AQA GCSE Biology | 8461

SPECIFICATION POINT 4.3.1.1

Communicable (infectious) diseases

Mark schemes and examiner comments

Tier	**Higher**
Question groups	**33**
Available paper years	**2007–2025**

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.

4.3.1.1 Communicable (infectious) diseases

Answer 01 · Mark scheme

June 2007 | BLY1A | Original Q3 | Legacy

Three	**3**	**2**	**3**	**4**

Answer 02 · Mark scheme

June 2007 | BLY1H | Original Q4 | Legacy

The full source mark scheme begins on page 49. Follow original question 4 in that document.

Answer 03 · Mark scheme

March 2008 | BLY1AP | Original Q6 | Legacy

Six	**2**	**4**	**3**	**3**

4.3.1.1 Communicable (infectious) diseases

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**

4.3.1.1 Communicable (infectious) diseases

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**

4.3.1.1 Communicable (infectious) diseases

Answer 06 · Mark scheme

question	answers	extra information	mark
2(a)	antibodies	allow antitoxins / memory cells do **not** allow antigens	1
	immune	ignore protection allow resistant	1
2(b)(i)	fell		1
	numerical qualification to zero / nothing / by 100%	allow stopped in 1995	1
2(b)(ii)	(no) % vaccination fell **or** when no vaccination	ignore circle	1
	but autism numbers did not fall / stayed high / increased **or** '(yes) might support it if time lag between vaccination and autism symptoms' / 'time lag for diagnosis' (1) 6 year time lag quantified (1)		1
Total			**6**

4.3.1.1 Communicable (infectious) diseases

Answer 06 · Mark scheme January 2009 | BLY1H | Original Q2 | Legacy

Biology BLY1H - AQA GCSE Mark Scheme 2009 January Series

COMPONENT NUMBER: BLY1H

COMPONENT NAME: Science B / Biology

STATUS: Final

DATE: January 2009

Answer 07 · Mark scheme March 2009 | BLY1AP | Original Q8 | Legacy

Eight	**3**	**3**	**1**	**2**

Answer 08 · Mark scheme June 2009 | BLY1AP | Original Q2 | Legacy

Two	**A** antibodies **4**			
	B antitoxins **2**			
	C pathogens **1**			
	D toxins **3**			
	A	**B**	**C**	**D**

Answer 09 · Mark scheme June 2009 | BLY1AP | Original Q6 | Legacy

Six	**1**	**4**	**1**	**4**

Answer 10 · Mark scheme November 2009 | BLY1AP | Original Q2 | Legacy

No matching mark scheme was available in the supplied archive for this question.

Answer 11 · Mark scheme November 2009 | BLY1AP | Original Q8 | Legacy

No matching mark scheme was available in the supplied archive for this question.

Answer 12 · Mark scheme March 2010 | BLY1AP | Original Q3 | Legacy

Three	**3**	**4**	**4**	**1**

4.3.1.1 Communicable (infectious) diseases

Answer 13 · Mark scheme

March 2010 | BLY1AP | Original Q9 | Legacy

Nine	**2**	**4**	**4**	**2**

Answer 14 · Mark scheme

June 2010 | BLY1AP | Original Q3 | Legacy

Three	**4**	**1**	**3**	**1**

4.3.1.1 Communicable (infectious) diseases

Answer 15 · Mark scheme

June 2010 | BLY1H | Original Q3 | Legacy

Question 3

question	answers	extra information	mark
3(a)	worldwide **or** several countries (outbreak)	ignore affects large numbers of people	1
3(b)	any **three** from • new strain of flu / virus changes / virus different • vaccination not effective **or** new vaccine not yet developed • antiviral drugs not effective / not yet developed • *people* not immune to it • virus not recognised by white blood cells / antibodies **or** antibodies / antitoxins not effective • people / animals travel between countries / abroad spreading infection	 ignore mutation allow resistant / immune to vaccine allow drugs / treatment not effective do **not** allow antibiotics not effective allow people not resistant accept no antibodies / antitoxins ignore white blood cells / antibodies fighting off	*3*
Total			**4**

4.3.1.1 Communicable (infectious) diseases

Answer 15 · Mark scheme

June 2010 | BLY1H | Original Q3 | Legacy

BLY1H

Answer 16 · Mark scheme

March 2011 | BLY1AP | Original Q4 | Legacy

Four	**4**	**2**	**1**	**4**

4.3.1.1 Communicable (infectious) diseases

Answer 17 · Mark scheme

June 2011 | BLY1H | Original Q3 | Legacy

Question 3

question	answers	extra information	mark
3	(wbc) ingest / digest pathogens / bacteria / viruses	allow eat germs ignore swallow germs ignore ingest the disease ignore attack / kill the disease	1
	(wbc) produce antibodies		1
	(wbc) produce antitoxins		1
	any **one** from: • (antibodies) destroy or kill pathogens / bacteria / viruses / germs • (antitoxins) counteract / destroy /neutralise toxins / poisons • reasonable reference to memory cells **or** rapid production of antibodies upon re-infection	 ignore destroy / kill disease ignore attack / fight pathogens ignore attack / killing toxins	1
Total			**4**

4.3.1.1 Communicable (infectious) diseases

Answer 17 · Mark scheme

June 2011 | BLY1H | Original Q3 | Legacy

BLY1H

Answer 18 · Mark scheme

November 2011 | BLY1AP | Original Q8 | Legacy

Eight	**2**	**3**	**3**	**1**

4.3.1.1 Communicable (infectious) diseases

Answer 19 · Mark scheme

January 2012 | BL1HP | Original Q2 | Legacy

Question 2

question	answers	extra information	mark
2(a)	both lead to reduction / fall (in measles cases)	can be implied	1
	measles vaccine caused a big drop **or** correct use of figures		1
	MMR wipes out measles **or** drops to (almost) zero **or** doesn't fall as much as measles vaccine **or** correct use of figures.		1
2(b)	mump(s)	either order	1
	rubella / german measles	allow phonetic spelling	1
2(c)	white blood cells	allow lymphocytes / leucocytes ignore memory cells	1
	(wbc) produce antibodies	ignore antitoxins / antigens / antibiotics / engulfing	1
	in future / if re-infected antibody production rapid / fast(er) / quick(er)	allow ecf from antitoxins / antigens / antibiotics ignore engulfing ignore reference to specificity	1
Total			**8**

4.3.1.1 Communicable (infectious) diseases

Answer 19 · Mark scheme

January 2012 | BL1HP | Original Q2 | Legacy

COMPONENT NUMBER: BL1HP

4.3.1.1 Communicable (infectious) diseases

Answer 20 · Mark scheme

June 2012 | BL1HP | Original Q1 | Legacy

Question 1

question	answers	extra information	mark
1 (a)	don't kill pathogens / bacteria / viruses / microbes / microorganisms	allow don't contain antibiotics ignore antibodies / attack / fight allow only treat symptoms / pain ignore kill disease / germs	1
1 (b)	any **two** from: • age • gender • extent / severity of pain **or** how long had pain before trial • type of pain / illness / site of pain • (body) mass / weight / height • other medical issues / drugs taken / health / fitness • ethnicity	accept 'the pain' for **1** mark, if neither extent or type given ignore pain threshold allow body size / physique	2
1 (c)(i)	75	ignore calculations / %	1
1 (c)(ii)	faster pain relief / decrease	allow pain relief sooner **or** it works quicker **or** more pain relief at start / in first hour / $1\frac{3}{4}$ hours	1
1 (c)(iii)	decrease of pain higher / more decrease of pain is longer lasting	ignore more effective unless qualified by time >$1\frac{3}{4}$ hours allow effect lasts longer	1 1

Question 1 continues on the next page . . .

4.3.1.1 Communicable (infectious) diseases

BL1HP

Question 1 continued

question	answers	extra information	mark
1 (d)	any **three** from: **(Yes because)** • rapid pain relief (from A) • long lasting pain relief (from B) • and it costs less • the sum of the pain relief (from A + B) is greater (than X) **(No because)** • drug X gives more pain relief • (A + B / they) might interact with each other • could result in overdose • could be more / new side effects	ignore yes or no if neither points gained allow (more) dangerous	3
Total			**10**

4.3.1.1 Communicable (infectious) diseases

Answer 20 · Mark scheme

June 2012 | BL1HP | Original Q1 | Legacy

BL1HP

4.3.1.1 Communicable (infectious) diseases

Answer 21 · 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**

4.3.1.1 Communicable (infectious) diseases

Answer 21 · Mark scheme

June 2012 | BL1HP | Original Q5 | Legacy

BL1HP

4.3.1.1 Communicable (infectious) diseases

Answer 22 · Mark scheme

January 2013 | BL1HP | Original Q6 | Legacy

Question 6

question	answers	extra information	mark
6(a)(i)	any **one** from: • (produce) toxins / poisons • (cause) damage to cells	 kill / destroy cells allow kills white blood cells	1
6(a)(ii)	produce antitoxins engulf / ingest / digest pathogens / viruses / bacteria / microorganisms	 accept phagocytosis or description ignore eat / consume / absorb for engulf ignore references to memory cells	1 1
6(b)(i)	dead / inactive / weakened (measles) pathogen / virus	accept idea of antigen / protein ignore bacteria	1 1
6(b)(ii)	(after infection) rise begins sooner / less lag time steeper / faster rise (in number) longer lasting **or** doesn't drop so quickly	accept converse if clearly referring to before vaccination idea of staying high for longer ignore reference to higher starting point	 1 1 1
6(b)(iii)	antibodies are specific or needs different antibodies	accept antigens are different **or** white blood cells do not recognise virus	1
6(c)	reduces spread of infection / less likely to get an epidemic	 accept idea of eradicating measles	1
Total			**10**

4.3.1.1 Communicable (infectious) diseases

Answer 22 · Mark scheme

January 2013 | BL1HP | Original Q6 | Legacy

BL1HP

4.3.1.1 Communicable (infectious) diseases

Answer 23 · Mark scheme

June 2013 | BL1HP | Original Q1 | Legacy

Question 1

question	answers	extra information	mark
1(a)(i)	lower percentage (of women) who died numerical reference to a pair of figures to show this	allow fewer (women) died allow any difference in a pair of figures	1 1
1(a)(ii)	doctors were not transferring pathogens / bacteria / viruses / microorganisms / microbes	ignore reference to nurses allow fungi ignore disease / germs / infection	1 1
1(b)	any **three** from: • lower percentage of patients died (when doctors washed hands or in ward A) • large decrease or reference to proportional decrease • little / no difference / similar to ward B • continued drop (in ward A)	 allow fewer for lower percentage ignore raw data	3
1(c)	any **two** from: • better understanding / knowledge of immunity • better / new drugs • sterilisation of equipment **or** isolation of patients **or** some infectious diseases wiped out **or** earlier identification / treatment of infections	 accept ref to immunisation / vaccination accept examples, e.g. antibiotics / penicillin (discovered) allow better / new medicines ignore references to general hygiene	2
Total			**9**

4.3.1.1 Communicable (infectious) diseases

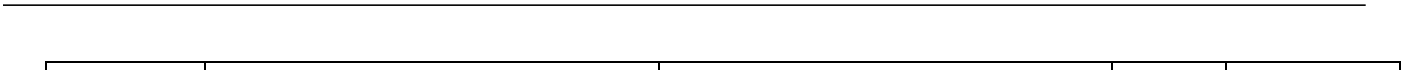
Answer 24 · Mark scheme June 2015 | BL1HP | Original Q4 | Legacy

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**	

4.3.1.1 Communicable (infectious) diseases

Answer 24 · Mark scheme

June 2015 | BL1HP | Original Q4 | Legacy



4.3.1.1 Communicable (infectious) diseases

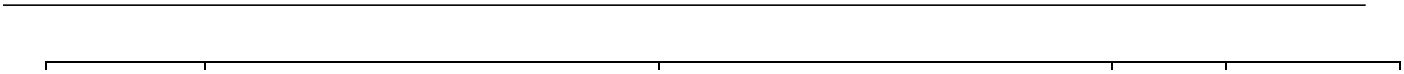
Answer 25 · Mark scheme June 2017 | BL1HP | Original Q6 | Legacy

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	

4.3.1.1 Communicable (infectious) diseases

Answer 25 · Mark scheme

June 2017 | BL1HP | Original Q6 | Legacy



4.3.1.1 Communicable (infectious) diseases

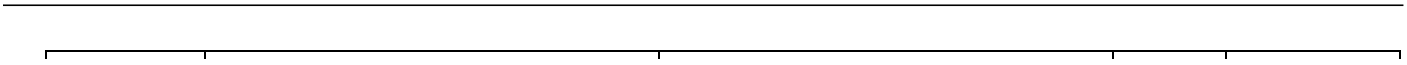
Answer 26 · Mark scheme

Question	Answers	Extra information	Mark	AO / Spec. Ref.
05.1	(mouthpiece) has pierced / entered the phloem **or** (the aphid) has been feeding from the phloem		1	AO2 4.2.3.2
05.2	yellow leaves due to lack of chlorophyll	ignore 'choroplasts' ignore magnesium is needed to make chorophyll	1	AO1
	(therefore) less / no light absorbed (by chlorophyll)		1	AO2
	(therefore) lower rate of / no photosynthesis	do **not** allow 'energy is produced by photosynthesis'	1	AO1
	(therefore) plant makes less / no sugar / glucose		1	AO1
	(therefore) plant converts less / no sugar / glucose into protein (for growth, so growth is stunted)	allow less glucose / sugar converted into cellulose (cell wall) allow less energy for protein synthesis	1	AO1 4.3.3.1 4.4.1.1 4.4.1.3
05.3	inject the protein / it into a mouse		1	AO1 4.3.2.1
	combine lymphocytes with tumour / cancer cells to make hybridoma (cells)	ignore white blood cells allow T or B lymphocytes ignore tumour unqualified	1	
	find a hybridoma which makes a monoclonal antibody specific to PVY		1	
	(the scientist) clones (the hybridoma) to produce many cells (to make the antibody)	do **not** allow cloning of original stem cells allow many rounds of cloning / mitosis	1	
Total			**10**	

4.3.1.1 Communicable (infectious) diseases

Answer 26 · Mark scheme

June 2018 | 8461/1H | Original Q5



4.3.1.1 Communicable (infectious) diseases

Answer 27 · Mark scheme

June 2019 | 8461/1H | Original Q2

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

4.3.1.1 Communicable (infectious) diseases

Answer 27 · Mark scheme

June 2019 | 8461/1H | Original Q2

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

4.3.1.1 Communicable (infectious) diseases

Answer 27 · Mark scheme

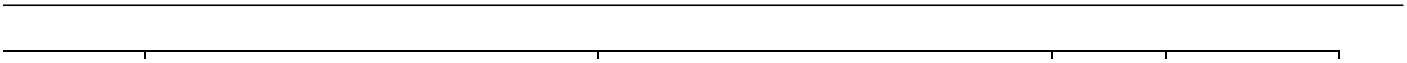
June 2019 | 8461/1H | Original Q2

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

4.3.1.1 Communicable (infectious) diseases

Answer 27 · Mark scheme

June 2019 | 8461/1H | Original Q2



Answer 28 · Mark scheme

November 2020 | 8461/1H | Original Q7

The full source mark scheme begins on page 61. Follow original question 7 in that document.

4.3.1.1 Communicable (infectious) diseases

Answer 29 · Mark scheme

June 2022 | 8461/1H | Original Q7

Question 7

Question	Answers	Extra information	Mark	AO / Spec. Ref.
07.1	any **one** from: • sexual contact / intercourse • exchange of body fluids	allow intercourse unqualified ignore kissing allow example of exchange such as (drug) users sharing needles **or** blood transfusion **or** passage from mother to foetus in uterus	1	AO1 4.3.1.1 4.3.1.2

Question	Answers	Extra information	Mark	AO / Spec. Ref.
07.2	(number of cases) in women decreases then increases, then decreases (number of cases) in men increases then decreases	ignore use of figures allow **total** numbers (of men and women together) increase then decrease ignore reference to differences between men and women if no other marks awarded allow overall trend decreases in **both** for **1** mark	1 1	AO3 4.3.1.1 4.3.1.2

4.3.1.1 Communicable (infectious) diseases

Answer 29 · Mark scheme

Question	Answers	Extra information	Mark	AO / Spec. Ref.
07.3	any **one** from: • better education (into prevention of spread of HIV) • condoms more widely available **or** condoms easier to source **or** condoms cheaper • new / better drugs (to prevent HIV infection / spread) • better / more testing / identification (of people with HIV)	allow increased awareness about HIV ignore contraception / protection unqualified allow PrEP / anti-retrovirals stop the virus being passed on ignore new treatments do **not** accept antibiotics allow less promiscuity ignore vaccination	1	AO3 4.3.1.2

Question	Answers	Extra information	Mark	AO / Spec. Ref.
07.4	$\frac{242}{1288}$		1	AO2 4.3.1.2
	0.1878…	allow a rounded answer	1	
	0.188 (:1)	allow a correctly rounded answer from student's incorrect division using numbers from **Table 8** do **not** accept if a unit is given	1	

4.3.1.1 Communicable (infectious) diseases

Answer 29 · Mark scheme

Question	Answers	Extra information	Mark	AO / Spec. Ref.
07.5	any **one** from: • calculate as a percentage • give the numbers per 100 000 people	ignore calculate as a proportion allow any standard number eg 10 000 / 1000	1	AO3 4.3.1.2

Question	Answers	Extra information	Mark	AO / Spec. Ref.
07.6		ignore reference to WBC unqualified		AO1 4.3.1.7 4.3.1.6 4.3.1.2
	inactive HIV / virus is injected (into bloodstream / muscle / body)	allow dead HIV / virus is injected (into bloodstream / muscle / body) allow (named) part of HIV / virus is injected (into bloodstream / muscle / body)	1	
	white bloods cells produce antibodies (against inactive virus)	allow lymphocytes produce antibodies (against inactive virus) do **not** accept phagocytes produce antibodies (against inactive virus)	1	
	(if infected with HIV) correct / specific antibodies are produced quickly		1	
	antibodies destroy the (active) virus / HIV	allow antibodies 'kill' the (active) virus / HIV	1	

4.3.1.1 Communicable (infectious) diseases

Answer 29 · Mark scheme

June 2022 | 8461/1H | Original Q7

Question	Answers	Extra information	Mark	AO / Spec. Ref.
07.7	HIV / antigen / protein injected into mouse extract / collect (mouse) lymphocytes that make a specific antibody to HIV / antigen / protein lymphocytes are combined with a tumour cell to create a hybridoma (hybridoma) cloned to create many cells that produce the antibody	allow other correct small mammals eg rat allow extract specific lymphocytes from someone with HIV for **2** marks allow lymphocytes are combined with a myeloma / cancer cell to create a hybridoma **alternative route** HIV / antigen / protein injected into mouse (1) lymphocytes from mouse are combined with a tumour cell to create a hybridoma (1) the hybridoma that makes the specific / correct antibody is isolated (1) (hybridoma) cloned to create many cells that produce the antibody (1)	1 1 1 1	AO1 4.3.2.1

4.3.1.1 Communicable (infectious) diseases

Answer 29 · Mark scheme

Question	Answers	Extra information	Mark	AO / Spec. Ref.
07.8		allow 'the virus' for HIV throughout		AO3 4.3.2.1 4.3.2.2
	monoclonal antibody is complementary / specific to HIV antigen	allow correct description of complementarity	1	
	monoclonal antibodies attach to (all the) HIV antigens		1	
	(so) HIV cannot bind to (human) cell **or** (so) HIV genetic material cannot enter (human) cell	allow white blood cells **or** phagocytes identify (monoclonal) antibodies and engulf / destroy (antibody bound) HIV **alternative route** monoclonal antibody is complementary / specific to HIV antigen (1) monoclonal antibody with (anti-retroviral) drug attached attaches to the HIV antigens (1) drug destroys the virus **or** drug destroys genetic material (1)	1	

Total Question 7		19

4.3.1.1 Communicable (infectious) diseases

Answer 30 · 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.		

4.3.1.1 Communicable (infectious) diseases

Answer 30 · Mark scheme

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

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

4.3.1.1 Communicable (infectious) diseases

Answer 30 · 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**

4.3.1.1 Communicable (infectious) diseases

Answer 31 · Mark scheme

June 2023 | 8461/1H | Original Q5

Question 5

Question	Answers	Extra information	Mark	AO / Spec Ref.
05.1	vector		1	AO1 4.3.1.5

Question	Answers	Extra information	Mark	AO / Spec Ref.
05.2	any **three** from: • protist / it has mitochondria • protist / it has (a) nucleus **or** protist DNA / genetic material is not free in the cytoplasm • protist / it does not have a single loop of DNA / genetic material • protist / it does not have <u>plasmid</u>s • protist / it does not have a cell wall	allow converse for prokaryotic cells allow eukaryotic for protist if neither mark awarded, allow **1** mark for protist has membrane-bound structures ignore genetic information ignore genetic information do **not** accept eukaryotic cell does not have a cell wall allow protist / it does not have a slime capsule ignore cilia / flagellae / ribosomes ignore size / shape	3	AO2 4.1.1.1 4.3.1.5

4.3.1.1 Communicable (infectious) diseases

Answer 31 · Mark scheme

June 2023 | 8461/1H | Original Q5

Question	Answers	Extra information	Mark	AO / Spec Ref.
05.3	less oxygen carried (in blood)	allow less oxygen carried (to cells) ignore reference to number of red blood cells unqualified do **not** accept no oxygen carried	1	AO2 4.4.2.3 4.4.2.1 4.2.2.3
	less energy released from respiration	do **not** accept energy produced / made / created	1	

Question	Answers	Mark	AO / Spec Ref.
05.4	any **three** pairs from: **Sexual reproduction** / **Asexual reproduction** involves two parents / involves one parent involves gametes joining / fusing / **or** involves fertilisation / involves no (fusion of) gametes / **or** does not involve fertilisation there is mixing of genetic material / information / **or** there is genetic variation / **or** offspring are genetically different / there is no mixing of genetic material / information / **or** there is no genetic variation / **or** offspring are genetically identical ignore reference to clones involves (only) meiosis / involves mitosis **or** does not involve meiosis more energy required / less energy required slower / faster if no other mark awarded allow **1** mark for asexual reproduction produces many offspring pairs of answers can be in any order	3	AO1 4.6.1.1 4.1.2.2

4.3.1.1 Communicable (infectious) diseases

Answer 31 · Mark scheme

Question	Answers	Extra information	Mark	AO / Spec Ref.
05.5	(no bases so) DNA replication cannot occur	allow copying / duplicating / doubling for replication ignore cannot make DNA unqualified	1	AO2 4.1.2.2

Question	Answers	Extra information	Mark	AO / Spec Ref.
05.6	(after DNA replication) one set of chromosomes is pulled to each end of the cell	allow one (member) of each pair of chromosomes is pulled to each end of the cell ignore (half the) chromosomes are pulled to each end of the cell	1	AO1 4.1.2.2
	nucleus divides	allow two (new) nuclei form	1	
	cytoplasm **or** cell membrane divides to form two cells	allow cytokinesis	1	

Question	Answers	Extra information	Mark	AO / Spec Ref.
05.7	having disorder **S** reduces incidence / percentage of malaria	allow having disorder **S** reduces chance of getting malaria allow having disorder **S** protects against malaria	1	AO3 4.2.2.5 4.3.1.5
	as age increases a lower percentage of children with disorder **S** get malaria until age 10, then the percentage increases	allow protection against malaria increases with (increasing) age until age 10, then it decreases	1	

Total Question 5	15

4.3.1.1 Communicable (infectious) diseases

Answer 32 · 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

4.3.1.1 Communicable (infectious) diseases

Answer 32 · 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**

4.3.1.1 Communicable (infectious) diseases

Answer 33 · Mark scheme

June 2025 | 8461/1H | Original Q1

Question 1

Question	Answers	Extra information	Mark	AO / Spec Ref.
01.1	virus		1	AO1 4.3.1.2

Question	Answers	Extra information	Mark	AO / Spec Ref.
01.2	any **one** from: • (transfer of) droplets / saliva / mucus • sneezes • coughs	ignore other methods of transferring pathogens, unqualified such as touch or direct contact do **not** accept transfer through sexual intercourse	1	AO1 4.3.1.2

Question	Answers	Extra information	Mark	AO / Spec Ref.
01.3	willow	ignore parts of willow such as bark / leaves	1	AO1 4.3.1.9

Question	Answers	Extra information	Mark	AO / Spec Ref.
01.4	fever **or** (red skin) rash	allow high temperature allow (increased) sweating allow (red) spots / lumps / boils allow red / itchy skin allow cough / sneeze allow runny / blocked nose allow sore throat allow red / watery / sore eyes allow headache ignore flu-like symptoms, unqualified ignore pain unqualified do **not** accept nausea / diarrhoea	1	AO1 4.3.1.2

4.3.1.1 Communicable (infectious) diseases

Answer 33 · Mark scheme

Question	Answers	Extra information	Mark	AO / Spec Ref.
01.5	**few(er)** people (in population) with pathogen / measles / disease (due to vaccination) (so) **less likely** for pathogen / measles / disease to be passed on **or** (so) **less likely** for pathogen / measles / disease to be spread / caught	allow named types of pathogen allow (provides) herd immunity allow **less likely** to come into contact with a person with pathogen / measles / disease ignore (so) spread of disease is reduced allow **2** marks for fewer people with measles, so **less likely** to spread	1 1	AO2 4.3.1.2 4.3.1.7

Question	Answers	Extra information	Mark	AO / Spec Ref.
01.6	(graph reading) = 45 $\frac{45}{100} \times 240$ 108	 allow 0.45 × 240 allow for **1** mark an answer of 7 / 7.2 with evidence of having used 3(%) from **Figure 1** **or** allow for **1** mark an answer of 88 / 88.8 / 89 with evidence of having used 37(%) from **Figure 1**	1 1 1	AO2 4.3.1.2

4.3.1.1 Communicable (infectious) diseases

Answer 33 · Mark scheme

June 2025 | 8461/1H | Original Q1

Question	Answers	Extra information	Mark	AO / Spec Ref.
01.7		allow answers in terms of numbers of children or likelihood of getting disease		AO3 4.3.1.2
	a lower percentage of vaccinated children have severe measles / infection / disease **or** a higher percentage of unvaccinated children have severe measles / infection / disease **or** vaccination reduces severity of measles / infection / disease	allow converse	1	
	correct use of supporting comparative data from **Figure 9**	allow examples such as (severe disease is) 42% higher (in unvaccinated) **or** 15 times higher (than in vaccinated) **or** allow correct use of raw data used in a comparative way	1	

Total Question 1	11

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

4.3.1.1 Communicable (infectious) diseases

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.

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Dr Michael Cresswell, Director General.

4.3.1.1 Communicable (infectious) diseases

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.

4.3.1.1 Communicable (infectious) diseases

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.

4.3.1.1 Communicable (infectious) diseases

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

4.3.1.1 Communicable (infectious) diseases

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

4.3.1.1 Communicable (infectious) diseases

BLY1H Question 3

	answers	extra information	mark
	adaptation and linked advantage 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 sandy soil (1)		
total			4

4.3.1.1 Communicable (infectious) diseases

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

4.3.1.1 Communicable (infectious) diseases

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

4.3.1.1 Communicable (infectious) diseases

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

4.3.1.1 Communicable (infectious) diseases

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

4.3.1.1 Communicable (infectious) diseases

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

AQA

GCSE
BIOLOGY
8461/1H

Paper 1 Higher Tier

Mark scheme

June 2020

Version: 1.0 Final

206G8461 1H/MS

4.3.1.1 Communicable (infectious) diseases

MARK SCHEME – GCSE BIOLOGY – 8461/1H – JUNE 2020

Mark schemes are prepared by the Lead Assessment Writer and considered, together with the relevant questions, by a panel of subject teachers. This mark scheme includes any amendments made at the standardisation events which all associates participate in and is the scheme which was used by them in this examination. The standardisation process ensures that the mark scheme covers the students' responses to questions and that every associate understands and applies it in the same correct way. As preparation for standardisation each associate analyses a number of students' scripts. Alternative answers not already covered by the mark scheme are discussed and legislated for. If, after the standardisation process, associates encounter unusual answers which have not been raised they are required to refer these to the Lead Examiner.

It must be stressed that a mark scheme is a working document, in many cases further developed and expanded on the basis of students' reactions to a particular paper. Assumptions about future mark schemes on the basis of one year's document should be avoided; whilst the guiding principles of assessment remain constant, details will change, depending on the content of a particular examination paper.

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Information to Examiners

1. General

The mark scheme for each question shows:

- the marks available for each part of the question
- the total marks available for the question
- the typical answer or answers which are expected
- extra information to help the Examiner make his or her judgement
- the Assessment Objectives, level of demand and specification content that each question is intended to cover.

The extra information is aligned to the appropriate answer in the left-hand part of the mark scheme and should only be applied to that item in the mark scheme.

At the beginning of a part of a question a reminder may be given, for example: where consequential marking needs to be considered in a calculation; or the answer may be on the diagram or at a different place on the script.

In general the right-hand side of the mark scheme is there to provide those extra details which confuse the main part of the mark scheme yet may be helpful in ensuring that marking is straightforward and consistent.

2. Emboldening and underlining

2.1 In a list of acceptable answers where more than one mark is available 'any **two** from' is used, with the number of marks emboldened. Each of the following bullet points is a potential mark.

2.2 A bold **and** is used to indicate that both parts of the answer are required to award the mark.

2.3 Alternative answers acceptable for a mark are indicated by the use of **or**. Different terms in the mark scheme are shown by a / ; 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.

4.3.1.1 Communicable (infectious) diseases

Question	Answers	Extra information	Mark	AO / Spec. Ref.
01.1		allow correct chemical symbols ignore any attempt at balancing equation ignore light / chlorophyll		AO1 4.4.1.1
	before arrow carbon dioxide **and** water	either order	1	
	after arrow glucose	ignore sugar / carbohydrate do **not** accept starch	1	
01.2		ignore description of subsequent parts of the photosynthesis reaction		AO1 4.1.1.2 4.4.1.1
	<u>light</u>	allow sun<u>light</u> ignore sun	1	
	(light) is captured / trapped / absorbed by chlorophyll / chloroplasts	allow (light) is used by chlorophyll / chloroplasts	1	
01.3	$\frac{18.5 + 19.3 + 19.5}{3}$ **or** $\frac{57.3}{3}$		1	AO2 4.4.1.2 RPA 6
	19.1 (cm^3/hour)	allow an answer correctly calculated using only two correct values	1	
01.4	a ring around 14.2	allow clear indication of correct result	1	AO3 4.4.1.2 RPA 6

4.3.1.1 Communicable (infectious) diseases

01.5	any **one** from: • scale / value was misread • there was air / oxygen in the syringe / measuring cylinder / apparatus • the lamp / light was moved • temperature changed • had different mass / length of pondweed • pondweed had not acclimatised	ignore human error ignore references to counting bubbles or time allow measurement error allow light intensity changed ignore different bulb / lamp unqualified	1	AO3 4.4.1.2 RPA 6
01.6	did not use it in calculation (of mean)		1	AO3 4.4.1.2 RPA 6
01.7	any **one** from: • light (intensity) • carbon dioxide (concentration) • pondweed size / amount • pondweed species	do **not** accept temperature ignore time allow distance / power / colour of lamp / light allow same (piece of) pondweed	1	AO3 4.4.1.2 RPA 6
01.8	enzyme(s) lose the shape of the active site	allow enzyme(s) (start to) denature allow enzyme(s) destroyed / damaged do **not** accept enzyme(s) killed	1	AO2 4.2.2.1

4.3.1.1 Communicable (infectious) diseases

01.9	y-axis labelled '(rate of) photosynthesis in cm^3/hour'		1	AO2 4.4.1.2 RPA 6
	suitable scale on y-axis	must take up half or more of grid provided	1	
	all points plotted to within ± ½ small square	allow 3 or 4 correct plots for **1** mark ignore any attempt to plot a point at 20 °C	2	
	correct curved line of best fit	ignore line joined point to point with straight lines ignore extrapolation	1	
Total			**16**	

4.3.1.1 Communicable (infectious) diseases

Question	Answers	Extra information	Mark	AO / Spec. Ref.
02.1	movement / spreading out of molecules / particles	allow movement / spreading out of (named) substances / chemicals / gases / liquids ignore reference to membranes / cells	1	AO1 4.1.3.1
	from (an area of) high(er) concentration to (an area of) low(er) concentration	allow down / with the concentration gradient ignore along / across the concentration gradient do **not** accept movement from / to a concentration gradient	1	
02.2	increased carbon dioxide concentration in the air		1	AO2 4.1.3.1 4.2.3.2
	increased number of stomata that are open		1	

4.3.1.1 Communicable (infectious) diseases

02.3	**Level 3:** Relevant points (reasons/causes) are identified, given in detail and logically linked to form a clear account.	5–6	AO1 4.1.3.1 4.2.2.2 4.2.2.3
	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
	• (many) alveoli
	  • provide a large(r) surface area (**:** volume)
	
	• capillaries are thin
	  or alveoli / capillary walls are thin **or** one cell thick
	  or capillaries are close to the alveoli
	  • which provides short diffusion path (for oxygen / carbon dioxide)
	
	• breathing (mechanism) moves air in and out
	or lungs are ventilated
	  • to bring in (fresh) oxygen
	  • to remove carbon dioxide
	  • to maintain a concentration / diffusion gradient
	
	• large capillary network (around alveoli)
	or good blood supply
	  • to remove oxygen(ated blood) quickly
	  • to bring carbon dioxide to the lungs quickly
	  • to maintain a concentration / diffusion gradient		

4.3.1.1 Communicable (infectious) diseases

02.4	osmosis	allow diffusion	1	AO1 4.1.3.1 4.2.3.2 4.1.3.2
02.5	active transport (because) energy is needed (to move nitrate ions) from a low(er) concentration (in the soil) to a high(er) concentration (in the root / cell)	 allow (to move nitrate ions) against / up the concentration gradient allow (because) there is a lower concentration (of nitrate ions) in the soil **or** (because) there is a higher concentration (of nitrate ions) in the root / cell ignore reference to amount / number of nitrate ions ignore along / across the concentration gradient do **not** accept if reference to molecules / atoms moving	1 1 1	AO3 AO2 AO2 4.1.1.3 4.2.3.2 4.1.3.3
Total			**14**	

4.3.1.1 Communicable (infectious) diseases

Question	Answers	Extra information	Mark	AO / Spec. Ref.
03.1	any **two** from: (both have) • cytoplasm • (cell) membrane • DNA / genetic material • ribosomes	ignore reference to shape allow RNA ignore genetic information if no other mark awarded allow sub-cellular structures for **1** mark if no other mark awarded allow correct cellular process, e.g. respiration for **1** mark	2	AO2 4.1.1.1 4.1.1.2 4.1.2.1
03.2	any **three** from: • prokaryotic cell is smaller • prokaryotic cell has no mitochondria • prokaryotic cell has no nucleus **or** DNA is free in the cytoplasm **or** genetic material is free in the cytoplasm • prokaryotic cell has a single loop of DNA **or** prokaryotic cell has a single loop of genetic material • prokaryotic cell has plasmids	allow converse for eukaryotic cells allow reference to bacterium instead of prokaryotic cell ignore reference to features not shown in Figure **5** if neither mark awarded, allow prokaryotic cell has no membrane-bound organelles ignore genetic information ignore genetic information ignore circular / rings of DNA allow prokaryotic cells have smaller ribosomes	3	AO2 4.1.1.1 4.1.1.2 4.1.2.1

03.3	1 µm = 0.001 mm **or** 1 mm = 1000 µm **or** 0.05 mm = 50 µm **or** 0.05 × 1000 (1:) 50	 do **not** accept if a unit is given	1 1	AO2 4.1.1.1 4.1.1.2
03.4	mitosis	correct spelling only	1	AO1 4.1.2.2
03.5	35%		1	AO2 4.1.2.2
03.6	 (stage 1) DNA / chromosomes replicate / duplicate mitochondria / ribosomes / sub-cellular structures increase in number **or** mitochondria / ribosomes / sub-cellular structures replicate (stage 2) one set of chromosomes is pulled / moved to each end of the cell (stage 3) the cytoplasm **and** cell membrane divides (to form two cells)	ignore names of the stages of the cell cycle ignore genetic material ignore DNA / chromosomes double / reproduce allow cytoplasm increases ignore cell grows unqualified allow one of each chromosome is pulled / moved to each end of the cell ignore nucleus divides allow cytoplasm divides **and** (new) cell membranes form ignore nucleus divides	 1 1 1 1	AO1 4.1.2.2
Total			**13**	

4.3.1.1 Communicable (infectious) diseases

Question	Answers	Extra information	Mark	AO / Spec. Ref.
04.1	fatty acids		1	AO1 4.2.2.1
	glycerol		1	4.4.2.3
04.2	enzyme binds to the substrate because they are complementary (shapes)	allow enzyme joins to the substrate because they fit together exactly allow enzyme joins to the substrate because the substrate fits the active site ignore reference to specificity do **not** accept same shape	1	AO2 4.2.2.1
	(so) substrate is broken down (into products)	allow (so) substrate splits (into products) ignore products are formed, unqualified	1	
	(so) products are released **or** enzyme is not changed	allow enzyme is not used up allow reference to activation energy for either marking point 2 **or** marking point 3	1	
04.3	each <u>active site</u> has a specific shape (so only fits one type of lipid molecule)	allow each <u>active site</u> is a different shape do **not** accept reference to the substrate having an active site	1	AO2 4.2.2.1
04.4	add Benedict's (solution / reagent to the liquid)		1	AO1 4.2.2.1 RPA 4
	boil / heat	allow any temperature of 65 °C or above	1	
	(if glucose is present the blue) colour changes to yellow / green / orange / brown / (brick)red		1	

04.5	add iodine solution / reagent (to the liquid) (if starch is present) it changes colour to blue / black (from yellow / orange / brown)	allow add a drop of iodine ignore iodine unqualified	1 1	AO1 4.2.2.1 RPA 4
04.6	glucose from photosynthesis (excess) glucose converted to starch	do **not** accept starch made in photosynthesis allow (excess) glucose is stored as starch	1 1	AO2 4.2.2.1 4.4.1.1 4.4.1.3 4.4.2.3
04.7	starch (stores) have been converted to glucose (so the glucose can be) used for respiration / (named) metabolic reactions **or** (so the glucose can be) used to release energy (because) there is no light to make (new / more) glucose by photosynthesis	ignore reference to residual glucose from previous photosynthesis do **not** accept idea of energy being produced / created / made	1 1 1	AO3 4.4.1.1 4.4.2.1 4.4.1.3
04.8	any **one** from: • test roots / stems of plants (in the light and dark) • test other species of plant • measure the concentrations of glucose **and** starch • vary the time in the dark / light • test variegated leaves	do **not** accept reference to changing the independent variable allow test other parts of the plants allow test other types of plant ignore mass / amount allow any other valid extension ignore repeats	1	AO3 4.4.1.2 4.4.1.3
Total			**17**	

4.3.1.1 Communicable (infectious) diseases

Question	Answers	Extra information	Mark	AO / Spec. Ref.
05.1	mechanical	allow physical allow structural	1	AO3 4.3.3.2
05.2	any **one** from: • to deter herbivores • to prevent animals damaging it	ignore to injure animals, unqualified allow to deter animals eating it do **not** accept to deter predators	1	AO2 4.3.3.2
05.3	chemical		1	AO3 4.3.3.2

4.3.1.1 Communicable (infectious) diseases

05.4	any **two** from : • lack of magnesium (ions) (1) (so) not enough chlorophyll for (efficient) photosynthesis (1) (so) not enough glucose to make proteins for growth **or** not enough glucose to release energy for growth (1) • infection by pathogen / bacteria / virus / fungus (1) (so) leaves become discoloured / yellow so less photosynthesis (1) (so) not enough glucose to make proteins for growth **or** not enough glucose to release energy for growth (1) • infected by aphids (1) (which) remove sugars from phloem (1) (so) not enough glucose to make proteins for growth **or** not enough glucose to release energy for growth (1) • lack of (available) light (1) (so) chlorophyll breaks down (1) (so) not enough glucose to make proteins for growth **or** not enough glucose to release energy for growth (1)	allow (so) lack of chlorophyll produced causes yellow leaves (1), (so) not enough photosynthesis to produce glucose which is used to make proteins for growth (1) allow correctly named pathogen allow has rose black spot / TMV allow other symptoms of named pathogens / disease award once only award once only award once only	5	AO2 4.3.3.1 4.3.1.1 4.3.1.2 4.3.1.4 4.4.1.1 4.4.1.2 AO1 4.4.2.3 4.4.1.3

4.3.1.1 Communicable (infectious) diseases

05.5	(bacteria) obtain glucose / sugar (from the plant) (glucose used) for respiration **or** (glucose used) for making other named substances	 allow (glucose used) to release energy	1 1	AO3 AO2 4.2.3.2 4.4.1.3
05.6	(gorse plant) obtains nitrate (ions) needed for amino acids / proteins	 allow needed to make chlorophyll / DNA	1 1	AO2 4.1.3.3 4.4.2.3 AO1 4.3.3.1
05.7	willow bark		1	AO2 4.3.1.9
Total			**13**	

4.3.1.1 Communicable (infectious) diseases

Question	Answers	Extra information	Mark	AO / Spec. Ref.
06.1	any **two** from: • BMI / morphology / obesity level • smoking habits • diet • medication • family history of liver disease • fitness levels • ethnicity • area of UK they live in	ignore genetic factors allow mass / weight **and** height allow previous drinking habits allow medical conditions allow drug use allow level of exercise allow race	2	AO3 4.2.2.6
06.2	2.55 – 1.60 (= 0.95) $\left(\frac{0.95}{2.55} \times 100 = \right)$ 37 (.2549019608…) (%)	allow 1.60 – 2.55 (= –0.95) allow value for with meals in range 1.60 to 1.65 (for 1.60) allow answer correctly calculated from values in ranges 1.60 to 1.65 and 2.50 to 2.60 allow – 37(.2549019608...)(%)	1 1	AO2 4.2.2.6
06.3	12 × 2 × 7 = 168 (g/week) 1.8	 allow in range 1.8-1.9 allow correct reading from a calculation that omits the 2 **or** the 7 do **not** accept if a unit is given	1 1	AO2 4.2.2.6

4.3.1.1 Communicable (infectious) diseases

06.4	any **two** from: • consuming alcohol increases the RR (with / without meals) **and** supporting data • consuming less than 50 g/week of alcohol with meals does not increase the RR • even (small amounts of alcohol at) 25 g/week increases the RR if not with meals	allow risk for RR throughout allow data in terms of number of glasses of wine allow increasing alcohol consumption increases the RR at an increasing rate allow any value between 35 and 60 g/week	2	AO3 4.2.2.6
06.5	any **two** from: • large number in survey • long term / 15 year survey • well controlled	allow 800 000 in survey if neither mark awarded allow large study allow many controls	2	AO3 4.2.2.6
06.6	any **one** from: • people underestimate / overestimate alcohol consumption • people may change (lifestyle / drinking) habits over time • some people may drink all their weekly alcohol at once	allow people lie about alcohol consumption **or** people lie about other named control variables ignore survey only tested women	1	AO3 4.2.2.6

06.7	**Level 2:** Scientifically relevant facts, events or processes are identified and given in detail to form an accurate account.	3-4	AO2 4.4.2.3 4.2.2.1
	Level 1: Facts, events or processes are identified and simply stated but their relevance is not clear.	1-2	AO1 4.4.2.2 4.2.2.6 4.2.2.5 4.5.3.3
	No relevant content	0	
	Indicative content Responses may refer to either total or partial liver failure • no bile made (in the liver) ○ fats / lipids are not emulsified ○ surface area of fats / lipids not increased ○ pH of small intestine will not be alkaline / neutralised ○ enzymes (in small intestine) will not work effectively **or** (named) food not digested / absorbed ○ so may lose weight • lactic acid not broken down / oxidised ○ accumulation of lactic acid in blood / body ○ lactic acid is toxic **or** body will be poisoned ○ oxygen debt higher / prolonged ○ so muscle pain / fatigue • proteins / amino acids will not be broken down (in liver) ○ (amino acids) not deaminated ○ amino acids not made into urea **or** will not form ammonia ○ (however) any ammonia formed is toxic ○ so accumulation of amino acids in blood / body • liver does not break down / remove other toxins (like alcohol) ○ toxins accumulate in blood / body ○ body will be poisoned ○ so pain **or** jaundice **or** swollen liver **or** portal hypertension occurs • glycogen stores will not be formed ○ cannot control blood glucose ○ so hyperglycaemia / hypoglycaemia / diabetes / coma may occur		

Total			**15**

4.3.1.1 Communicable (infectious) diseases

Question	Answers	Extra information	Mark	AO / Spec.Ref.
07.1		ignore add mAbs and dye to slide (unbound)		AO2 4.3.2.2
	bind fluorescent dye to mAbs		1	
	put (bound) fluorescent mAbs on the slide (and rinse off)		1	
	mAbs will bind to Candida albicans / pathogens and show up under the microscope	allow mAbs will bind to Candida albicans / pathogens and show up under UV (lamp)	1	
07.2	more Candida albicans / pathogens will be engulfed / killed by phagocytes / white blood cells	allow Candida albicans / pathogens will be engulfed / killed by phagocytes / white blood cells more quickly do **not** accept white blood cells produce antibodies do **not** accept lymphocytes engulf Candida albicans	1	AO2 4.2.2.3 4.3.1.6 4.3.1.7
	therefore less damage to cells / tissues / organs	ignore less toxin released (by Candida albicans)	1	

07.3	**Level 2:** Scientifically relevant facts, events or processes are identified and given in detail to form an accurate account.		4-6	AO1 4.3.1.9
	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 • given first to healthy volunteers ○ at (very) low dose ○ to test it is safe **or** to test for toxicity **or** to check for any side effects • then to some patients (with the disease) **or** people with the disease ○ to test for the correct / optimum dose ○ to check for any side effects ○ to test for efficacy **or** to test if it works ○ in a double blind trial ○ where neither patients nor doctors know who has the mAbs and who has a placebo (or alternative treatment) • reference to large trial **or** long duration **or** control variables			
07.4	any **one** from: • (the body will) not reject the mAbs **or** (the body is) less likely to reject the mAbs • mouse mAbs are (more likely to be) rejected • the human lymphocytes have already responded to that infection / cancer cell so they are known to work against the disease	do **not** accept idea of rejection of cells	1	AO3 4.3.2.2 4.3.2.1 4.3.1.6
Total			**12**	

Answer 26 · Examiner comments

June 2018 | 8461/1H | Original Q5

Question 5 (standard, standard / high & high demand)

05.1 Many students recognised the relevance of the phloem, although some of these simply stated that the phloem carries sugars, without linking this to feeding by the aphid.

Some students continued the theme from the previous question and linked 'high concentration' in the question to diffusion, osmosis or active transport.

05.2 Although many students showed some understanding of the reason for stunted growth, most did not go on to achieve three or four marks.

The lack of magnesium was often linked to chlorophyll deficiency, causing yellow leaves, although chloroplasts were sometimes confused with chlorophyll. The fact that reduced chlorophyll would lead to a reduction in light absorption was frequently omitted as students moved directly to a reduction in photosynthesis and in turn, reduced glucose production.

However a lack of glucose was only rarely linked to a shortage of protein or cellulose, but more commonly to a lack of energy which was insufficient. Many students were able to describe much of the process that happens when magnesium is not deficient but did not answer the question by stating that none of this would happen in the case of magnesium deficiency.

05.3 This was a new area of the specification and although many students knew that something had to be injected, most were confused either as to the organism receiving the injection or to the contents of the syringe.

At the next step the need for lymphocytes, cancer cells and the production of a hybridoma was not understood by many. Although many knew the term 'hybridoma' most answers described the wrong components. Specificity was only mentioned on very rare occasions, as was the need for the scientists to clone the hybridoma. Many students did know some details, but clarity of detail and explanation was frequently lacking.

4.3.1.1 Communicable (infectious) diseases

Answer 28 · Examiner comments

November 2020 | 8461/1H | Original Q7

Question 7 (standard/high & high demand)

Many students unnecessarily explained how monoclonal antibodies were produced for **07.1**, and very few scored marks on this question. Many students misunderstood the context of the question, and indicated that the mAbs would be injected into the slide. Some students thought that the mAbs were made of lymphocytes. In **07.2**, several students incorrectly stated that the mAbs themselves or lymphocytes would engulf the pathogen.

In **07.3**, many students were able to access Level 2, however, a number of students made blanket statements about clinical trials that applied to all participants. Several students were unable to clarify the difference between patients and healthy volunteers, with some using confusing terminology such as ‘healthy patients’.

4.3.1.1 Communicable (infectious) diseases

Answer 28 · Examiner comments

Concluding Remarks

Generally, the standard of this paper was broadly comparable to previous years. Students generally scored well on simple recall of knowledge questions (AO1) and the topics of cell structure, photosynthesis and movement across membranes were well answered. Most students were able to apply their knowledge effectively in straightforward questions (AO2), but some found application of knowledge to new situations more difficult. Many student's understanding of the structure and function of enzymes is limited and a lack of clear knowledge meant that some students articulated answers poorly on paper. Many students struggle to answer AO3 questions, particularly where complex data needs to be analysed or improvements to practical techniques need suggesting. A lack of precision when quoting, plotting or describing data is common.

As in previous years, details of the Benedict's test for sugar and iodine solution test for starch had not been recalled well, indicating that many students understanding of this practical activity was below expectations. Students continue to find the role of the liver in the human body a challenge.

4.3.1.1 Communicable (infectious) diseases

Mark Ranges and Award of Grades

Grade boundaries and cumulative percentage grades are available on the Results Statistics page of the AQA Website.

4.3.1.1 Communicable (infectious) diseases

Answer 29 · Examiner comments

June 2022 | 8461/1H | Original Q7

Question 7 (Standard, standard/high and high demand)

07.1 Over 90% of students answered correctly, although occasional vague answers such as 'physical contact' were seen. References to sex or sexual contact / intercourse were the most commonly seen responses, but sharing needles or exchange of body fluids was also frequently seen. Some students talked about 'contraception' but did not qualify this as being a barrier method, which was not creditworthy.

07.2 Nearly 80% of students gained one mark in this question, either for referring to the number of cases increasing and then decreasing in men, or, for the fall-back mark of an overall decrease. A surprising number of students failed to read the figures correctly and suggested that cases in both men and women were decreasing or increasing until 2014. Several students identified a trend but failed to attribute it to men, women or both. Some did not attribute an overall decrease to **both** men and women or that the **total** number increased then decreased. Many compared the numbers of men and women, particularly saying that the number of cases in men was higher than in women, which was not incorrect, but not creditworthy. Several described the increase in 2014 as an anomaly. Students should be reminded to check the number of marks available for each question and to take care to consider each column of the table separately.

07.3 Just over half of students grained credit in his question. Those who fell short of the mark often gave vague answers such as 'education' or' contraception' without reference to an improvement, such as 'more', 'greater' or 'better'. Reference to vaccines was very common, which was the most common answer for zero marks, as well as several suggesting the development of herd immunity.

07.4 Over two thirds of students achieved full marks on this calculation question. Those that scored two marks often had the numerator and denominator reversed in their division or failed to round their answer to three significant figures, with the most common incorrect answer given being 0.19. The majority of students achieved 3 marks for a correct answer, sometimes given without any working shown and sometimes when the method of calculation was not clearly apparent. Some gave the figures as a ratio and did no calculation. Others gave the figures as a ratio but then produced figures which indicated that they had divided them. Many divided both numbers by 2, for no apparent reason. It was apparent that some students didn't have calculators, although some still managed a correct calculation.

07.5 Less than half of students gained this mark, with the most common incorrect answer being graphing the data to visually compare. It was also suggested frequently that the same number of men and women should be tested, considering this as a controlled investigation rather than gathered statistics. A significant number suggested presenting the results as a ratio, or presenting the total number, rather than just new cases.

07.6 A significant number of students were muddling the terms antibodies and antigens in their answer to this question about the process of vaccination. There was also some confusion around antibodies and antitoxins, and some suggesting the vaccine itself contained the antibodies. The most commonly achieved mark was mark point 1, although some students forgot to mention that the inactive virus needed to be injected into the body in some way. For MP2, some students failed to gain credit because they referred to the 'body' or 'immune system' producing the antibodies, which was not specific enough. For MP3, most students did not articulate the idea of specificity, just that antibodies were produced more quickly. There was occasionally confusion between white blood cells, lymphocytes and antibodies, with students saying that specific lymphocytes were produced, rather than specific antibodies. For this mark point, correct / specific antibodies could be inferred if it was stated that specific antibodies had been produced for MP2, and that these were produced on

infection. A few students talked about monoclonal antibodies suggesting they may have returned to this question after looking at questions 07.7 and 07.8. Surprisingly, MP4 was the least credited, as most students ended their account at the production of antibodies and failed to make any reference to what the antibodies do. Where there were references to the virus being destroyed / killed, this was equally likely to be in the context of the dead / inactive virus. There were also many references to preventing infection or 'fighting off', 'dealing with', 'tackling the virus' or other similar imprecise statements. There were frequent references to vaccination of a large proportion of the population providing herd immunity.

07.7 Many students were confident in describing the need for the mouse to be injected and understood that lymphocytes are combined with a tumour cell to create a hybridoma, however, many students went on to suggest that the antibodies were fused to the tumour cell, rather than the lymphocytes. The combination of ideas of extraction of lymphocytes and that these must be ones that produce specific antibodies to HIV was less well described. The most challenging part was that these hybridoma cells are then cloned to create many cells, and that it is these cells that produce the monoclonal antibodies. Vague references to 'injecting disease' were occasionally seen. The 'allowed' idea that specific lymphocytes were extracted from someone with HIV was not seen. Another common misconception highlighted by this question was the idea that the hybridoma is the monoclonal antibody. There were some very interesting attempts at spelling hybridoma in student answers.

07.8 Just over 50% of students scored marks on this question, with many not using the figure to scaffold their answer. Several answers referring to the idea of reducing the speed of spread of the virus resulting in less damage to the immune system (and therefore meaning that the patient's own immune system is better able to fight the virus for longer, reducing the chance of the viral load getting high enough to result in AIDs) were seen.
Most students missed mark point 1, and for those who did attempt it, many omitted to reference the idea that the shapes of the antibody and antigen were complementary, rather just giving the key word 'specific'.
There was further evidence of the misconception seen in question 07.7 regarding the hybridoma being given to people as the treatment (rather than isolating the antibodies), or that the hybridoma is the monoclonal antibody.
A number of students made references to the antigen or antigen binding site shape being changed which may be evidence of confusion with enzyme biology. There were also a lot of students describing the antigen being destroyed so that the HIV could not bind to the human cell. A reasonably sized group of students clearly do not understand the process of viral infection and talked about the antigen binding site allowing the human cell to take in the HIV DNA and 'learn it' so that they can produce antibodies to fight it off.
In some responses it appeared that students were identifying the human cell from the figure as a white blood cell which 'remembers' HIV, whilst others mistook the human cell for the monoclonal antibody. For the final mark point, many students thought that it was the monoclonal antibodies which engulfed / destroyed the HIV, or that the antibodies destroyed infected cells once the HIV genetic material had entered. Some thought that it was the human cell, or the antigen binding sites on it, that were doing the engulfing when invaded by HIV.

4.3.1.1 Communicable (infectious) diseases

Use of statistics

Statistics used in this report may be taken from incomplete processing data. However, this data still gives a true account on how students have performed for each question.

Mark Ranges and Award of Grades

Grade boundaries and cumulative percentage grades are available on the Results Statistics page of the AQA Website.

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.

4.3.1.1 Communicable (infectious) diseases

Answer 30 · 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.

Answer 31 · Examiner comments June 2023 | 8461/1H | Original Q5

Question 5 (Standard, standard/high and high demand)

05.1 The majority of students answered this question correctly with just over 68% of students gaining credit. A number of students referred to 'communicable disease' or 'carrier' which were not creditworthy.

Answer 31 · Examiner comments

05.2 Students were told in the stem of the question that the malarial protist is a eukaryotic cell, and clearly most students processed this information and just under 95% of student gained some marks. Incorrect responses were seen often when students mixed up protist and prokaryote structures or had misconceptions regarding prokaryote structure suggesting a lack of cell membrane or cytoplasm.

05.3 Most students gained credit for stating that lesson oxygen could be carried by the blood, if red blood cells burst. Only around 20% of students linked this idea to respiration and energy release for the second marking point. Some students suggested that as a result 'no oxygen would be carried' which was not creditworthy. We again this year saw the usual incorrect idea of energy being produced or created which lost students this second marking point.

05.4 Over 70% of students were able to gain some marks on this question, with 8% gaining the full 3 marks available. Many students knew that sexual reproduction involved 'gametes' but they failed to include the idea of fusion and missed out on the first marking point. A pleasing number of students gave the idea of genetic variation for the second marking point, but when 'genetic' was omitted or students simply referred to 'clones' credit was not awarded. The full array of possible creditworthy ideas were seen, as well as the fallback mark.

05.5 Only around 37% of students gained this mark. Those that did not, often lacked detail in their answer. Students were required to specifically refer to DNA, and terms such as 'chromosome' or 'genetic material' were ignored. Furthermore, references to DNA 'multiplying' or 'reproducing' did not gain credit.

05.6 This was a high demand question, and in particular the first marking point proved a good discriminator with very few students referring to 'one set of chromosomes' being pulled to each end of the cell, and instead giving vague references to 'chromosomes pulling apart', or 'DNA halves' which are insufficient at this level. While the process of mitosis is undoubtedly familiar to most students, they struggled to articulate their ideas clearly in their responses. Less than 3% of students gained all 3 marks as a result. Almost 37% gained 1 mark for references either the 'nucleus dividing' or 'the cell membrane / cytoplasm dividing' to form 2 cells.

05.7 The majority of students got muddled with the data in this question or misinterpreted it due to misreading the information provided in the stem informing them that 'the incidence of malaria in children with disorder S was calculated as a percentage of the incidence in children without disorder S'. Consequently, most students concluded that that having disorder S *increased* the chances of children getting malaria and therefore only a minority gained credit, with only 1% of students gaining 2 marks. The trend was however described correctly by around 27% of students for the whole age range obtaining 1 mark.

4.3.1.1 Communicable (infectious) diseases

Answer 32 · 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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4.3.1.1 Communicable (infectious) diseases

Answer 33 · Examiner comments

June 2025 | 8461/1H | Original Q1

Question 1 (standard demand)

01.1 Over 80% of students gained credit for the answer of 'virus' in this question. Of the minority of incorrect answers, the most common was 'bacteria', followed by 'fungi', 'protist' and 'communicable'.

01.2 65% of students correctly stated how measles could be spread, but some referred more vaguely to 'direct contact' or 'through the air', neither of which gained credit. A few incorrectly believed that measles is a sexually transmitted disease.

01.3 Pleasingly, 85% of students were able to identify 'willow' in this question. A small number of students did not gain credit as they had included a second, incorrect answer alongside willow, such as foxglove.

01.4 90% of students achieved the mark in this question owing to the wide range of creditable symptoms listed in the mark scheme. Some students gave unnecessarily long lists of symptoms, which occasionally led to the mark being disqualified when symptoms such as nausea and diarrhoea were included.

01.5 Although students found this question accessible, very few (10%) managed to gain both marks. 45% of students achieved 1 mark, usually for the idea of herd immunity in MP1. Many students focused on how vaccination affects individuals, rather than the impact of vaccination on the population as a whole. This led to responses about personal immunity rather than a decrease in measles frequency at the population level. Occasionally, students stated that measles would not be passed on to the next generation, as if it was a genetic disorder. MP2 required the idea of reduced likelihood, chance or probability of measles being spread and not a simple rewrite of the question such as 'therefore spread would be reduced'.

01.6 90% of students scored full marks in this question. The most common error seen involved using data from more than one bar or calculating a percentage using values from two bars.

01.7 Most students made a reasonable attempt at this question, with those scoring marks realising that the data in the figure showed the percentages of vaccinated and unvaccinated children who all had measles, and the degree of severity of these cases. The data did not show information about the likelihood of the children catching measles in the first place. Students who achieved both marks (45%) typically used comparative language and precise data from the graph in one concise sentence. Terms like *only* were effectively used to emphasise differences, and some students successfully manipulated data to give clear, accurate responses. Those who achieved 1 mark had usually identified that vaccination reduces severity (MP1) whilst those that scored zero marks (31%) tended to give an answer which focused on the chance of contracting measles.