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**Year 12 Human Biology**

**Unit 3: Test – Homeostasis and Immunity (5%)**

**Task 5**

**TYPE:** Test

**TIME:** 60 minutes

Multiple Choice: 10 marks

Short Answer: 28 marks

Extended Answer: 17 marks

TOTAL 55 MARKS

**Do not write on this question booklet**

**Do not turn page until instructed to do so**

**Section A: Multiple Choice (10 Marks)**

Answer all questions by shading the most correct answer on the multiple choice answer sheet.

1. The concentration of the mumps antibody in the blood of a person was measured over a period of 90 days. The results are shown on the graph below.

Concentration

of antibodies

(arbitrary units)

0 30 60 90

Time (days)

30

A

It is reasonable to conclude that the graph represents the concentration of the mumps antibodies in:

1. a newborn baby whose mother had been vaccinated against mumps.
2. a newborn baby whose mother had a mumps antibody injection at the end of the pregnancy.
3. an adult who became infected with mumps at time A on the graph.
4. a child who had been vaccinated against mumps at time A on the graph.
5. Suffocation victims are usually given a mixture of 95% oxygen and 5% carbon dioxide rather than pure oxygen, because the carbon dioxide:
6. decreases the danger of choking by dilating bronchiole tubes.
7. increases the speed with which gases pass through the alveoli of the lungs.
8. directly stimulates the diaphragm to produce the breathing action.
9. acts on the respiratory centre to stimulate breathing.

**The following information relates to Questions 3 and 4.**  
  
Measles is an infectious disease caused by a virus. Symptoms usually appear 6–10 days after exposure to the virus and include a rash, headache and fever. In a proportion of cases the patient is affected by secondary bacterial infections, especially of the lungs. Antibiotics are often prescribed.

1. Antibiotics are likely to:
2. decrease the rate of DNA synthesis by the measles virus.
3. reduce fever by resetting the body’s thermostat.
4. disrupt the synthesis of new bacterial cell components.
5. do all of the above.
6. When suffering from measles and a secondary bacterial lung infection, antibodies are produced by the patient’s immune cells. Which of the following statements is true of these antibodies?
7. The same antibody is capable of attacking the measles virus and the bacteria infecting the lung.
8. The antibodies which attack the virus are produced by helper T cells, whereas the antibodies which attack the bacteria are produced by B cells.
9. Viral antibodies and bacterial antibodies are produced by the same plasma cells.
10. Large quantities of antibodies specific to the measles virus remain in the circulation for a short time.

1. Insulin controls the metabolism of:
2. Fats
3. Proteins
4. Carbohydrates/ Sugars
5. Hormones
6. The process of converting glycogen to glucose is called:
   1. Glycogenolysis
   2. Lipogenesis
   3. Glucagon
   4. Glycogenesis
7. After the removal of gland X, a patient was unable to regulate body temperature effectively. Gland X was the:
8. Thyroid
9. Pancreas
10. Thymus
11. Adrenal Glands
12. Homeostatic control of water content of blood occurs in the nephron when the filtrate reaches the:
    1. Proximal convoluted tubule
    2. Loop of Henle
    3. Distal convoluted tubule
    4. Glomerulus
13. Substances that stimulate the production of antibodies are called:  
    1. Antipathogens
    2. Antitoxins
    3. Antigens
    4. Antibacterials
14. Immunity to disease that is acquired by an infant from its mother’s breast milk is an example of what type of immunity?
    1. Natural active immunity
    2. Natural passive immunity
    3. Artificial passive immunity
    4. Artificial active immunity

**END OF SECTION A**

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**Year 12 Human Biology**

**Unit 3: Test – Homeostasis and Immunity (5%)**

Name \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Teacher Mrs Cunningham

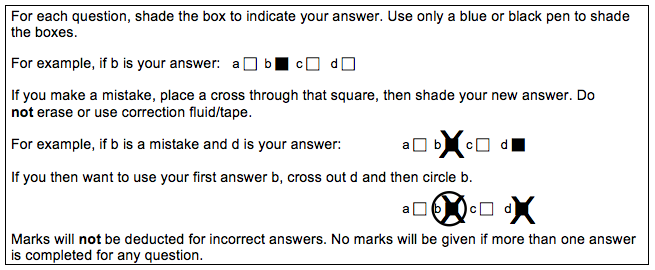
**Task 5**

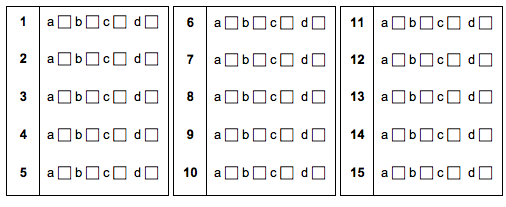
**TYPE:** Test

**TIME:** 60 minutes

TOTAL /55 MARKS

**Multiple choice & answer booklet**





**Section B: Short Answer (28 Marks)**

Answer all questions in the spaces provided.

**Question 11 (4 Marks)**

Question 11 refers to the graph below, showing the immune response of a person injected with two doses of an antigen.

1. Name and describe the function of the type of cell that directly results in the response which occurs between day 0 and 10 on the graph above. (2 marks)

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1. Explain how and why the shape of the graph is different after the second injection of antigen compared with the first exposure. (2 marks)

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**Question 12 (6 Marks)**

The balance of gas concentrations within the body are controlled by a stimulus response mechanism.

1. Name and state the location of the receptor/s for low oxygen concentration. (1 marks)

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1. Explain the relationship between carbon dioxide, hydrogen ion concentration and pH levels in the blood. (3 marks)

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1. Which one - carbon dioxide, oxygen or pH levels in the blood, results in the most immediate response by the peripheral chemoreceptors? (1 mark)

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1. Identify the mode of transmission to relay the information to the respiratory centre. (1 mark)

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**Question 13 (6 marks)**

To investigate the effects that air temperature has on body temperature, a naked subject stood in a room especially designed for controlling air temperature. The subject was exposed to 480C to monitor the body’s response to dry heat. After a rest period, the same subject was then exposed to 50C to monitor the body’s response to dry cold. The data recorded are shown on the graphs below. Use the graphs to answer the following.



1. List two physiological adjustments the body would make to cope with the situation at point A in the graph, and explain how these may be of benefit.

(4 marks)

|  |  |  |
| --- | --- | --- |
|  | Physiological Adjustment | Benefit |
| (i) |  |  |
| (ii) |  |  |

1. Using the information in the graphs alone, did the most efficient temperature regulation occur when the subject was exposed to heat or cold? Give one (1) reason for your answer.

(2 marks)

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**Question 14 (7 marks)**

Meningococcal disease is caused by the bacterium *Neisseria meningitides. N. meningitides* are found in the throat and nasal passages of about 10% of the population. These carriers of *N. meningitides* suffer no disease symptoms. In susceptible individuals, however, the bacteria can pass into the bloodstream and cause disease.

1. Based on the example above, outline two (2) external defence mechanisms which have failed to stop this bacterium from entering the body. (2 marks)

One: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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Two: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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1. Some individuals with Meningococcal disease suffer from a sudden increase in body temperature. Describe what occurs in their body to bring about this increase in body temperature, leading up to the crisis point. (3 marks)

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Children and young adults are now routinely vaccinated against one strain of *N. meningitides*. Meningococcal C vaccine is effective in providing protection against bacteria of serogroup C. An effective vaccine against serogroup B has not yet been produced. In serogroup B bacteria, the key polysaccharide is identical to polysaccharides found in the body and so is recognised as self by the body’s immune system.

1. Explain two (2) ways in which routine immunisation for meningococcal C may cause a decrease in the incidence of the disease in Victoria.(2 marks)

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**Question 15 (5 marks)**

Emily was recently diagnosed with hyperglycaemia and is in the process of receiving treatment for this.

1. Prior to receiving treatment, name the receptor that would detect this change in homeostasis. (1 mark)

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1. Explain the effect of hyperglycemia on osmotic pressure in the blood, and list two symptoms that would result from this effect. (4 marks)

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**END OF SECTION**

**Section C: Extended Answer (17 Marks)**

Answer all parts of ALL questions on the lines provided.

**Question 16**

In 1960, Australian Sir Frank MacFarlane Burnet (a Virologist) was awarded the Nobel Prize for medicine for correctly predicting how the body’s immune system responds to infection. He investigated the “Bundaberg Distaster”, in which twelve children in Queensland were given a diphtheria vaccine contaminated with *Staphylococcus aureus* bacteria (Golden Staph).

1. Describe the children’s humoral immune response when faced with the invading Staphylococcus pathogen. (6 marks)
2. Describe four (4) differences between humoral and cell-mediated immunity. (4 marks)

**Question 17**

Louise is a 43-year old female who has type 1 diabetes.

1. Describe how her body responds after eating a meal high in carbohydrates. (4 marks)
2. What does Louise have to do in order to manage her condition and how does her body respond to this. (3 marks)

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