Immunity

Question Paper 1

Level	International A Level
Subject	Biology
Exam Board	Edexcel
Topic	Microbiology, Immunity and Forensics
Sub-Topic	Immunity
Booklet	Question paper 1

Time Allowed: **48 minutes**

Score: **/40**

Percentage: **/100**

Grade Boundaries:

A*	A	B	C	D	E	U
>85%	77.5%	70%	62.5%	57.5%	45%	<45%

1 Vitamin C is important for the body's defences against infection.

(a) Upper respiratory tract infections (URTIs) are caused by viruses.

A study was carried out to investigate the effect of vitamin C on the body's protection against URTIs.

One group of people was given vitamin C. Another group was given a placebo.

The table below shows the results of this study.

Group	Number of people in each group	Total number of URTIs in each group	Number of people in each group who developed an URTI	Mean duration of each URTI / days	Mean number of symptoms per group
Given vitamin C	23	14	10	2.5	16.1
Given a placebo	25	12	8	4.2	37.4

(i) Explain why one group was given a placebo.

(2)

(ii) Using the data in the table, describe the effects of vitamin C on URTIs.

(3)

(iii) Comment on the reliability of the data shown in this table.

(3)

*(b) The table below shows some effects of vitamin C on the body's defences against infection.

Defences against infection	Effects of vitamin C
Phagocytes	Improved chemotaxis (movement towards a chemical), phagocytosis and killing mechanism
B and T lymphocytes	Faster cell division
Interferon	Increased production

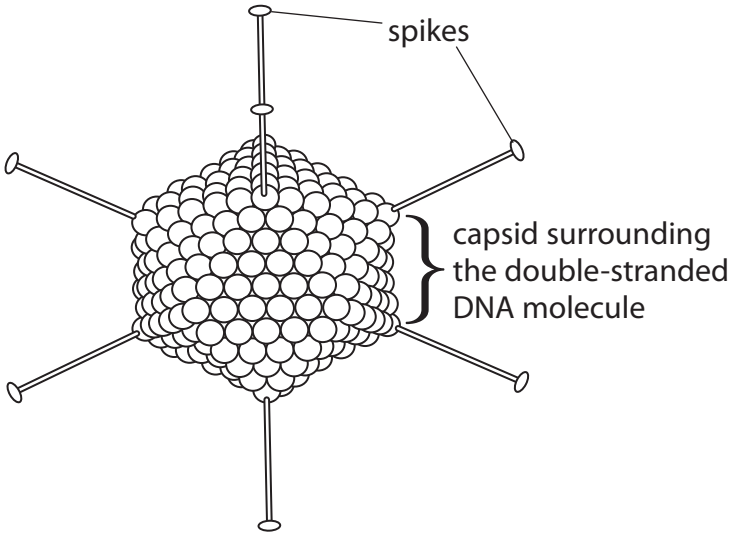
Using the information in the table and your own knowledge, suggest how vitamin C could help to protect people from URTIs.

(6)

(Total for Question 1 = 14 marks)

2 Adenoviruses can cause infections of the respiratory tract.

The diagram below shows the structure of an adenovirus.



(a) (i) Using the information in the diagram and your own knowledge, describe how the structure of the adenovirus is different from the structure of the Human Immunodeficiency Virus (HIV).

(3)

(ii) The DNA of the adenovirus carries genes. Suggest what these genes code for.

(2)

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(b) When the adenovirus infects someone for the first time, an immune response occurs and the person develops immunity.

T killer cells are involved in the immune response to the adenovirus.

(i) Put a cross ☒ in the box next to the term that completes the following statement.

The type of immunity that develops the first time the adenovirus infects a person is called

(1)

☒ **A** artificial active immunity

☒ **B** artificial passive immunity

☒ **C** natural active immunity

☒ **D** natural passive immunity

(ii) Put a cross ☒ in the box next to the cell that presents antigen to T killer cells.

(1)

☒ **A** B lymphocyte

☒ **B** macrophage

☒ **C** T helper cell

☒ **D** virus-infected host cell

(iii) Put a cross ☒ in the box next to the name of the chemical that T helper cells produce to activate the T killer cells.

(1)

☒ **A** chromatin

☒ **B** cysteine

☒ **C** cytokine

☒ **D** cytosine

(iv) Put a cross ☒ in the box next to the term that completes the following statement.

Once activated, the T killer cells divide by

(1)

☒ **A** exocytosis

☒ **B** meiosis

☒ **C** mitosis

☒ **D** phagocytosis

(v) Describe the role of T killer cells in the immune response to a viral infection.

(4)

(Total for Question 2 = 13 marks)

3 When a pathogen infects a person for the first time, an immune response takes place. The appropriate T helper cell is activated and a clone from this cell is produced.

(a) (i) Name the type of division that occurs when the T helper cell is cloned.

(1)

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(ii) Suggest how a microscope slide could be prepared to observe cell division in T helper cells.

(3)

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(b) Describe the role of T helper cells in the immune response.

(3)

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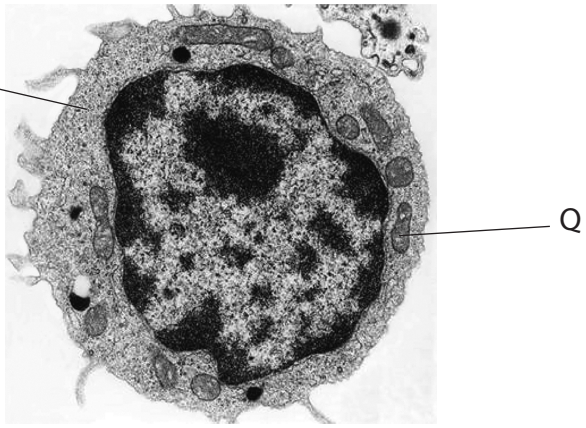
(c) The electron micrograph below shows a T helper cell. Some structures of this cell have been labelled.



Magnification ×6000

Place a cross ☒ in the box to identify each of the labelled structures.

(i) Structure P

(1)

☒ **A** cytoplasm

☒ **B** lysosome

☒ **C** nucleolus

☒ **D** vacuole

(ii) Structure Q

(1)

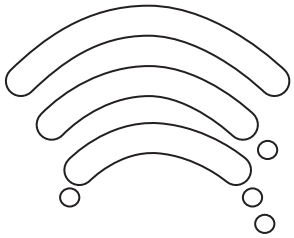
☒ **A** endoplasmic reticulum

☒ **B** lysosome

☒ **C** mitochondrion

☒ **D** nucleus

(d) The diagram below shows an organelle found in T helper cells.



(i) Name this organelle.

(1)

(ii) Describe the role of this organelle in T helper cells.

(3)

(Total for Question 3 = 13 marks)