**Question number** | **Answer**                                                                                                                                                                                                 | **Marks** | **Guidance**                                                                                                                                                                                                 |
---|---|---|---|
1 (a) | (Micro)organism that causes disease / harm to body / an immune response; | 1 | Accept: named microorganism that causes disease Allow infection |
1 (c) | 1. Antigens (on pathogen) are a specific shape/ have specific tertiary / 3D structure; 2. Antibody fits/binds / is complementary to antigen/ antibody-antigen complex forms; OR 3. Antibodies are a specific shape / have specific tertiary/ 3D structure; 4. Antigens (on pathogen) fit/ bind/ are complementary to antibody / antibody-antigen complex forms; | 2 | 1/3 Structure alone is insufficient Reject – active site |
2 (a) | Has more than one/four polypeptide chains / made up of polypeptide chains; | 1 | |
2 (b) | 1. Antibody/variable region has specific amino acid sequence/primary structure; 2. The shape/tertiary structure of the binding site; 3. Complementary to fits/binds with these antigens; 4. Forms complex between antigen and antibody; | 3 max | 2 Do not accept active site for this point. 3 Accept active site for this point. |
3 (a) | | 1 | |
3 (b) | 250 – 70 = 180 180 / 5 weeks = 36 | 2 | |
3 (c) | exponential curve becomes straight line plot on a log scale | 1 | |
3 (d) | disease is rare so no previous immunity in population / everyone susceptible takes time for individuals affected to: recognise / bind Ebola antigen (to B and T lymphocytes) clone matching B / T cells secrete antibodies while immune system fighting pathogen it is infectious contagious / passed on by contact with body fluids / touching contaminated clothing or bedding | 4 | |
4 (a) | 1. Microvilli; 2. Carrier proteins/co-transport proteins/membrane-bound enzymes; 3. Many mitochondria; | 2 max | 1. Accept large surface area Accept lots of ATP produced |
### Answers to practice questions

#### AQA Biology

#### 5 Cell recognition and the immune system

<table>
<thead>
<tr>
<th>Question</th>
<th>Correct Answer</th>
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<tbody>
<tr>
<td>4 (b) (ii)</td>
<td>Substance that causes an immune response/production of antibodies; 1. Not lipid soluble; 2. Too large (to diffuse through the membrane); 3. Antigens do not have the complementary shape/cannot bind to receptor/channel/carrier proteins (in membranes of other epithelial cells); 2 max</td>
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<tr>
<td>4 (c)</td>
<td>1. (Vaccine contains) antigen/attenuated/dead pathogen; 2. Microfold cells take up/bind and present/transport antigen (to immune system/lymphocytes/Tcells); 3. T-cells activate B-cells; 4. B-cells divide/form clone/undergo mitosis; 5. B-cells produce antibodies; 6. Memory cells produced; 7. More antibodies/antibodies produced faster in secondary response/on reinfection; 5 max</td>
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<tr>
<td>5 (a)</td>
<td>Girls are not sexually active / not likely to carry HPV / vaccine may not work if already infected / few girls sexually active (at this age); 1 Neutral: girls are not sexually mature Neutral: to provide better protection Accept: provides immunity before sexually active Neutral: girls are less likely to have 'it' as could mean the vaccine from the question stem</td>
</tr>
<tr>
<td>5 (b)</td>
<td>Other (HPV) types have different antigens; No memory cells for other types / memory cells not activated; Antibodies cannot attach to antigen / correct antibodies not produced / antibodies are not complementary; 2 max Accept: refs. to antigenic variability Accept: B cells for memory cells Accept: memory cells cannot recognise antigen for 'not activated' Accept: examples of memory cell activation</td>
</tr>
<tr>
<td>5 (c)</td>
<td>More antigen; More memory cells; So more antibodies produced / antibodies produced quicker (if infected); 2 max Accept: 'many' / 'enough' instead of 'more' Neutral: primary / secondary response Accept: T cells / B cells / plasma cells instead of 'antibodies’ Reject: the idea that vaccines contain antibodies Q Reject: antibodies ‘fight’ / 'antibiotics</td>
</tr>
<tr>
<td>5 (d)</td>
<td>Cancer takes years to develop / develops later in life; Takes time for females to become sexually active / females must become sexually active to obtain data; Few people / only teenagers vaccinated; 2 Neutral: will take time to vaccinate 80% of young girls Accept: do not develop cancer instantly</td>
</tr>
</tbody>
</table>
| 5 (e) | (Cervical cancer) can be caused by other types of HPV / other factors / example given; OR (Some) women may have been infected (with HPV) 1 Accept: 'caused by other types of HPV' in the context of mutation Neutral: to check for abnormal cells / that they are immune to the virus
| 5 (f) | areas B and D  
B = 84% immunised  
D = 81% immunised  
higher than 80% needed for herd immunity  
A only 79% / borderline  
C lowest % vaccinated = 72.8% | 2 |