

Unit 3 Biology
Revision Booklet 6 – Solutions

2011 – Question 5

Question 5a.

Marks	0	1	Average
%	26	74	0.8

Endocytosis/phagocytosis

Question 5b.

Marks	0	1	2	Average
%	22	34	44	1.2

Either of:

- antibodies bind to bacteria and cause agglutination, macrophages then engulf and destroy them
- macrophages display foreign antigens of the bacteria; the cells stimulate the production of antibodies.

This question essentially required students to give definitions of macrophages and antibodies. General answers such as 'Macrophages and antibodies identify and destroy bacteria' were too vague to gain full marks.

Question 5c.

Marks	0	1	Average
%	48	52	0.5

The enzyme breaks down protein.

This question caused issues for many students. Some answers indicated that protease enzymes were **made** of proteins, which is correct but not relevant in this case.

Question 5d.

Marks	0	1	Average
%	55	45	0.5

The drug needs to be complementary to the active site and, by binding, prevent the enzyme from breaking down the antibodies.

2009 - Question 8

Question 8a.

Marks	0	1	2	Average
%	21	35	44	1.3

Both of:

- bone marrow produces blood cells (or a specific example)
- a consequence of a lack of a particular type of cell, such as less oxygen carried due to fewer red blood cells or fewer antibodies due to fewer B cells.

Question 8bi-ii.

Marks	0	1	2	Average
%	3	39	58	1.6

Question 8bi.

Chemical 2

Question 8bii.

Either of:

- chemical 2 has a shape which will combine exactly with bcl-2
- chemical 2 has the best shape to combine with bcl-2.

To gain the mark a **comparative** statement had to be made.

Question 8c.

Marks	0	1	Average
%	74	26	0.3

One of:

- fewer adverse side effects of this drug
- provides an extra binding site for, for example, another drug or enzyme
- the drug passes more readily into cancer cells.

This question required students to read, analyse and interpret the data given. More careful reading would have assisted this process.

2007 – Question 8

Question 8a.

Marks	0	1	Average
%	68	32	0.4

Acceptable answers included:

- intact skin
- mucus
- stomach acid
- saliva
- tears.

Skin alone was not sufficient to gain the mark.

Question 8b.

Marks	0	1	Average
%	69	31	0.3

Interferons are produced by viral infected cells and warn nearby cells and make them more resistant to infection **or** stimulate the production of antiviral proteins.

This part was poorly answered. Students appeared to have little knowledge of interferons; many described their role as that of complement proteins. Incorrect statements such as 'Interferons interfere with viruses' were common.

Question 8c.

Marks	0	1	Average
%	76	24	0.3

The **lack of nucleic acid**; therefore the host cell cannot be programmed to replicate viruses.

Many students just reiterated the stem of the question and failed to relate their answer to preventing the disease. Other incorrect information given was that viruses are made of cells and are living.

Question 8d.

Marks	0	1	Average
%	54	46	0.5

As a control to give a comparison to injecting the vaccine and to show that the response was due to the vaccine, not the saline.

Students who wrote 'as a control' or 'as a comparison', with no further information did not gain the mark. The key point of control is to make a valid comparison and to show that the variable is responsible for the result; in this case, it is the vaccine that led to the production of antibodies, **not** the saline.

Question 8e.

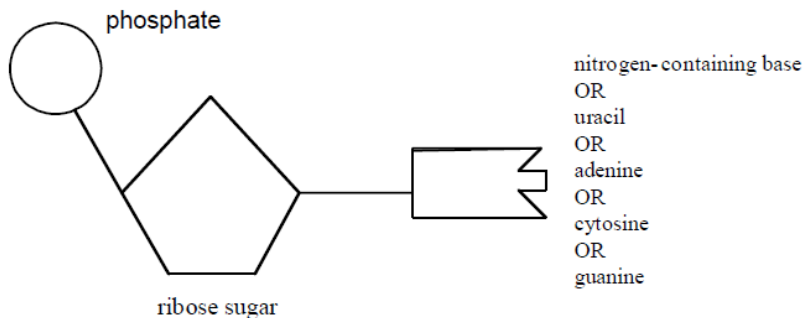
Marks	0	1	2	Average
%	40	37	23	0.9

There is a delay in the production of antibodies as there must be recognition of the antigen and cloning of B cell. The second or subsequent response is greater and faster because of the presence of memory cells.

Many students failed to provide a sufficient explanation, instead simply repeating information that was given in the question, such as 'The response increases with each vaccination'.

2006 – Question 8**Question 8a.**

Marks	0	1	2	Average
%	67	14	19	0.5



This part of the question was very poorly answered. The difference between the polymer RNA and its constituent monomers was not clear to many students. Many who knew the names of the monomer parts were often confused as to how those parts were organised within the molecule.

Words alone were insufficient; there had to be some attempt to present a labelled diagram, as required by the question. 'Ribose sugar' rather than just 'sugar' was expected; however, specific or general indications of a nitrogenous base were accepted. The shapes of each of the parts did not have to be as specific as shown here but did have to be presented in the correct order of connection. Reverse images, correctly labelled, were also accepted.

Question 8b.

Marks	0	1	Average
%	63	37	0.4

Either of the following responses was acceptable:

- T cells increase to reach optimum at year one and HIV increases for about six months and then declines (significantly)
- T cell concentration increases in response to HIV infection, then HIV level drops.

The question asked for comment on events 'in the first year'. Failure to consider the appropriate portion of the graph resulted in irrelevant answers. Students were expected to refer to at least two elements of the graph.

Question 8c.

Marks	0	1	Average
%	72	28	0.3

Answers needed to relate the swelling of the lymph nodes to their role within defence mechanisms against infective agents, in this case the HIV virus.

Question 8d.

Marks	0	1	Average
%	22	78	0.8

The majority of students correctly identified that the immune system had been effectively destroyed.

Question 8e.

Marks	0	1	Average
%	50	50	0.5

Viruses continually mutate in random ways, and increasing the number of drugs used increases the chance that one of the drugs may be able to inhibit the action caused by a random change.

Many students failed to provide a sufficient explanation, instead simply repeating information that was given in the question.

2005 – Question 2**Question 2****2a**

Marks	0	1	2	Average
%	44	13	43	1.0

2ai.

Ribosomes

2aii.

The function of the ribosomes is to synthesise protein.

Students needed to recognise the pathogen as a bacterium. The presence of a circular molecule of DNA and the size of the pathogen should have been used to identify the pathogen.

2b

Marks	0	1	2	Average
%	33	50	17	0.9

2bi.

A virus

2bii.

The pathogenic agent's inability to reproduce outside a living cell.

Many students correctly identified the pathogenic agent as a virus but fewer students could give a significant feature that distinguishes a pathogenic agent from a pathogenic organism. Incorrect responses that gave 'smaller size' or 'becoming living within a cell' as the significant feature were not awarded a mark.

2c

Marks	0	1	Average
%	23	77	0.8

The mosquito is a vector, which transmits the organism from one human to another.

Some students' responses stated that the mosquito was a carrier. When there was no further explanation as to what the student meant by a carrier, the response was not awarded a mark.

2d

Marks	0	1	Average
%	61	39	0.4

The following answers were accepted:

- an external covering that is resistant to digestion by mosquito digestive enzymes
- an external covering that is resistant to extremes of pH that may be encountered
- mouth parts to burrow through the stomach wall of the mosquito.

The structural feature chosen had to clearly relate to the survival of the larvae in the mosquito. If a structure was given and it was not clear how this structure could help in the survival of the larvae the response was not awarded a mark. An example of such a response would be 'an external covering' with no further explanation.

2e

Marks	0	1	Average
%	61	39	0.4

The following responses were accepted:

- suckers or hooks that enable them to secure their position in the lymph nodes
- high surface area to volume ratio to maximise the absorption of nutrients.

This time the structural feature had to relate to the survival of the larvae in the human. Some students incorrectly thought that the larvae passed through the digestive system of the humans. Students are reminded to read the information in the stem of the question carefully and use this information when formulating their answers.

2f

Marks	0	1	Average
%	22	78	0.8

There were many correct responses that could have been given to this question, some of which were:

- vaccinate humans against both larval and adult proteins
- for humans, use a chemical treatment that is active against the larva and worm
- clean up mosquito breeding areas
- using a spray to kill mosquitoes
- some form of human behaviour that reduces the chance of being bitten.