

Mark scheme

Question			Answer/Indicative content	Marks	Guidance
1	a		Virus ✓ Bacteria ✓	2 (2 x AO 1.1)	<u>Examiner's Comments</u> Less than half of all candidates managed to score 1 mark on this question, indicating that they were unsure what type of pathogen caused the diseases.
	b	i	Spores / fungi / powdery mildew more likely to be splashed by the rain (on to plants) / transported by splashes of rain ✓ Spores / fungi / powdery mildew grow better in moist weather ✓	2 (2 x AO 2.1)	IGNORE references to wind ALLOW moist weather / rain helps spores / fungi / powdery mildew to grow <u>Examiner's Comments</u> Where candidates scored 1 mark on this question, it was usually for identifying that the spores got splashed and therefore transported to the plants in the spring. The second mark proved harder to obtain, with candidates not recognising that more spores would be produced due to the cool, moist weather.
		ii	Sexual (reproduction) ✓	1 (AO 2.1)	<u>Examiner's Comments</u> This question proved challenging for the majority of candidates. Many candidates incorrectly wrote asexual. Other incorrect responses included mitosis, heterozygous and homozygous.
		iii	Fungi on the pieces of dead barley ✓ Stops spores / fungi / powdery mildew spreading (to the new plants) ✓	2 (AO 2.1) (AO 3.1b)	ALLOW contaminating / infecting / moving as AW for spreading <u>Examiner's Comments</u> About half of all candidates scored 1 mark on this question, either for recognising that the dead barley

					would still contain spores, or for the idea that clearing the dead plants would stop the new plants getting infected.
			Total	7	
2			First check the answer on the answer line If answer = 0.005 (%) award 2 marks $(35 \div 700\,000) \times 100 \checkmark$ 0.005(%) $\checkmark$	2 (2 x AO 2.1)	ALLOW $5 \times 10^{-3}(\%)$ <u>Examiner's Comments</u> Approximately half of all candidates scored at least 1 mark on this question. Where candidates knew how to do the calculation, they usually went on to gain the second mark.  OCR support The <u>Science Mathematical Skills Handbook</u> would be useful to share with candidates or incorporate into lessons to practise calculating percentages, among other mathematical skills.
			Total	2	
3			A	1 (AO 2.1)	<u>Examiner's Comments</u> This was answered correctly by the majority of candidates.
			Total	1	
4		i	(The nucleus) contains the DNA / genetic material / chromosomes / faulty gene $\checkmark$	1 (AO 2.1)	<u>Examiner's Comments</u> Less than half of all candidates answered this correctly. There were a lot of vague responses about the nucleus controlling the cell.
		ii	Make sure it is safe / identify side effects / To see if it works / To find the correct dosage $\checkmark$	1 (AO 1.1)	ALLOW could go wrong / unknown effect IGNORE cannot test on humans <u>Examiner's Comments</u> This question was answered well by candidates. Commonly seen responses included: to ensure it was safe, or to make sure there were no side effects.

			Total	2	
5			B	1 (AO 1.1)	<u>Examiner's Comments</u> This question was also found quite challenging, with a lot of candidates incorrectly selecting D as their answer.
			Total	1	
6			C	1 (AO 2.1)	<u>Examiner's Comments</u> The majority of candidates were able to correctly select C as their response.
			Total	1	
7	a			3 (3 x AO 1.1)	All four correct = 3 marks Two or three correct = 2 marks 1 correct = 1 mark <u>Examiner's Comments</u> The majority of candidates found this question accessible, with most gaining 2 or more marks.
	b		Answers in either order Weakened ✓ Dead ✓	2 (2 x AO 1.1)	ALLOW antigens / fragments / pieces / attenuated / inactive / altered / harmless <u>Examiner's Comments</u> This question proved quite challenging for the majority of candidates. Incorrect responses included simply stating bacteria, viruses or pathogens. Other candidates stated that they contain antibodies.
			Total	5	
8			D	1 (AO 1.1)	<u>Examiner's Comments</u> The majority of candidates were able to correctly select D as an example of a communicable disease.

			Total	1	
9			Antibiotics do not affect viruses / only kill bacteria ✓ A is caused by viruses / not caused by bacteria ✓	2 (2 xAO 2.1)	ALLOW only treat bacterial infections / only effective against bacteria <u>Examiner's Comments</u> This question proved to be quite challenging for half the candidates. Some candidates used the wrong information from the table and talked about how it was transmitted through faeces, so antibiotics wouldn't work. Another common error was that because the infection only lasted two months, taking antibiotics wouldn't work. Successful responses identified it as a viral disease and then correctly stated that antibiotics only work on bacterial disease.
			Total	2	
10			D	1 (AO 1.1)	<u>Examiner's Comments</u> Half of all candidates answered this correctly. C was a commonly seen incorrect response.
			Total	1	
11	i		(Hepatitis) A, B and D ✓	1 (AO 2.1)	<u>Examiner's Comments</u> Half the candidates were able to correctly select the responses from the table.
	ii		(Hepatitis) A ✓	1 (AO 3.1a)	<u>Examiner's Comments</u> The majority of candidates correctly selected hepatitis A.
	iii		Alcoholic (hepatitis) ✓	1 (AO 3.1a)	<u>Examiner's Comments</u> The majority of candidates correctly selected alcoholic hepatitis as being non-communicable.
	iv		(Hepatitis) D ✓	1 (AO 2.1)	<u>Examiner's Comments</u> While the majority of candidates correctly identified hepatitis D, a few also mentioned hepatitis B in their response, which meant they did not gain the mark.

			Total	4	
12				2 (2 xAO 1.1)	IGNORE no soil use hydroponics line Three correct = 2 marks One or two correct = 1 mark DO NOT ALLOW more than 1 line from/to each box <u>Examiner's Comments</u> The majority of candidates answered this well.
			Total	2	
13		A		1 (AO 1.1)	<u>Examiner's Comments</u> Over half of all candidates answered this correctly.
			Total	1	
14		D		1 (AO 2.2)	ALLOW 12 <u>Examiner's Comments</u> Over half of the candidates answered this correctly. C was the most common distractor.
			Total	1	
15	a	Idea that the blood bypasses the blockage / can reach the heart (muscle) ✓ (Heart muscle) can respire / contract / obtain oxygen/glucose ✓		2 (2 × AO 2.1)	IGNORE flow/volume of blood unless qualified IGNORE replace vessel DO NOT ALLOW unblock the vessel <u>Examiner's Comments</u> The majority of candidates did not score maximum marks for this question which was assessing their application of knowledge and understanding of heart bypass surgery. The candidates who gained a mark mostly correctly identified the heart able to gain oxygen through the bypass.  Assessment for learning

					Centres could reinforce learning about the heart and circulation to consolidate candidates understanding of the heart as a muscle which need to respire to contract to function. Candidate's responses focused on increased blood flow to the body rather than the direct result of the bypass surgery on the heart muscle.
	b	i	FIRST CHECK THE ANSWER ON ANSWER LINE If answer = 125 000 award 2 marks 500 × 250 ✓ 125 000 ✓	2 (2 × AO 2.1)	ALLOW 0 or 1175000 - 1200000 for 1 mark <u>Examiner's Comments</u> The majority of candidates did not score this mark by correctly calculating the number of people who had a bypass operation in the USA in 1990 by times the number from the graph by the total population provided in the USA. Most answers stated 500 which the number (per million of population) from the graph without any further processing.
		ii	Fewer people (at risk) of heart attacks ✓ More angioplasty (operations done instead) ✓	2 (2 × AO 3.1b)	IGNORE references to reasons why there are fewer people at risk of heart attacks <u>Examiner's Comments</u> This question differentiated well between higher and lower ability candidates, where they had to analyse information from a graph to evaluate. The candidates who did not score here did not extract the information from the graph and instead wrote about improved diets and awareness of heart disease.
	c		(Stem cells) can differentiate/specialise into muscle/heart cells/tissue ✓ The heart will then beat more efficiently ✓ Idea that more oxygen/glucose supply to the body (cells) ✓	3 (3 × AO 2.1)	ALLOW they can replace damaged cells / develop into/change/divide/become muscle cells/tissue IGNORE fix/repair muscle cells IGNORE replace scar tissue ALLOW idea of stronger heartbeat IGNORE pump more blood <u>Examiner's Comments</u>

					This question proved challenging for the candidates with a high level of no response to the question. Those candidates who scored only gained one mark and very few gained full marks. The most common given mark was correctly identifying that the heart will beat more efficiently. Candidates who did not gain marks stated what stem cells are without applying it to the question and referring that those cells would specialise into muscle/heart cells.
			Total	9	
16	a		Bulbs will grow much faster than seeds ✓ The gardener will know the colour of the flowers from bulbs ✓	2 (2 × AO 1.2)	More than 2 boxes ticked then each additional incorrect box negates a mark ALLOW numbers instead of ticks <u>Examiner's Comments</u> The majority of candidates gained at least one mark here for correctly choosing the correct a statement on asexual reproduction.
	b		Pathogen ✓ Mutation ✓ Gene ✓	3 (3 × AO 1.1)	More than 1 answer for each line negates the mark <u>Examiner's Comments</u> This question differentiated well between lower and higher ability candidates. Candidates had to correctly complete each sentence from the list of words about genetics. Most candidates gained at least one mark.
	c		Microscopes didn't have the magnification/resolution / could not see the virus which was very small ✓	1 (AO 2.2)	ALLOW microscopes were not developed enough to see viruses ALLOW need an electron microscope / cannot be seen with a light microscope ALLOW ORA for modern day microscopes IGNORE technology <u>Examiner's Comments</u> Candidates found this question

					challenging and were unable to identify that microscopes would not have had the resolution or magnification ability to see the virus. Most answers which did not gain any marks wrote about technology not advanced.
d			Level 3 (5–6 marks) Provides an explanation of how each control method works AND Provides an evaluation of each method <i>There is a well-developed line of reasoning which is clear and logically structured. The information presented is relevant and substantiated.</i> Level 2 (3–4 marks) Provides an explanation of a control method AND Provides an evaluation of a method OR Provides an explanation how each control method works OR Provides an evaluation of each method <i>There is a line of reasoning presented with some structure. The information presented is relevant and supported by some evidence.</i> Level 1 (1–2 marks) Provides an explanation of a control method OR Provides an evaluation of a method. <i>There is an attempt at a logical structure with a line of reasoning. The information is in the most part relevant.</i> 0 marks <i>No response or no response worthy of credit</i>	6 (3 × AO 1.2) (3 × AO3.2a)	AO1.2 Demonstrate knowledge and understanding of the methods of control for the disease. Digging/burning the plants will destroy/kill the virus/infection / - prevent the insects from feeding on the infected tulips - Spraying fields with insecticide will kill the insects - Insects cannot spread infection AO3.2a Analyse information to make judgements on the methods of control. Digging up and burning advantages: - Only kill the infected bulbs - Does not involve paying for insecticide - Will not cause bioaccumulation by insecticide - Will not kill harmless/useful insects • Digging up and burning disadvantages: - Will not stop further spread by insects - Time consuming / may have to pay for labour - Contribute to greenhouse effect / global warming / CO₂ produced / harmful gasses / pollution - Less tulips/crop - Detection of disease maybe too late • Insecticide advantages:

					- Faster method - Less labour/ time investment - Does not contribute to greenhouse effect / global warming / CO₂ production - don't destroy the crops • Insecticide disadvantages: - Repeat application - Cost involved - Cause bioaccumulation - Kill useful/harmless insects - Disrupt food chains/webs - Reduce biodiversity - Promote insecticide resistance <u>Examiner's Comments</u> The Level of Response question had a high level of no responses, whereby if those candidates had attempted the question could have gained some marks. Those candidates who attempted to answer mainly produced Level 1 and Level 2 answers and very few were able to explain how each method would control the disease plus discuss the advantages and disadvantages of each method. A number of candidates got confused that pesticides would kill the infection not the insects and harm the tulips. Exemplar 1 <i>If they dig up and burn any tulips as soon as they show signs of infection this can cause pollution into environment and could potentially damage other tulips around the surrounding area. However, an advantage of this is the infection will be killed.</i> <i>A disadvantage of spraying their fields with insecticides is it could also kill the tulips, as well preventing the infection from spreading.</i> Exemplar 1 shows a Level 2, 4 marks response where the candidate has correctly identified how digging up and burning the tulips would control the disease by killing the infection with a correct evaluation of a method, by
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					causing pollution. They did not identify how insecticides would reduce the spread of infection and incorrectly stated that tulips would be killed.								
			Total	12									
17	a		Fat ✓ Oxygen ✓ Attack ✓	3 (AO 1.1)	<u>Examiner's Comments</u> This question testing knowledge and understanding was one of the most assessable questions in section B. The majority of candidates achieved full marks here for correctly completing each sentence from the list of words about heart disease.								
	b		<table><tr><td>eating vegetables</td><td></td></tr><tr><td>inheriting certain genes</td><td>✓</td></tr><tr><td>regular exercise</td><td></td></tr><tr><td>smoking cigarettes</td><td>✓</td></tr></table>	eating vegetables		inheriting certain genes	✓	regular exercise		smoking cigarettes	✓	1 (AO 1.1)	Both boxes correct for one mark. <u>Examiner's Comments</u> Again this was correctly answered by the most candidates by correctly identifying the two factors which can increase the risk of heart disease from a list. Those candidates who did not gain this mark only ticked one box.
eating vegetables													
inheriting certain genes	✓												
regular exercise													
smoking cigarettes	✓												
			Total	4									
18	a		HIV ✓	1 (AO 1.1)	ALLOW flu ALLOW Covid/Corona ALLOW any other credit worthy virus <u>Examiner's Comments</u> This question tested the knowledge and understanding of microbes and roughly half of candidates could correctly identify a virus that weakens the immune system. Incorrect answers ranged from named bacteria and protist pathogens.								
	b	i	(Use of a) tissue/handkerchief ✓	1 (AO 1.2)	ALLOW wear a face mask / cover mouth (when sneezing) ALLOW idea of self-isolation / avoid close contact / wash hands IGNORE vaccination /protective clothing <u>Examiner's Comments</u> This was one of the most assessable questions on the examination paper.								

					The candidates were well informed how to reduce the spread of an airborne pathogen.
		ii	Any two from: Mucus released from goblet cells ✓ Mucus will trap the virus ✓ Cilia will waft the mucus away from the lungs ✓	2 (2 × AO 1.1)	IGNORE nose hairs / other defence barriers <u>Examiner's Comments</u> The candidates found this question requiring knowledge and understanding on defence barriers challenging and mistook this as an immune response answer. Most candidates referred to antibodies, white blood cells. Those candidates who did recognise that the answer required barrier of defence made generic answers such as coughing and hairs, without knowing the technical terms of mucus and cilia. This question had a significant number of candidates which answered with a 'no response'.  Misconception Candidates did not recognise that to prevent entry of microbes into the lungs the barriers of defence are producing mucus by goblet cells and cilia removing the trapped microbes in the mucus. Centres could reinforce subject specific key words when teaching these key ideas.
	c		Weakened or dead virus ✓	1 (AO 1.2)	AW pathogen/microbe/measles for virus ALLOW virus antigen/attenuated virus <u>Examiner's Comments</u> This question tested the knowledge and understanding of vaccines and most candidates did not know what is found in a vaccine. A lot of answers which did not gain any marks were responses such as antibodies and the virus. This question had a significant

					number of candidates which answered with a 'no response'.  Misconception A significant number of students did not recognise that a dead / weakened version of the pathogen is found in a measles vaccine and incorrectly answered antibodies.
	d	i	(Number of cases) decreased ✓ (More) people were immune/vaccinated ✓	1 (2 × AO 3.2b) 1	ALLOW idea of herd immunity <u>Examiner's Comments</u> The majority of candidates scored one mark here for recognising that the measles cases would decrease after the introduction of the vaccine. This question was testing their ability to analyse information and ideas to draw conclusions.
		ii	(Number of cases) increased ✓ Less children were vaccinated due to risk of autism ✓	1 (2 × AO 3.2b) 1	<u>Examiner's Comments</u> The majority of candidates scored one mark here for recognising that the measles cases would increase after the 1998 report. This question was testing their ability to analyse information and ideas to draw conclusions.
			Total	9	
19			B ✓	1 (AO 1.1)	<u>Examiner's Comments</u> This question assessed the knowledge and understanding of communicable diseases and most candidates correctly identified B Tuberculosis.
			Total	1	
20			C ✓	1 (AO 2.2)	
			Total	1	
21			B ✓	1 (AO 1.1)	

			Total	1	
22			D ✓	1 (AO 1.1)	
			Total	1	