

# Diseases and Immunity

## Mark Scheme

<b>Level</b>	IGCSE
<b>Subject</b>	Biology
<b>Exam Board</b>	CIE
<b>Topic</b>	Diseases and Immunity
<b>Paper Type</b>	(Extended) Theory Paper
<b>Booklet</b>	Mark Scheme

**Time Allowed:** 44 minutes

**Score:** /37

**Percentage:** /100

<p>1 (a)</p>	<p><b>MP1</b> attach to virus / bacteria / antigens ;  <b>MP2</b> prevent movement around the body ;  <b>MP3</b> prevent entry into <u>cells</u> ;  <b>MP4</b> stop division ;  <b>MP5</b> combine with / neutralise, toxins ;  <b>MP6</b> clump, bacteria / viruses, together ;  <b>MP7</b> help phagocytes engulf virus / bacteria ;</p>	<p>[max 3]</p>										
<p>(b)</p>	<p>kidney would be rejected ;          (lymphocytes produce anti-A) antibodies ;          (antibodies) attach to blood vessels ;</p>	<p>[max 2]</p>										
<p>(c)</p>	<p>no, blood / capillaries / antigens / antibodies / white cells / lymphocytes, in the cornea ;</p>	<p>[max 1]</p>										
<p>(d)</p>	<p><math>I^A I^O \times I^B I^O</math> ;  <math>I^A I^O + I^B I^O</math> ;  <math>I^O I^O</math> ;</p>	<p>[3]</p>										
<p>(e)</p>	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 30%;">term</th> <th>example</th> </tr> </thead> <tbody> <tr> <td>a dominant allele</td> <td style="text-align: center;"><b><math>I^A</math></b></td> </tr> <tr> <td>heterozygous genotype</td> <td><math>I^A I^O / I^B I^O / I^A I^B</math> ;</td> </tr> <tr> <td>codominant alleles</td> <td><math>I^A</math> <b>and</b> <math>I^B</math> ;</td> </tr> <tr> <td>phenotype</td> <td>(blood) group, A / B / AB / O ;</td> </tr> </tbody> </table>	term	example	a dominant allele	<b><math>I^A</math></b>	heterozygous genotype	$I^A I^O / I^B I^O / I^A I^B$ ;	codominant alleles	$I^A$ <b>and</b> $I^B$ ;	phenotype	(blood) group, A / B / AB / O ;	<p>[3]</p>
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		<p>[Total: 12]</p>										

Question	Answer	Marks	Additional Guidance
2 (a) (i)	<p><b>X</b> – protein (coat /AW)/ capsid / capsomere(s);  <b>Y</b> – genetic material / nucleic acid / RNA;</p>	2	<p><b>A</b> DNA / gene(s)  <b>R</b> nuclear material / chromosome</p>
(ii)	<p>cell wall;  cell membrane;  cytoplasm;  loop of DNA;  (slime) capsule;  flagellum / flagella;  plasmids;  ribosome(s);  AVP;</p>	max 3	<p><b>R</b> cellulose cell wall  <b>I</b> size / complexity / shape  e.g. pi</p>
(b) (i)	<p>number of people living with HIV:  numbers living with HIV increased (from 1990), levelled off /  increased slightly, from 2000 / 2001 / 2002;  any one correct data quote from vertical axis for numbers living  with HIV;</p> <p>number of people newly infected with HIV:  numbers newly infected increased (and levelled off between 1994  and 1998) <b>and</b> decreased since, 1997 / 1998;  any one correct data quote from vertical axis for numbers newly  infected with HIV;</p>	4	<p>date quotes must have correct year, but <b>A</b> ‘starts’  for 1990 and ‘ends’ for 2009 / 2010</p> <p><b>A</b> any correct manipulation of the data, e.g.  increased by / percentage increase, etc.</p> <p><b>A</b> ± ½ a square for data quotes</p>

2	<p><b>(ii)</b> people living with HIV are living longer; success of (named) treatment for HIV/AIDS; success in reducing transmission; reference to, education/information/funding, about HIV/AIDS;</p>	<p><b>max 2</b></p>	<p>e.g. drugs/antivirals/AZT/nursing care <b>A</b> ref. to barrier contraception /condom/femidom</p>
	<p><b>(iii)</b> from mother to fetus/across the placenta; from mother to baby at birth; in breast milk; unprotected / unsafe sex; sharing, needles/syringes; in blood products / blood for transfusion/transplants/ blood to blood contact; AVP;</p>	<p><b>max 3</b></p>	<p><b>R</b> saliva <b>R</b> other sharps, e.g. razors unless qualified by blood contact <b>R</b> using contaminated/dirty/used, needles unqualified <b>A</b> intravenous drug use/AW <b>R</b> donating blood <b>R</b> blood unqualified <b>A</b> 'blood exchange' <b>I</b> body fluids unqualified</p>
	<p><b>(iv)</b> weakens the immune system /reduces capacity of body to respond to disease/AW;  <u>lymphocytes</u> are, damaged/destroyed/killed/not functional; (B/T) lymphocytes/white blood cells, stop making antibodies;  any <b>two</b> roles of antibodies or lymphocytes or phagocytes which will not happen or not happen very well;;</p>	<p><b>max 3</b></p>	<p><b>R</b> 'no immune system' / 'destroys immune system' <b>A</b> 'fight' disease  antibodies stop, pathogens spreading (in the body) antibodies cause pathogens to, clump/agglutinate antibodies kill bacteria antibodies make it easier for phagocytes to ingest pathogens antibodies, neutralise toxin(s)/make toxins harmless phagocytes, ingest/AW, pathogens lymphocytes kill infected cells</p>
		<p><b>[Total: 17]</b></p>	

Question	Answers	Marks	Additional Guidance
3 (a)	<p>1 enter, blood / plasma / lymph ;</p> <p>2 infect / enter, white blood cell / lymphocyte / phagocyte / AW ;</p> <p>3 infect, brain / liver / lungs / skin / reproductive system / kidney / gut ;</p> <p>4 cannot reproduce ;</p> <p>5 may be transmitted to another person ;</p> <p>6 e.g. of method of transmission ; R excreted, die</p>	[max 2]	<p>A ref. to antibodies combining with virus</p> <p>A 'attack' / 'invade' white blood cells</p> <p>A 'attack' / 'invade' / enter</p> <p>MP6 A sexual intercourse / in blood / in breast milk / across placenta / needle stab</p>
(b)	<p>1 infects / destroys / kills, phagocytes ;</p> <p>2 destroys / kills / disables, <u>lymphocytes</u> ;</p> <p>3 fewer antibodies produced ;</p> <p>4 ref. to, T lymphocytes / T cells ;</p> <p>5 slow / no / weaker, immune response / response by immune system ;</p> <p>6 <i>idea of increased susceptibility to disease / infection / (named) pathogens ;</i> A viruses / bacteria cancers ;</p> <p>7 fungal infections / TB / pneumonia / named disease linked with HIV ; R common cold</p> <p>9 develop AIDS ;</p> <p>10 AVP ;</p>	[max 3]	<p>A no phagocytosis</p> <p>A fewer lymphocytes R 'attacks' / 'damages'</p> <p>A 'immune system not working'</p> <p>A suppresses / damages, immune system</p> <p>A 'can't fight disease'</p> <p>MP3–8 A <i>answers that give role(s) of immune system followed by 'this doesn't happen'</i></p>
(c) (i)	(substance) changes / modifies / affects, (chemical) reactions in the body / how the body works ;	[1]	I category of drug, medicine, specific effects of named drug, etc.
(ii)	<p><i>antibiotics</i> if 'antibodies' written rather than antibiotic – mark to max 1</p> <p>are not effective against viruses / only effective against bacteria ;</p> <p><i>idea that</i> nothing for them to act on ; e.g. cell wall / protein synthesis / cellular structure / capsule</p>	[2]	<p>I viruses inside cells</p> <p>A do not work against viruses</p> <p>A <b>ORA</b></p> <p>R 'life processes'</p>
<b>[Total: 8]</b>			