

Question Number	Answer	Mark
1(a)(i)	C T helper cells ;	(1)

Question Number	Answer	Mark
1(a)(ii)	D reverse transcriptase ;	(1)

Question Number	Answer	Additional guidance	Mark
1(b)(i)	<p>1. reference to glycoprotein ;</p> <p>2. credit detail of structure e.g. specific (3D) shape, L and H regions, Y-shape, 4 (peptide) chains, disulphide bridges between peptides, hinge region ;</p> <p>3. reference to { antigen-binding site / variable region / Fab (region) / eq } ;</p> <p>4. idea of antibodies have a { similar / constant / Fc / eq } region;</p> <p>5. produced by plasma cells / present on B cells ;</p> <p>6. role of antibody described e.g. opsonisation, immobilisation, agglutination, lysis ;</p>	<p>1. Accep protein, chains of amino acids</p> <p>2. Igno active site Accept a Y-shaped drawing</p> <p>3. Accep references to { binding to specific antigen / antigen-specific / antigen receptors}</p> <p>5. Accept present on B effector cells</p>	(2)

Question Number	Answer	Additional guidance	Mark
1*(b)(ii)	<p>(QWC – answer must be organised in a clear, logical sequence)</p> <ol style="list-style-type: none"> 1. reference to artificial (active) immunity ; 2. reference to {vaccine / vaccination} ; 3. containing {synthetic molecule / (synthetic) antigen / (synthetic) glycoprotein} ; 4. ref to stimulation of the {specific / humoral} immune response (to the synthetic antigen) ; 5. credit detail of process of producing effector B cells e.g. clonal expansion of B cells, involvement of cytokines, T helper cells activate B cells ; 6. reference to (production of B) memory cells ; 7. idea that (2G12) antibodies are produced {faster / in greater concentration} on {reinfection / eq} ; 	<p>Mps are awarded if the statements are clearly expressed</p> <p>5. Ignor references to production of activated T killer cells</p> <p>6. Ignore references to production of T memory cells</p> <p>7. Acce ref to secondary immune response</p>	(5)

Question Number	Answer	Additional guidance	Mark
1(c)	<p>1. idea that HIV infection does not always produce symptoms ;</p> <p>2. reference to {provirus / latency } ;</p> <p>3. reference to test needed to detect (symptomless) HIV ;</p> <p>4. idea that only people who suspect they may have contracted HIV would have a test ;</p> <p>5. idea that {some people would not want to be tested / impossible to test everyone} ;</p> <p>6. idea that symptoms are common to other diseases ;</p> <p>7. {new cases arising/ patients dying} all the time / eq ;</p> <p>8. idea of new strains of virus arising ;</p>	2. Accep virus is dormant	(2)

Question Number	Answer	Additional guidance	Mark
2(a)(i)	<p>1. idea that interferon involved in viral infections, lysozyme affects bacteria;</p> <p>2. idea of interferon produced by infected cells, lysozyme present in {secretions / phagocytes / neutrophils / macrophages / eq};</p> <p>3. interferon {inhibits / eq} {replication / eq} of viruses, lysozyme {kills / destroys} bacteria;</p>	<p>Piece together throughout Accept lysosome throughout Ignore pathogen throughout</p> <p>2. Acce named secretion {produced / released}</p> <p>3. Acce a reference to lysozyme destroying cell walls</p>	(3)

Question Number	Answer	Additional guidance	Mark
2(a)(ii)	<p>1. reference to (lysozyme) is an enzyme ;</p> <p>2. idea that {proteins / active sites / enzymes} have a specific shape ;</p> <p>3. idea that lysozyme acts on cell wall ;</p> <p>4. of bacteria ;</p>	Accept lysosome in this context	(4)

Question Number	Answer	Additional guidance	Mark
2(b)(i)	<p>1. reference to histamine released as a result of damaged {tissue / cells} ;</p> <p>2. (histamine released from) {basophils / mast cells / platelets} ;</p> <p>3. detail of effect of histamine e.g arterioles dilate, vasodilation, increased blood flow, capillaries more permeable ;</p> <p>4. named effect of inflammation e.g. {oedema / swelling /redness / heat / pain / eq} ;</p>	<p>2. Accep white blood cells, macrophages and neutrophils</p> <p>4. Acce raises temperature</p>	(3)

Question Number	Answer	Additional guidance	Mark
2(b)(ii)	<p>1. idea of (only) {a local reaction produced / histamines produced around bite area} ;</p> <p>2. idea that cream {has been applied to actual site of production of histamine } ;</p> <p>3. idea of {effect / treatment / relief / eq} {more rapid / immediate / eq };</p> <p>4. idea of higher concentration of antihistamine at site ;</p> <p>5. idea that the antihistamines will not be {digested (by enzymes) / destroyed (by acid / enzymes) / eq } ;</p> <p>6. idea that tablets may lower immune response generally / lead to side-effects ;</p>	2-6 Accept converse	(3)

Question Number	Answer	Mark
3(a)	C – plasma cell ;	(1)

Question Number	Answer	Mark
3(b)(i)	<p>1. idea of using {virus / PCV2} as vaccine ;</p> <p>2. which is {modified / attenuated / harmless / similar / part of / eq} ;</p> <p>3. idea that the vaccine contains the antigen ;</p> <p>4. idea of {activation / proliferation} of (specific) {B cell / T cell / lymphocyte} ;</p> <p>5. reference to production of (B / T) memory cells ;</p> <p>6. idea that body now able to produce (specific) antibody {faster / at higher concentration / eq} on another exposure to PCV2 ;</p>	(3)

Question Number	Answer	Mark
3(b)(ii)	<p>1. reference to giving a placebo (to group B) ;</p> <p>2. idea that all (other) {conditions / factors / variables} should be {controlled / same as group A} ;</p> <p>3. stated example e.g. food, temperature of housing / eq ;</p> <p>4. reference to group B is a control group ;</p> <p>5. (so that) only the (effect of) {vaccine / vaccination} is tested / eq ;</p> <p>6. ref to {valid / validity} ;</p>	(3)

Question Number	Answer	Mark
3(b)(iii)	<p>1. {Greater change / higher / eq} in group A (than B) / eq ;</p> <p>2. group A rises for first 30 days, group B rises (slightly) for first 20 days / eq ;</p> <p>3. (this) rise for group A is {faster / greater} than for group B / eq ;</p> <p>4. (after the rise) group A falls, group B levels off / eq (until day 140) ;</p> <p>5. after day 140, group A rises, group B falls / eq ;</p> <p>6. credit use of comparative manipulated figures (with units) ;</p>	(3)

Question Number	Answer	Mark
3(b)(iv)	<p>1. idea that (antibodies present at birth as) both groups received antibodies from mother ;</p> <p>2. via {placenta / blood / milk / breast feeding} ;</p> <p>3. reference to passive immunity ;</p> <p>4. group A concentration falls because {piglets not infected by (PCV2) virus/ antibodies excreted / passive immunity is short term} /eq ;</p> <p>5. group B concentration rises because {PCV2 / virus} present / eq ;</p>	(3)

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4(a)	<table border="1"> <thead> <tr> <th>Description</th> <th>True</th> <th>False</th> </tr> </thead> <tbody> <tr> <td>B and T cells are formed in the bone marrow</td> <td>✓</td> <td></td> </tr> <tr> <td>B cells stimulate T cells to produce clones of memory cells</td> <td></td> <td>✓</td> </tr> <tr> <td>T helper cells produce chemicals that destroy pathogens</td> <td></td> <td>✓</td> </tr> <tr> <td>B and T cells are able to form clones by mitosis</td> <td>✓</td> <td></td> </tr> </tbody> </table> <p>1 mark each correct row ;;;;</p>	Description	True	False	B and T cells are formed in the bone marrow	✓		B cells stimulate T cells to produce clones of memory cells		✓	T helper cells produce chemicals that destroy pathogens		✓	B and T cells are able to form clones by mitosis	✓		(4)
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4(b)	<ol style="list-style-type: none"> 1. (bacteria are) too small / reference to limitation of {magnification / resolution} ; 2. (bacteria) not stained ; 3. idea of bacteria already {removed / destroyed} e.g. phagocytosis ; 4. idea that bacteria are not present in the blood e.g. only a small {region / sample} shown, reference to local infection ; 	(2)

Question Number	Answer	Mark
4(c)(i)	<p>Either:</p> <ol style="list-style-type: none"> 1. idea of fewer {lymphocytes / eq} ; 2. reference to {lymphocytes / eq} no longer needed / eq ; 3. (as) {antibiotics / drugs} {kill / destroy / eq} bacteria ; <p>Or:</p> <ol style="list-style-type: none"> 4. more {lymphocytes / eq} ; 5. idea of clonal expansion (of lymphocytes) / eq ; 6. idea that the antibiotics have not killed all the bacteria yet ; 	(2)

Question Number	Answer	Mark
4(c)(ii)	<ol style="list-style-type: none"> 1. idea that a placebo has no effect ; 2. (therefore there will be) more bacteria / eq ; 3. (therefore there will be) more {lymphocytes / eq} ; 4. (more lymphocytes due to) clonal expansion / eq ; 	(2)