Mark scheme

Disease and immunity

Biology 0610 · Questions from Paper 3 and Paper 4

Total marks

90

MARKS FOR EACH QUESTION

1	2	3	4	5	6	7	8	9	10	Total
7	9	8	9	9	6	8	9	11	14	**90**

Question 1 [7]

1(a)	hairs ; mechanical ; antibodies ; engulf ;	**4**	
1(b)	(named examples of) hygienic food, preparation / storage ;;; (named examples of) good personal hygiene ;;; (named example of) appropriate waste disposal ;	**3**	e.g., store food at correct temperature / cook food thoroughly / ref. to cleaning utensils or surfaces / avoiding cross contamination / pest-proof food storage e.g., washing hands or body / washing clothes or bedding / not sharing a toothbrush or razor

Question 2 [9]

2(a)(i)	disease-causing organism;	**1**	
2(a)(ii)	(direct) contact / through blood / through (named) body fluids; (contaminated) surfaces / AW; (contaminated) food / water / AW; from, animals / (named) vector; through the air / AW;	**2**	
2(a)(iii)	*mechanical* skin / hairs in nose; *chemical* mucus / stomach or hydrochloric acid / gastric juices;	**2**	
2(b)(i)	ref. to white blood cells; phagocytosis / engulfing / description of engulfing; ref. to production of antibodies / causing cells to clump / stick to cell surface AW;	**3**	
2(b)(ii)	vaccination / antibiotics / antifungals / antivirals / antitoxin / antiseptics/AVP;	**1**	
		Total: 9	

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Question 3 [8]

3(a)(i)	(antibiotic), killed the bacteria / stopped the growth of bacteria ;	1	
3(a)(ii)	(most effective) **2** **1** **3** (least effective) ; *reason:* more bacteria killed / more clear area / AW ;	2	
3(b)	cytoplasm ; DNA ; cell wall ; cell membrane ;	3	**A** ribosome ;
3(c)	<table><tr><th>example</th><th>direct contact</th></tr><tr><td>air</td><td></td></tr><tr><td>blood</td><td>✓ ;</td></tr><tr><td>body fluids</td><td>✓ ;</td></tr><tr><td>contaminated food</td><td></td></tr><tr><td>contaminated surfaces</td><td></td></tr></table>	2	

Question 4 [9]

4(a)	sneeze (may) contain (named) pathogens ; *idea of* pathogens being removed by washing hands ;	2	
4(b)	*any two from:* boiling water / bottled water ; chlorinated water / UV steriliser / purification or sterilising tablets ; waste disposal / sewage treatment / separate drinking and toilet systems ; AVP;	2	**A** do not drink contaminated water e.g. microfiltration / remove water to stop mosquitoes breeding / AW
4(c)	*any three from:* skin ; hairs in the nose ; mucus / ciliated cells ; stomach acid ; white blood cells / antibodies / phagocytosis ; tears ; AVP ;	3	**A** immune system e.g. platelets / blood clotting / increased body temperature / fever / ear wax
4(d)	transmissible non–transmissible non–transmissible ;;	2	all three correct = two marks two or one correct = one mark

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Question 5 [9]

5(a)	any substance (taken into the body), that modifies / affects ; chemical reactions (in the body) ;	**2**	
5(b)	bacterial ;	**1**	
5(c)	**1** resistance to antibiotic **A** took the longest time (to be detected) / AW; **2** resistance to antibiotic **C** took the least time (to be detected) / AW ; **3** resistance to antibiotic **B** was the first (to be detected) ; **4** *idea of* the newer the antibiotic the quicker resistance developed ; **5** data manipulation ;	**3**	e.g. idea of years taken to develop resistance in **one** of the antibiotics **A** took 36 years, **B** took 11 years, **C** took 3 years
5(d)	mucus ; stomach / hydrochloric, acid ; hairs in the nose ; skin ; blood clot / scabs ; AVP ;; e.g. tears, vaginal secretions, ear wax, saliva, cilia	**3**	

Question 6 [6]

6(a)	(named) mechanical (barriers) ; (named) chemical barriers ; ref. to active immunity ; white blood cells / lymphocytes / phagocytes ; (phagocytes) engulf (named) microorganisms / phagocytosis ; lymphocytes produce antibodies ; ref. to specific, antigens / pathogens ; ref. to long term immunity / memory cells ; AVP ;	**5**	
6(b)	antibiotics ;	**1**	

Question 7 [8]

7(a)(i)	genetic material ; protein coat ; parasitic / pathogenic ; only reproduce in a host / do not show (other) features of living organisms / AW ; very small ; they are not cellular / absence of named organelle; AVP ; cannot be killed / cannot be treated, with antibiotics.	**2**	**A** DNA / RNA **A** virus are non-living.
7(a)(ii)	active immunity ; harmless / dead / weakened / attenuated pathogen / microorganisms ; injected / ingested ; ref. to antigens ; (antigen) triggers antibody production ; by lymphocytes ; memory cells (are produced) ; rapid response to reinfection ; long-term immunity ; prevention of spread person to person e.g. no host for pathogen / herd ref to programmes of mass vaccination ; AVP ;	**5**	.
7(b)	shape / size / AW ; genetic material (sequence / type) ; host species / type of disease it causes ; AVP ;	**1**	

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Question 8 [9]

8(a)	*Helicobacter* ;	**1**	
8(b)	circular DNA / chromosome ; plasmid(s) ; cell membrane ; cell wall (not made of cellulose) ; cytoplasm ; capsule ; (small) ribosomes ; flagella ; AVP ;	**2**	**A** naked, DNA / chromosome **I** cilia e.g. pili
8(c)(i)	antibiotic(s) ;	**1**	
8(c)(ii)	(stomach / hydrochloric / gastric) acid / HCl / mucus ;	**1**	
8(d)	*active immunity* 1 exposure to antigen ; **ora** 2 after, infection by pathogen / vaccination ; 3 immune response occurs / antibodies produced ; *passive immunity* 4 antibodies acquired from another individual ; 5 e.g. by breast milk / injection of antibodies ; 6 active is, permanent / long-term (immunity) ; **ora** 7 ref to memory cells, in active / not in passive ; 8 response is slow on first exposure in active ; **ora**	**4**	

Question 9 [11]

9(a)(i)	*any two from:* ref. to passive immunity ; *idea of* immediate / fast, protection / response / AW ; AVP ; e.g. idea that gives time for immune system to produce own, antibodies / antitoxins	**2**	
9(a)(ii)	*any three from:* ref. to active immunity ; (more) memory cells are produced ; long-term, immunity / protection ; after second injection higher concentration of antibodies than passive immunity ; reduces the chance of catching the disease (again) / AW ; response to second injection is, faster / greater, than first ; AVP ;	**3**	
9(b)	*any four from:* pathogens have antigens ; antibodies, lock on to, antigens / pathogens ; antibody is specific (to antigen / pathogen) ; antibody has a complementary (shape) to antigen / AW ; antibody marks pathogen for, destruction by phagocytes / phagocytosis ; antibodies destroy pathogens / described ; AVP ;	**4**	
9(c)	*any two from:* absorbs / transports, fat / fatty acids (and glycerol from lacteals) ; drains / AW, tissue fluid ; returns, fluid / lymph, to, blood / plasma ; AVP ;	**2**	

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Question 10 [14]

10

(a) (i)	all bacteria are, susceptible / sensitive to this antibiotic / not resistant ; (antibiotics) killed the bacteria / stopped bacteria growing / AW ;	[max 1]	**R** immune (as equivalent to resistance)
(ii)	(all) bacteria are, resistant / not affected (by the antibiotic) / ORA ;	[1]	**R** immune (as equivalent to resistance) **ecf** from 2(a)(i)
(iii) **1** **2** **3**	only a few bacteria from the sample are resistant / ORA ; caused, by mutations / genes ; resistant bacteria, grew / reproduced ;	[max 2]	**R** immune (as equivalent to resistance) **ecf** from 2 (a)(i) and 2 (a)(ii) **A** susceptible bacteria did not grow
(b) **1** **2** **3** **4**	person may be infected with bacteria, that are resistant to, some / an, antibiotic(s) ; (test) to find the most effective antibiotic ; that kills all bacteria (in the person) ; prevents antibiotic resistance ;	[max 2]	**R** immune (as equivalent to resistance) No **ecf** from 2 (a)
(c) **1** **2** **3** **4** **5** **6** **7**	prescribe / use, antibiotics less often ; not for, viral / fungal, infections ; make sure people complete the course of antibiotics / AW ; develop new antibiotics ; do not use the same antibiotics for too long / rotate antibiotics / AW ; use combinations of antibiotics ; AVP ; e.g. isolation of patients with antibiotic-resistant infections / good hygiene to prevent spread of infection	[max 4]	

(d) (i)		[1]	
(ii) **1** **2** **3** **4** **5** **6** **7**	easier / quicker, to supply the demand ; more cost effective ; no / less, rejection / allergies / side effects ; human insulin more effective (than animal insulin) ; because can be individually modified ; no risk of transmission of disease from animals ; ethical / religious / animal welfare consideration ;	[max 3]	
		[Total:14]	

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