**Year 12**

**ATAR**

**Human Biology**

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| Name: |
| Teacher: |

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| --- | --- | --- | --- | --- |
| **Task 6: Immunity Test** | | | | Weighting 5% |
|  | Marks Received | Marks Available | Percentage | |
| Multiple Choice |  | 13 |  | |
| Short Answer |  | 32 |  | |
| Extended Answer |  | 10 |  | |
| Total |  | 55 |  | |

Time Allocated:

Reading time: 5 minutes

Working time: 55 minutes

**Year 12**

**ATAR**

**Human Biology**

**MULTIPLE CHOICE ANSWER SHEET**

|  |
| --- |
| Name: |
| Teacher: |

For each question, shade the box to indicate your answer. Use only a blue or black pen to shade the boxes. If you make a mistake, place a cross through that square then shade your new answer. Do not erase or use correction fluid/tape. Marks will not be deducted for incorrect answers. No marks will be given if more than one answer is completed for any question.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **1** | a | b | c | d |
| **2** | a | b | c | d |
| **3** | a | b | c | d |
| **4** | a | b | c | d |
| **5** | a | b | c | d |
| **6** | a | b | c | d |
| **7** | a | b | c | d |
| **8** | a | b | c | d |
| **9** | a | b | c | d |
| **10** | a | b | c | d |
| **11** | a | b | c | d |
| **12** | a | b | c | d |
| **13** | a | b | c | d |

**PART A: Multiple Choice Section [Total: 13 marks]**

1. Macrophages are large white blood cells that

(a) divide to produce B lymphocytes.

(b) engulf bacteria and destroy them.

(c) produce antibodies against specific antigens.

(d) secrete bacterial-destroying enzymes into the blood.

2. Which of the following differentiates correctly between antibiotics and vaccines?

(a) Antibiotics treat for an invading bacterium, while many vaccines involve the introduction of an inactivated pathogen into the bloodstream.

(b) Antibiotics provide long-lasting immunity due to the production of memory cells, while vaccines only provide short-term immunity.

(c) Antibiotics provide artificial, active immunity, while vaccines provide artificial, passive immunity.

(d) Antibiotics are often injected into the bloodstream, while vaccines are normally ingested in pill form.

3. Antibiotics are often ineffective against viruses because viruses

(a) keep changing their external protein coat.

(b) are able to disguise themselves in the host cell membrane.

(c) are not true living cells, so their metabolism is not affected by antibiotics.

(d) can destroy or inhibit the actions of antibiotics in living cells.

4. A typical characteristic of a virus is that it

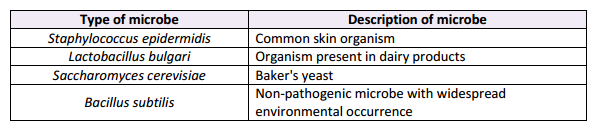
(a) is destroyed by antibiotics.

(b) releases toxins into the body of the host.

(c) evades detection by the host's immune system.

(d) manipulates the host cell's DNA to produce copies of itself.

5. The table lists the types of microbes identified in a cheeseburger prepared at an outdoor market.



Would it be safe to eat this cheeseburger?

Choose the best answer from the following.

(a) Yes, food should be completely free of microbes

(b) No, Lactobacillus and Saccharomyces are highly pathogenic

(c) Yes, organisms that grow in or on the human body do not cause disease

(d) No, most of the food we eat is contaminated by different microbes

6. An example of specific immunity is the

(a) action of mucus to remove bacteria from the respiratory tract.

(b) presence of 'natural flora’ bacteria in different areas of the body.

(c) presence of antibacterial agents, such as enzymes, in saliva.

(d) action of memory cells when an individual is subjected to a second infection of measles.

7. After contact with the polio virus, a child developed polio and recovered. Twelve months later, the child came in contact with the polio virus again but did not show any symptoms of the disease. This happened because, shortly after the first infection, the child

(a) had an injection of polio antibodies.

(b) grew memory B cells specific to polio.

(c) grew memory B cells that could respond to any virus.

(d) developed T cells that consumed the new polio virus particles.

8. Penicillin is an example of an

(a) antibiotic.

(b) antibody.

(c) antigen.

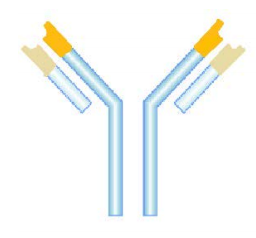
(d) antitoxin.

9. The following diagrams show the antigens on the surface of different bacteria isolated from an open wound.



Antigen 1 Antigen 2 Antigen 3 Antigen 4

An antibody was also detected. It is shown below.



This antibody is most likely to react to antigen

(a) 1.

(b) 2.

(c) 3.

(d) 4.

10. Of the different types of Leucocytes, which ones are involved in the formation of T-cells and B-cells?

(a) monocytes.

(b) basophils.

(c) eosiophils.

(d) lymphocytes.

11. Ig is the abbreviation for Immunoglobulins. One Ig usually contains two pairs of polypeptide chains. The ends of these chains are referred to as ‘variable portions’. What is the common name for Immunoglobulins?

(a) antibodies.

(b) cytotoxins.

(c) macrophages.

(d) antigens.

12. Which of the following is the hallmark of the cell-mediated immune response?

(a) phagocytosis.

(b) binding of antibodies to antigens.

(c) cell lysis by T-cells.

(d) antigen presentation.

13. Inflammation in the area of a wound, like a tear in the skin, is a useful reaction to the damage because:

1. It results in more blood flow to the area.
2. It allows more seepage of plasma from the capillaries into the surrounding tissue.
3. It may enable a blood clot to form more readily in the area.
4. All of the above.

**PART B: Short Answer Section [Total 32 marks]**

14. *Light for Riley* is a community campaign created after Riley Hughes, a 3 week old infant, died from Whooping Cough in a Western Australian Hospital in 2015. Since then, Riley’s mother Catherine and her husband have promoted the protection of children from vaccine-preventable diseases through the process of immunisation.

1. Complete the following table on two of the traditional vaccines commonly used

(6 marks)

|  |  |  |  |
| --- | --- | --- | --- |
| **Vaccine type** | **Description** | **Advantage for this type of vaccine** | **Example of a disease that this vaccine is used to protect against** |
| Living attenuated micro-organisms |  |  |  |
| Toxoids |  |  |  |

1. Traditional vaccines have shown to be very effective, but they have certain problems. Developers of modern vaccines have tried to produce vaccines that that are affective for prolonged periods but produce no side effects. Describe how modern vaccines work. (2 marks)

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1. Explain the difference between an antibody and an antigen. (2 marks)

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1. Local health agencies in Western Australia suggest that Whooping Cough vaccinations be given at 2, 4 and 6 months of age. State the type of immunity and likely source of antibodies for newborns between the ages of 0 and 2 months. (2 marks)

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A newborn baby was monitored for the presence of pertussis antibodies, with none detected for the first two months of life. The baby was then given the routine vaccinations at 2, 4 and 6 months of age.

1. On the following figure, draw a graph indicating the level of pertussis antibodies you would expect in the baby from the age of 2 to 12 months. (3 marks)

Level of Pertussis Antibodies (arbitrary units)

2 4 6 8 10 12

Time (months)

15.The skin and mucous membranes provide an external defence against pathogens. Describe **two** of the body’s **other** external defences against infection by pathogens.

(2 marks)

1:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

2:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

16. The effects of many diseases have been minimised in many countries due to the introduction of live attenuated vaccines. A live attenuated vaccine uses a weakened version of the disease-causing pathogen to stimulate an immune response in the vaccinated person. The MMR (measles, mumps and rubella) vaccination program attracts a lot of media attention, which highlights some of the risks and ethical considerations associated with the use of vaccines.

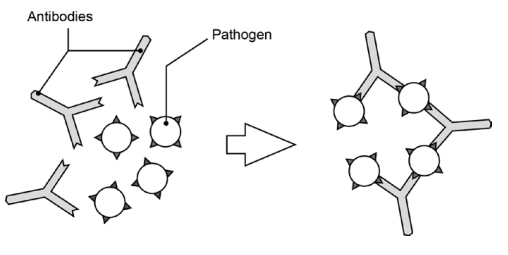
Discuss **one** risk and **one** ethical concern associated with the use of vaccines.

(2 marks)

Risk:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Ethical concern:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

17. The diagram below shows one of the actions of antibodies on pathogens.



1. What action of antibodies does the diagram represent? (1 mark)

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1. Describe **three** other ways in which antibodies can act on pathogens to help fight infection. (3 marks)

1:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

2:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

3:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

18. Immunity can be passive or active and natural or artificial. Complete the table below describing the different types of immunity. (4 marks)

|  |  |  |
| --- | --- | --- |
|  | **Passive** | **Active** |
| **Natural** |  |  |
| **Artificial** |  |  |

19. During a game of soccer, one of the female players is pushed and falls to the ground, as she does, she cuts her knee open on a piece of old glass. By the time she reached home her knee had become all red and swollen. Her Mum told her not to worry about that because it was all part of her body’s way of stopping the spread of pathogens that may have been on the glass. The girl’s mother was talking about the inflammatory response.

Explain, in sequence, the steps the body goes through during the inflammatory response. (5 marks)

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**PART C: Extended Response [Total 10 marks]**

20. A female with a defective kidney received a new kidney transplant from a non-related male. The female patient failed to take the appropriate medication and the transplant was rejected. Describe the cell-mediated immune response that resulted in the rejection of the transplanted kidney.

(10 marks)

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