

Q1. (June 2019)

D

Q2. (June 2019)

D

Q3. (June 2019)

B

Q4. (June 2019)

B

Q5. (June 2019)

18	(a)	antigens ✓ white blood cells ✓	2	1.1	
	(b) (i)	as a control / to compare the results ✓	1	1.2	ALLOW show the drug is having the effect/works /no psychological effect
	(ii)	FIRST CHECK ANSWER ON THE ANSWER LINE If answer = 75 (patients) award 2 marks 480/6.4 ✓ =75 (patients) ✓	2	2.2	
	(c)	Any two from: for peer review ✓ idea of checking the results ✓ to increase the number of patients tested ✓ conclusions more valid ✓	2	2.2	IGNORE get accurate results ALLOW check for safety/bias ALLOW conclusions are more reliable

Q6. (June 2019)

21	(a)	<table><tr><th colspan="3">Communicable disease</th><th rowspan="2">Non-communicable disease</th></tr><tr><th>Caused by a bacterium</th><th>Caused by a fungus</th><th>Caused by a virus</th></tr><tr><td>crown gall disease</td><td>barley powdery mildew</td><td>AIDS</td><td>type 2 diabetes</td></tr></table> ✓✓✓	Communicable disease			Non-communicable disease	Caused by a bacterium	Caused by a fungus	Caused by a virus	crown gall disease	barley powdery mildew	AIDS	type 2 diabetes	3	1.1	4 correct = 3 marks, 2 or 3 correct = 2 marks, 1 correct = 1 mark
Communicable disease			Non-communicable disease													
Caused by a bacterium	Caused by a fungus	Caused by a virus														
crown gall disease	barley powdery mildew	AIDS	type 2 diabetes													
	(b)	(i) viruses are not destroyed/killed by antibiotics ✓ wants to avoid the spread of antibiotic resistant (bacteria) ✓	2	2.1	ALLOW antibiotics are ineffective in treating viruses / antibiotics only kill bacteria DO NOT ALLOW viruses can become antibiotic resistant											
		(ii) virus sinusitis patient's should be getting better / the symptoms should have disappeared/only last 14 days ✓ any symptoms/infection (after 14 days) is caused by bacteria ✓	2	3.1a	IGNORE time for bacteria need to grow											

Q7. (June 2022)

D

Q8. (June 2022)

B

Q9. (June 2022)

B

Q10. (June 2022)

16	(a)	Fat ✓ Oxygen ✓ Attack ✓	3	1.1									
	(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	1.1	Both boxes correct for one mark.
eating vegetables													
inheriting certain genes	✓												
regular exercise													
smoking cigarettes	✓												
	(c)	Idea that the blood bypasses the blockage / can reach the heart (muscle) ✓ (Heart muscle) can respire / contract / obtain oxygen/glucose ✓	2	2 x 2.1	IGNORE flow/volume of blood unless qualified IGNORE replace vessel DO NOT ALLOW unblock the vessel								
	(d) (i)	FIRST CHECK THE ANSWER ON ANSWER LINE If answer = 125 000 award 2 marks 500 x 250 ✓ 125 000 ✓	2	2 x 2.1	 ALLOW 0 or 1175000 – 1200000 for 1 mark								
	(ii)	Fewer people (at risk) of heart attacks ✓ More angioplasty (operations done instead) ✓	2	2 x 3.1b	IGNORE references to reasons why there are fewer people at risk of heart attacks								
(e)		(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 x 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								

Q11. (June 2022)

21	(a)		HIV ✓	1	1.1	ALLOW flu ALLOW Covid/Corona ALLOW any other credit worthy virus
	(b)	(i)	(Use of a) tissue/handkerchief ✓	1	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
		(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 x 1.1	IGNORE nose hairs / other defence barriers
	(c)		Weakened or dead virus ✓	1	1.2	AW pathogen/microbe/measles for virus ALLOW virus antigen/attenuated virus
	(d)	(i)	(Number of cases) decreased ✓ (More) people were immune/vaccinated ✓	1 1	2 x 3.2b	ALLOW idea of herd immunity
	(ii)		(Number of cases) increased ✓ Less children were vaccinated due to risk of autism ✓	1 1	2 x 3.2b	

Q12. (June 2023)

D

Q13. (June 2023)

D

Q14. (June 2023)

A

Q15. (June 2023)

D

Q16. (June 2023)

17	(a)	(i)	All points correctly plotted ✓✓	2	2 x 2.2	3 points correct = 1 mark ALLOW +/- half a square DO NOT ALLOW a bar graph
		(ii)	Line of best fit ✓	1	2.2	ALLOW ECF from incorrect points plotted IGNORE extrapolations
		(iii)	A figure in range of 1.55-1.7 ✓	1	2.2	ALLOW ECF figure from candidate's graph
		(iv)	Any two from: Less chance of mutations ✓ Less likely to get cancer/tumours ✓ Cancer/tumours can spread / be lethal ✓	2	2 x 1.1	ALLOW uncontrolled growth causes cancer/tumours ALLOW malignant

Q17. (June 2023)

18	(a)	(i)	(Hepatitis) A, B and D ✓	1	2.1	
		(ii)	(Hepatitis) A ✓	1	3.1a	
		(iii)	Alcoholic (hepatitis) ✓	1	3.1a	
		(iv)	(Hepatitis) D ✓	1	2.1	
	(b)		Antibiotics do not affect viruses / only kill bacteria ✓ A is caused by viruses / not caused by bacteria ✓	2	2 x 2.1	ALLOW only treat bacterial infections / only effective against bacteria
	(c)		Antigens ✓ White blood ✓ Antibodies ✓ Immune ✓	4	4 x 1.1	

Q18. (June 2024)

D

Q19. (June 2024)

A

Q20. (June 2024)

B

Q21. (June 2024)

C

Q22. (June 2024)

16	(a)			3	3 x 1.1	All four correct = 3 marks Two or three correct = 2 marks 1 correct = 1 mark
	(b)		Answers in either order Weakened ✓ Dead ✓	2	2 x 1.1	ALLOW antigens / fragments / pieces / attenuated / inactive / altered / harmless

Q23. (June 2024)

18	(a)	Virus ✓ Bacteria ✓	2	2 x 1.1	
	(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 2.1	IGNORE references to wind ALLOW moist weather / rain helps spores / fungi / powdery mildew to grow
	(ii)	Sexual (reproduction) ✓	1	2.1	
	(iii)	Fungi on the pieces of dead barley ✓ Stops spores / fungi / powdery mildew spreading (to the new plants) ✓	2	2.1 3.1b	ALLOW contaminating / infecting / moving as AW for spreading

Q24. (June 2024)

25	(a)	Antibiotics are used inside the body, but antiseptics are not ✓	1	1.1	DO NOT ALLOW more than one box ticked
	(b) (i)	Use a wire / (inoculating) loop / pour liquid culture over the agar ✓ Lift lid of Petri dish slightly / sterilise (wire) ✓	2	2 x 1.2	ALLOW pour solution with bacteria over the agar ALLOW use a spreader / rod / swab / pipette / cotton buds ALLOW idea of aseptic technique ALLOW ECF for incorrect named wire/loop
	(ii)	Allow oxygen to enter the dish / prevent anaerobic conditions ✓ Stop pathogens/harmful bacteria growing/reproducing/created / Otherwise, pathogens/harmful bacteria could grow/reproduce/create ✓ OR Stops oxygen to enter the dish / anaerobic conditions ✓ Pathogens/harmful bacteria grow/reproduce ✓	2	2 x 1.2	ALLOW (for bacteria) to carry out aerobic respiration ALLOW stop anaerobic bacteria from growing = 2 ALLOW bacteria need oxygen to carry out aerobic respiration = 2 (lack of oxygen, bacteria) can't carry out aerobic respiration bacteria ALLOW anaerobic bacteria can grow = 2 ALLOW bacteria can't get oxygen which is needed for aerobic respiration = 2
	(c) (i)	Idea that B is the most effective/killed the most/removed all the bacteria ✓ Idea C is the least effective/killed/removed the least bacteria ✓	2	2 x 3.2b	IGNORE references to petri dish A ALLOW B is more efficient than C/D (at killing bacteria) ALLOW D is more efficient than C (at killing bacteria) Correct order of efficiency (of killing bacteria) is B → D → C = two marks IGNORE strongest/weakest
	(ii)	Any two from: Using different concentrations/volume of disinfectant / make each disinfectant more dilute ✓ Using different concentrations/amounts of bacteria ✓ Using different types of bacteria ✓	2	2 x 3.3b	IGNORE amount IGNORE stronger bacteria ALLOW repeat for one mark if no marks are awarded IGNORE reference to time

Q25. (June 2025)

D

Q26. (June 2025)

C

Q27. (June 2025)

C

Q28. (June 2025)

B

Q29. (June 2025)

16	(a)	<pre> graph LR A[bronchitis] --- D[lungs] B[cirrhosis] --- C[liver] E[type 1 diabetes] --- F[pancreas] </pre>	2	2 × 1.1	3 correct lines = 2 marks 1 or 2 correct lines = 1 mark DO NOT ALLOW more than 1 line from each box
	(b) (i)	Smooth line of best fit drawn ✓	1	2.2	DO NOT ALLOW sketched lines or ruled lines
	(ii)	77 beats ✓	1	2.2	Value must match candidate's curve ALLOW answer rounded to 77
	(iii)	The more exercise/steps a person does then the lower their resting heart rate ✓	1	3.1	ALLOW ORA
	(c) (i)	Any two from: More men than women develop CVD ✓ In women there is no link between resting heart rate and CVD ✓ In men there is no link between resting heart rate and CVD up to 80 bpm / In men a resting heart rate of more than 80 increases the risk of CVD ✓	2	2 × 3.2b	
	(ii)	Increases the risk of CVD ✓ Valid ✓	2	2 × 3.3b	
	(d) (i)	Humans live longer than expected (according to their resting heart rate) ✓	1	3.2a	ALLOW idea of humans live longer than animals with the same resting heart rate
	(ii)	Idea of medicine / health care ✓	1	3.1b	

Q30. (June 2025)

(b) (i)	The kidney will contain foreign cells ✓ The patient will make antibodies against the kidney ✓	2	2 × 2.1	If three ticked and two correct = 1 mark If three ticked and one correct = 0
(ii)	They would be able to attack any pathogens ✓ So would not get diseases / would not get sick ✓	2	2 × 2.1	ALLOW named pathogens e.g. bacteria ALLOW ORA e.g. if the patient took drugs (to make the immune system less active) then they wouldn't be able to attack foreign pathogens ✓ so they might get sick ✓ If no other marks awarded allow 1 mark for idea of no rejection occurs

Q31. (June 2025)

(b)	(i)	Any three from: Soak the filter paper discs in antibiotic ✓ Place the discs on the surface of the nutrient agar ✓ Put the dish in the incubator ✓ After a few days look to see if there is a clear area around the disc ✓	3	3 × 1.2	ALLOW any method of putting antibiotic on to the filter paper discs IGNORE put antibiotic on to bacteria/petri dish ALLOW place the discs onto the petri dish ALLOW any reference to a set time IGNORE after a few days look to see if bacteria have been killed/affected
	(ii)	Bars correctly drawn ✓✓	2	2 × 2.2	Three correct bars = 2 marks, two correct bars = 1 mark ALLOW tolerance of +/- half a small square
	(iii)	Bacteria killed by antibiotics is going down in sheep ✓ Therefore, results do not support the idea ✓	2	2 × 3.2a	
(c)		Mutation ✓ Survive ✓ Natural selection ✓	3	3 × 1.1	

Q32. (June 2025)

21	(a)	Crown gall disease ✓	1	1.1	
	(b)	(i)	(Passed on) from the beetle when they bite into the plant ✓	1	3.1a
		(ii)	(Bacteria produce sticky glue which) blocks the xylem vessels ✓ Water cannot be transported (up to the leaves) ✓ Plant/leaves wilt ✓	3	3 × 2.1
		(iii)	(Insecticide will) kill the beetles ✓	1	3.1b
		(iv)	Biological control ✓	1	1.1

Q33. (June 2025)

22	(a)	Pathogen ✓	1	1.1	IGNORE microbe/fungi/virus/protist/parasite
	(b)	(i)	4	4 × 1.1	DO NOT ALLOW more than one line from a box
		<div style="display: flex; justify-content: space-between;"> <div style="width: 45%;"> <div style="border: 1px solid black; padding: 2px; margin-bottom: 5px;">chemicals on the surface of the bacteria</div> <div style="border: 1px solid black; padding: 2px; margin-bottom: 5px;">proteins produced by the body</div> <div style="border: 1px solid black; padding: 2px; margin-bottom: 5px;">medicine given by the doctor to kill the bacteria</div> <div style="border: 1px solid black; padding: 2px; margin-bottom: 5px;">cells that provide immunity</div> </div> <div style="width: 45%;"> <div style="border: 1px solid black; padding: 2px; margin-bottom: 5px;">antibiotics</div> <div style="border: 1px solid black; padding: 2px; margin-bottom: 5px;">antibodies</div> <div style="border: 1px solid black; padding: 2px; margin-bottom: 5px;">antigens</div> <div style="border: 1px solid black; padding: 2px; margin-bottom: 5px;">antiseptics</div> <div style="border: 1px solid black; padding: 2px; margin-bottom: 5px;">white blood cells</div> </div> </div> <div style="text-align: right; margin-top: -10px;">✓✓✓✓</div>			
		(ii) Would not give antibiotics / (would give) an antiviral ✓ (Viruses) are not destroyed by antibiotics ✓	2	2 × 1.1	IGNORE vaccine ALLOW antibiotics only kill bacteria ALLOW viruses are inside cells so antibiotics can't work

Q34. (Nov 2020)

C

Q35. (Nov 2020)

D

Q36. (Nov 2020)

(c)	(i)	use Benedicts (reagent) ✓ heat / boil ✓ no change in colour / stays blue / does not go red ✓	3	3 x 1.2
	(ii)	Yes (no mark) blood sugar levels will be controlled/not rise ✓ idea of a sugar replacement ✓	2	1 x 3.2a 1 x 2.1
				If No chosen = 0 marks IGNORE blood sugar levels will decrease ALLOW less sugar eaten

Q37. (Nov 2020)

17	(a)	lung ✓	1	2.2	
	(b)	mitosis ✓	1	1.1	
	(c)	(i) genetic engineering / genetic modification ✓	1	1.1	ALLOW GM / Gene Therapy
		(ii) worried about possible side effects / ethically / morally / religiously wrong ✓	1	3.2a	IGNORE playing God / not natural

Q38. (Nov 2020)

(d)*	<p>Please refer to the marking instructions on page 4 of this mark scheme for guidance on how to mark this question.</p> <p>Level 3 (5–6 marks) Provides a detailed explanation linking cholesterol to heart disease. AND Provides a detailed analysis to explain if this link is supported by the graph.</p> <p><i>There is a well-developed line of reasoning which is clear and logically structured. The information presented is relevant and substantiated.</i></p> <p>Level 2 (3–4 marks) Provides a detailed explanation linking cholesterol to heart disease. OR Provides a detailed analysis to explain if this link is supported by the graph.</p> <p>OR Provides a basic explanation linking cholesterol to heart disease. AND Provides a basic analysis of the information to explain if this link is supported by the graph.</p> <p><i>There is a line of reasoning presented with some structure. The information presented is relevant and supported by some evidence.</i></p> <p>Level 1 (1–2 marks) Provides a basic explanation linking cholesterol to heart</p>	6	<p>2 x 1.1 2 x 2.1 2 x 3.1b</p>	<p>AO1.1 Demonstrate knowledge and understanding of the importance of the blood supply to the heart muscle.</p> <ul style="list-style-type: none"> coronary artery carries blood to heart/muscle blood takes oxygen/glucose to the heart/muscle heart/muscle carries out aerobic respiration/needs energy energy is needed for the heart/muscle to contract <p>AO2.1 Apply knowledge and understanding of the requirements of the heart muscle</p> <ul style="list-style-type: none"> cholesterol build up (partially) blocks the blood flow in the artery this reduces blood/oxygen/glucose carried to the heart/muscle heart/muscle carries out less aerobic respiration/less energy released heart/muscle can't contract as forcefully <p>AO3.1b Analyse information and ideas to interpret the results on the study</p> <p>Support the link:</p> <ul style="list-style-type: none"> men with heart disease had (on average) a higher blood cholesterol level. Men without heart disease had (on average) a lower blood cholesterol level. build-up of cholesterol can lead to heart disease <p>Doesn't support the link:</p> <ul style="list-style-type: none"> considerable overlap between the two groups men can still have heart disease with low blood
	<p>disease.</p> <p>OR Provides a basic analysis of the information to explain if this link is supported by the graph.</p> <p>OR Demonstrates knowledge of the importance of the blood supply to the heart muscle.</p> <p><i>There is an attempt at a logical structure with a line of reasoning. The information is in the most part relevant.</i></p> <p>0 marks <i>No response or no response worthy of credit</i></p>			<p>cholesterol levels</p> <ul style="list-style-type: none"> Men without heart disease can still have high blood cholesterol levels

Q39. (Nov 2021)

B

Q40. (Nov 2021)

A

Q41. (Nov 2021)

C

Q42. (Nov 2021)

A

Q43. (Nov 2021)

(c)			3	1.1	A anywhere before B ✓ B anywhere before D ✓ D anywhere before C ✓	
		<table><tr><td>E</td><td>A</td><td>B</td><td>D</td><td>C</td></tr></table>				E
E	A	B	D	C		

Q44. (Nov 2021)

18	(a)	<table><tr><td>Causes them to divide uncontrollably</td><td>✓</td></tr><tr><td>Makes them produce antibodies</td><td></td></tr><tr><td>Makes them start producing hormones</td><td></td></tr><tr><td>Stops them dividing by mitosis</td><td></td></tr></table>	Causes them to divide uncontrollably	✓	Makes them produce antibodies		Makes them start producing hormones		Stops them dividing by mitosis		1	1.1	
Causes them to divide uncontrollably	✓												
Makes them produce antibodies													
Makes them start producing hormones													
Stops them dividing by mitosis													
	(b)	Oestrogen is made in the ovaries ✓ Oestrogen levels will fall ✓	2	2 x 2.1	ALLOW no oestrogen produced								
	(c)	(i) First check answer on the answer line If answer = 45000 award 3 marks 30 000 000 / 400 = 75 000 ✓ $75\,000 \times \frac{60}{100}$ ✓ = 45 000 (females) ✓	3	3 x 2.2									
		(ii) Any two from: May not actually develop breast cancer ✓ Would not be able to produce eggs ✓ Possible side effects of reduced oestrogen ✓	2	2 x 3.1b	ALLOW only a 60% chance ALLOW would not be able to have children ALLOW reference to menopause								

Q45. (Nov 2021)

(b)	Any two from: Make sure it is safe / identify side effects ✓ To see if it works ✓ To find the correct dosage ✓	2	2 x 1.2	ALLOW could go wrong / unknown effect IGNORE can't test on humans ALLOW see results
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