view to informing all examiners.

4.6.3.7 Resistant bacteria

BLY1H Question 1

	answers	extra information	mark
(a)	scientists figures based on research / calculations / data **or** scientists sample whole area	ignore reasons based on bias	1
	fishermen based on impression / hearsay / experience **or** fishermen fish in well-stocked / limited areas	scientists sample a wider area = **2** marks fishermen only fish in well-stocked areas = **2** marks if no marks gained fishermens' opinion **and** scientists' opinion gains **1** mark	1
(b)	any **two** from: • economic considerations • political impact • pressure groups **or** fears of extinction	eg fear for jobs, profits, big demand for cod eg allow EU / government decide or laws will be passed	2
total			4

4.6.3.7 Resistant bacteria

BLY1H Question 2

	answers	extra information	mark
(a)	any **two** from: • area of bed sampled • sampling time • size of net • kicking action • net position	control variables from information given	2
(b)	any **two** from: • some animals not dislodged • some animals missed / through / escaped net • invertebrates difficult to identify • invertebrates from outside area	must be ideas related to a sample ignore reliability etc	2
(c)	10 to 99 **or** 10 – 99 **or** 99 to 10 **or** 99 – 10		1
(d)	any **two** from: • increased / goes up • 0 at sample 4 • to (more than) 100	allow increase implied from all data described	2
(e)	mayfly because not found downstream of point where sewage enters stream **or** only in the unpolluted water		1 1
total			9

4.6.3.7 Resistant bacteria

BLY1H Question 3

	answers	extra information	mark
	adaptation and <u>linked advantage</u> eg	max **2** for 3 adaptations	max 2 max 2
	• roots widespread / long (1) to collect water from large area (1)	ignore large roots accept to collect more water	
	• some roots deep / long (1) to collect water from deep down (1)	ignore large roots accept to collect more water	
	• absence of leaves (1) reduces water loss (1)		
	• swollen stem (1) to store water (1)		
	• roots near surface (1) to absorb rainwater (1)		
	• roots widespread (1) support in <u>sandy</u> soil (1)		
total			4

4.6.3.7 Resistant bacteria

BLY1H Question 4

	answers	extra information	mark
(a)(i)	viruses live inside cells		1
	viruses inaccessible to antibiotic	allow drug / antibiotic (if used) would (have to) kill cell	1
(ii)	mutation	ignore mutation caused by antibiotic	1
	natural selection **or** no longer recognised by antibiotics	accept description of natural selection	1
(b)	(stimulate) antibody production	ignore antitoxin	1
	(by) white cells		1
	<u>rapidly</u> produce antibody on re-infection	ignore antibodies remain in blood	1
total			7

4.6.3.7 Resistant bacteria

BLY1H Question 5

	answers	extra information	mark
(a)	ovary or ovaries		1
(b)	(hormone) implant		1
(c)	do not have to remember to take		1
(d)	does not involve hormone **or** it is a mechanical method	allow coil may be dislodged allow egg <u>is</u> fertilised / released allow not preventing egg fertilisation / release	1
(e)	involves death of fertilised egg **or** (regard) fertilised egg as human **or** stops fertilised egg developing	allow embryo / baby for fertilised egg ignore against religion only allow fertilised egg is alive ignore side effects	1
(f)(i)	inhibit FSH (production) so no eggs mature / develop / are produced	allow inhibits LH allow (LH) <u>stimulates</u> egg release ignore progesterone	1 1
(ii)	contains FSH which causes egg to mature / develop / be produced **or** in women whose FSH is low	allow contain LH allow (LH) <u>stimulates</u> egg release	1 1
total			9

4.6.3.7 Resistant bacteria

BLY1H Question 6

	answers	extra information	mark
(a)	asexual reproduction / mitosis **or** no fusion of gametes **or** division after fusion **or** from fertilised egg **or** from same embryo **or** from same egg **and** sperm	ignore cloning	1
	each embryo has identical genetic information / genes / DNA / chromosomes		1
(b)	any **two** from: • experimental subject and control are identical **or** fair test since monkeys identical • monkeys similar to humans, so effect of drugs likely to be similar • all identical so will have same reaction to drugs / disease • it's better than catching wild ones	allow closely related so… ignore evolved from	2
total			4

4.6.3.7 Resistant bacteria

BLY1H Question 7

	answers	extra information	mark
(a)	any **two** from: • balance between two important for good heart health • high LDL causes heart disease / high cholesterol • high HDL reduces heart disease / cholesterol	ignore blood pressure do **not** accept converse argument do **not** accept converse argument	2
(b)	heart attacks greater amongst patients with low HDL levels statins reduce heart attacks of patients **or** placebo is less effective	ignore statins cause heart disease ignore comparative effects of the two statins allow pravastatin is more effective supported by appropriate calculations eg pravastatin > 39 33% < 39 31.4% Average 32.4 > 39 32% < 39 28.2% Average 30.05%	1 1
total			4

4.6.3.7 Resistant bacteria

BLY1H Question 8

	answers	extra information	mark
(a)	present day organisms have evolved from simpler organisms	ignore answers in terms of natural selection	1
	over long periods of time **or** millions / billions of years		1
(b)	(natural selection operates on successful) characteristics produced by chance / (random) mutation		1
	in this experiment caused by hormones / environment	allow this example indicates inheritance of acquired characteristics for **2** marks allow this is Lamarckism only for **1** mark	1
total			4

4.6.3.7 Resistant bacteria

Answer 15 · Examiner comments

June 2023 | 8461/1H | Original Q3

Question 3 (Standard, standard/high and high demand)

03.1 A little over half of students correctly stated how *Salmonella* bacteria cause the symptoms of vomiting and diarrhoea. While the word 'toxin' was commonly used, many students failed to gain credit as they didn't refer to toxins being released or produced which was essential for the mark, but there was some confusion between the terms excrete and secrete.

03.2 This levelled response question required students to make links between the immune response in an animal (following vaccination), and the prevention of a food poisoning outbreak in humans. The high demand required to enter level 2 resulted in less than 6% of students making the leap, with just under 62% of students failing to even enter level 1, thus gaining no credit.
For many students lack of adequate technical language was a barrier to gaining credit with vague statements eg the body or immune system makes antibodies or the body can react faster when the bacteria re-infects. Common errors included poor understanding of what memory cell specifically are – suggesting they act as antibodies, or that antibodies make white blood cells. There appeared to be less confusion about the difference between antibodies, antitoxins and antigens than in previous years. The 2% minority of students who were able to answer both parts of the question skilfully gained full marks in level 2.

03.3 It was encouraging to read that most students had experience of the practical, allowing over 70% of students to gain 1 or more marks. Although many students gave precise answers, 'sterilise equipment' or 'flame equipment' was deemed too vague at this level.

03.4 This question proved a challenge for the majority of students, with only 1% gaining the full 3 available marks, and just under 43% gaining no marks at all. Very few students identified 37°C as being human body temperature, perhaps thinking this was unnecessary or assumed. Some responses identified the potential growth of harmful bacteria but did not specify that it may be harmful to humans in relation to the 25°C being used in school laboratories.

03.5 Generally well answered with around 66% of students gaining the mark. The incorrect term 'control variable' was not infrequent.

03.6 75% of students gave a correct answer here. Where students failed to gain this mark, it was often due to a lack of precision in their response, with a lack of a comparative term or weak description of the area where bacteria had been killed. Some students were unsuccessful as they referred to just one of the antibiotics, and the question clearly asks why should either A or B be prescribed so both had to be included in the response.

4.6.3.7 Resistant bacteria

Answer 15 · Examiner comments

June 2023 | 8461/1H | Original Q3

03.7 Generally well answered with most students being able to make an attempt at the answer, and around 56% of students gaining credit. Where students failed to gain this mark, it was often due to a lack of precision, for example simply referring to the circle rather than the clear area or the area where bacteria had been killed.

03.8. It was pleasing to see over 66% of students giving correct responses as they were clear on the idea of developing resistance. Numerous students muddled resistance and immunity and some commented that animals become immune to antibodies and as such could not be credited. Sadly, some students correctly described the development of resistance but went on to negate the mark with comments such as 'now the bacteria are immune to the antibiotic'.

03.9 This high demand question was not accessible to most students, and indeed over three quarters of students failed to gain any marks. Many students simply rewrote information from the stem of the question without saying that this was due to pressure from water and linking it to the impact this had on either the cell wall or cell membrane. A sizeable minority thought that the antibiotic entered the bacteria by osmosis causing it to burst. As anticipated some students negated correct detail on water movement, by giving incorrect definitions of osmosis, and in particular incorrect references to water potential or diffusion gradients. If water concentration is not specified, it is assumed that solute concentration is being described and this often results in an incorrect answer (for example, 'water moves from an area of high concentration to an area of low concentration' is not correct). We continue to also see confusion regarding the role of the cell wall and cell membrane in a cell, as well as lack of understanding around the role antibiotics play in bacterial infections.

4.6.3.7 Resistant bacteria

Answer 16 · Examiner comments June 2024 | 8461/1H | Original Q6

Question 6 (standard, standard/high demand and high demand)

06.1 83% of students were able to name an appropriate antibiotic. Commonly seen incorrect answers included aspirin, ibuprofen and paracetamol.

06.2 65% of students scored one mark on this question, with the majority achieving the first marking point. 6% of students scored two marks.

The vast majority of responses referenced a zone of inhibition, rather than a description of an area where the bacteria had been killed, both of which were creditworthy. However, references to a 'clear' or 'white' area were not. A number of students missed out on the mark, however, for offering vague references to bacteria 'not growing' rather than describing the effect the antibiotic had on them. For marking point 2, the majority of students went on to simply repeat what they had said for marking point 1 in a different way; that because the bacteria were killed, or because there was a zone of inhibition, they cannot be resistant, rather than what would happen if the bacteria *were* resistant. Frequently, reference to the antibiotic being resistant was seen.

06.3 74% of students scored zero marks on this question, largely due to not accurately articulating their ideas. The most commonly seen response related to marking point 3, regarding the difficulty of developing new antibiotics in terms of cost or time, with nearly a quarter of students achieving one mark. Some students began a sentence about the difficulty of developing new antibiotics, but offered no further clarification and therefore could not be awarded a mark. For marking point 2, many students began to try to express the idea that diseases would become more common and/or diseases would be more difficult to treat. However, they struggled to articulate themselves in a way that was creditworthy, with the emphasis on (individual) illnesses or infection, rather than diseases generally.

06.4 36% of students were awarded the mark in this question. The majority of students were aware that viruses only exist inside living cells although many had difficulty expressing this clearly enough to gain the mark. The most commonly seen correct response referred to viruses needing cells to reproduce, rather than viruses *only* reproducing inside cells.

06.5 43% of students achieved the mark in this question. A significant number of students understood that drugs used to destroy viruses would also damage the body cells, with vastly fewer recognising that it was hard to get these drugs into cells. Those who did not gain credit for this idea often stated that 'antibiotics only kill bacteria', 'viruses are small, so are difficult to find' or 'it is hard/expensive to research and develop new drugs'.

Those student who referenced mutation usually did not gain credit because they described viruses mutating 'more' or 'faster', rather than frequently. Often, students used the term 'they' in their answer as referring to 'the drugs', when in fact 'they', in the context of the question, refers to 'the scientists'. Students should be encouraged to look at the subject of the question before answering in terms of 'they' or 'it' for example, or better still, not use such terms in their answer.

06.6 84% of students correctly identified AIDS as a viral disease that damages white blood cells.

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