

Student Name: \_\_\_\_\_



# **BIOLOGY 2017**

## **Unit 3**

### **Key Topic Test 9 – Immunity**

Recommended writing time\*: 45 minutes

Total number of marks available: 45 marks

## **QUESTION BOOK**

\* The recommended writing time is a guide to the time students should take to complete this test. Teachers may wish to alter this time and can do so at their own discretion.

**Conditions and restrictions**

- Students are permitted to bring into the room for this test: pens, pencils, highlighters, erasers, sharpeners and rulers.
- Students are NOT permitted to bring into the room for this test: blank sheets of paper and/or white out

**Materials supplied**

- Question book of 10 pages.

**Instructions**

- Print your name in the space provided on the top of the front page.
- All written responses must be in English.

**Students are NOT permitted to bring mobile phones and/or any other unauthorised electronic communication devices into the room for this test.**

**SECTION A – Multiple-choice questions**

**Instructions for Section A**

Answer **all** questions.

Choose the response that is **correct** for the question.

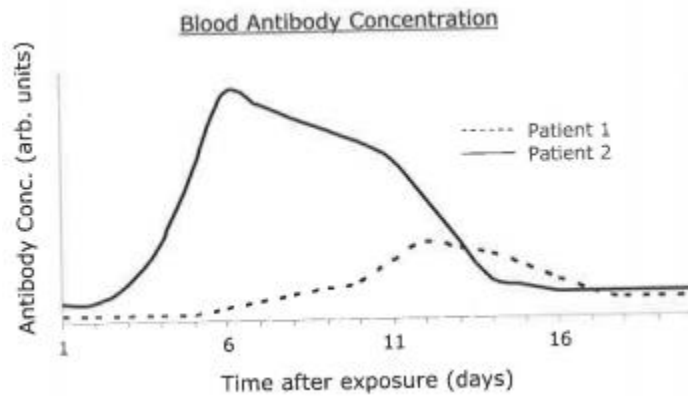
A correct answer scores 1, an incorrect answer scores 0.

Marks will **not** be deducted for incorrect answers.

No marks will be given if more than one answer is completed for any question.

**Question 1**

The following graph shows the amount of circulating antibodies in two patients exposed to the measles virus at the same time.



On the basis of this information it is reasonable to conclude that

- A. Patient 2 had been immunised against measles whereas Patient 1 had not.
- B. Patient 2 will suffer from measles for a shorter time than Patient 1.
- C. On day 12, Patient 1 had more circulating antibodies than Patient 2.
- D. Patient 1 is more likely to suffer from measles in the future.

**Question 2**

Long term immunity may be provided by

- A. an injection of anti-venom following a spider bite.
- B. ingestion of antibodies in breastmilk.
- C. vaccination with a solution containing killed viruses.
- D. antibodies which cross the placenta during foetal development.

**Question 3**

Diseases which occur when the body fails to distinguish self from non-self are known as

- A. hypersensitivities.
- B. allergies.
- C. auto-immune.
- D. tissue rejection.

**Question 4**

When a person reacts to environmental antigens such as dust, pollens or food constituents, it is said they have a

- A. response.
- B. condition.
- C. disease.
- D. hypersensitivity.

**Question 5**

An allergic reaction occurs as an over-reaction to a common environmental antigen. This reaction is induced by the release of

- A. cortisol.
- B. histamine.
- C. phagocytes.
- D. complement.

**Question 6**

One form of diabetes is thought to be the result of an autoimmune disease where antibodies are produced that attack and destroy insulin producing cells in the pancreas. Which of the following best explains the events leading to this form of diabetes?

- A. Microbes, with antigens close in structure to pancreatic proteins, cause the body to produce antibodies which also attack the pancreas.
- B. Antibodies formed as a result of infection undergo changes, and are then able to attack the pancreas.
- C. Antibodies are produced which are able to bind to two different types of antigen.
- D. The insulin producing cells are infected by a pathogen and antibodies are made against the cells.

**Question 7**

Examples of passive immunity include the immunity

- A. received as a result of vaccination with dead bacteria.
- B. a baby receives through breastfeeding.
- C. an adult has when he or she recovers from a bout of scarlet fever.
- D. that follows a sub-clinical infection.

**Question 8**

One would expect active immunity as a result of

- A. an injection of gammaglobulin after a family member is diagnosed with hepatitis.
- B. the passage of antibodies across the placenta.
- C. an injection of anti-venom after a snakebite.
- D. an injection of a toxoid.

**Question 9**

Monoclonal antibodies are antibodies which are made to target particular cells in the body. They can be used to treat diseases such as

- A. measles.
- B. typhoid.
- C. cancer.
- D. influenza.

**Question 10**

An example of naturally acquired passive immunity is

- A. immunity conveyed to a fetus by its mother during pregnancy..
- B. immunity obtained when a person is exposed to a live pathogen.
- C. immunity obtained when military recruits are vaccinated against smallpox.
- D. immunity obtained after an injection of anti-venom after a snakebite.

**SECTION B - Short-answer questions**

**Instructions for Section B**  
 Answer **all** questions in the spaces provided. Write using black or blue pen.

**Question 1**

Cytochrome C is a molecule that exists within mitochondria and usually aids the electron transport chain during aerobic respiration. However, when injury occurs to cells, cytochrome C is released into the cytoplasm, triggering the assembly of apoptosomes which control the action of a class of enzymes known as caspase proteases. These proteases initiate apoptosis by digesting key cellular proteins, so that the cell dies in order to be replaced by healthy cells.

Multiple Appendagal Aflomosis (MAA) is an autoimmune disease where the muscles in one's arms and legs are slowly broken down. In this condition, apoptosis in muscle cells is triggered through release of chemicals by T cells.

a. What is an autoimmune disease?

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1 mark

b. There are four types of immunity. Complete the following table.

Type	How acquired?	Short or long term?	Involves immune response?	Involves memory cells?

20 marks  
 Total 21 marks

**Question 2**

Sometimes the immune system malfunctions and reacts to a harmless foreign particle in an adverse way. This is known as an allergic reaction.

- a. Terry is allergic to pollen. He develops extremely watery eyes when exposed to pollen, and has visited you, his doctor, for an explanation. Explain, using scientific terms, what happens to Terry's eyes when he is exposed to pollen.

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3 marks

The molecule TSLP (thymic stromal lymphopoietin) is associated with allergies. It activates and regulates the immune system. It is thought that low levels of TSLP may trigger the immune system to become overactive and cause allergies to occur.

You are a researcher trying to prove this. You have: mice with low TSLP levels, common allergens such as pollen, and TSLP molecules in a form that you can administer to mice.

- b. Provide a hypothesis for your experiment.

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1 mark

**c.** Briefly outline the method of your experiment

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3 marks

**d.** What results would support your hypothesis?

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1 mark

Total 8 marks



**Question 3**

Diphtheria is a serious communicable bacterial disease that causes severe inflammation of the nose, throat and windpipe (trachea). It is caused by the bacterium *Corynebacterium diphtheriae*. The bacteria produce toxins that cause an abnormal membrane to grow in the throat, which can lead to suffocation. Other dangerous complications include paralysis and heart failure if the toxins spread throughout the body. Around 10 per cent of people exposed to diphtheria die from the disease. Diphtheria is extremely rare in most developed countries, including Australia, because of the widespread use of the diphtheria vaccine. However, it is important to continue vaccinating children against diphtheria because there is a risk that the infection can be brought in by people who have travelled to or come from developing nations.

**a.** What is a vaccine?

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1 mark

**b.** For the vaccine to be effective, it is recommended that travellers to regions affected by diphtheria have the vaccination approximately two to four weeks before travelling.

Why is this timeframe recommended?

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2 marks

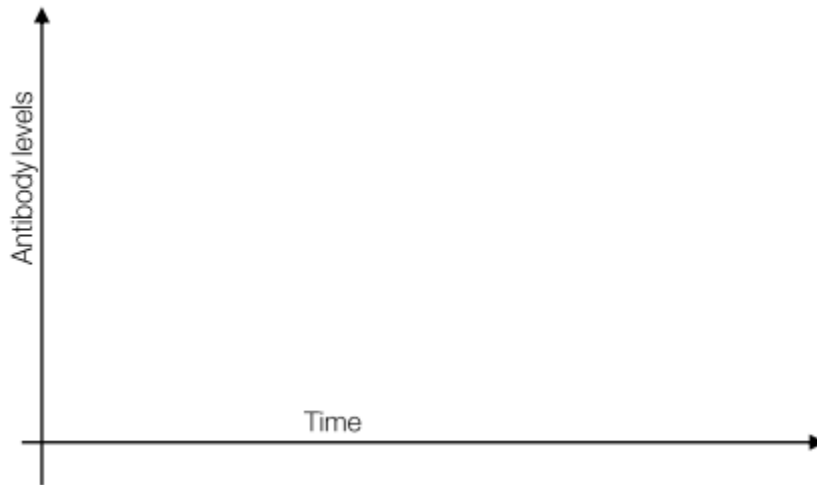
**c.** Is this type of vaccination active or passive immunity?

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1 mark

2017 BIOLOGY KEY TOPIC TEST

- d. On the axes below draw a graph showing the levels of antibodies in the blood after vaccination and after exposure to the diphtheria bacterium a year later.



2 marks  
Total 6 marks

**END OF KEY TOPIC TEST**