**1.** The drawing below shows the structure of a virus.



(a) Identify structures labelled I and II.

I: ...........................................................................................................................

II: ...........................................................................................................................

**(2)**

(b) Use the scale bar to calculate the maximum diameter of the virus. Show your working.

Answer: .....................................................

**(2)**

(c) Explain briefly why antibiotics are effective against bacteria but not viruses.

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**(3)**

(d) Explain how antibiotic resistance develops in bacteria.

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**(3)**

**(Total 10 marks)**

**1.** What does the nucleus of a human lymphocyte contain?

A. Only the genes to produce a specific antigen

B. Only the genes to produce a range of antibodies

C. Only the genes that control the growth and development of a lymphocyte

D. The whole genetic information for a human

**(Total 1 mark)**

**2.** Which term describes a molecule capable of triggering an immune response?

A. Antibody

B. Antigen

C. Pathogen

D. Antibiotic

**(Total 1 mark)**

**3.** What stimulates the production of antibodies?

A. AIDS

B. Antibiotics

C. Anticodons

D. Antigens

**(Total 1 mark)**

**4.** The diagrams show the death rate in January from influenza in Canada and the United Kingdom (UK). Canada is a very large, sparsely populated country. The United Kingdom is a densely populated island.



(a) (i) Identify the year in which there were no observed deaths from influenza in **either** country.

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**(1)**

(ii) Calculate the total number of deaths from influenza in 1968 in Canada assuming the population size was 19.8 million.

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**(1)**

(b) Compare the death rates between Canada and the United Kingdom between 1953 and 1963.

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**(3)**

(c) Influenza is caused by a virus. Outline the diversity of structure in viruses.

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**(2)**

**(Total 7 marks)**

**1.** (a) I: protein coat / capsid / capsomere; II: DNA / nucleic acid / RNA / genetic material; 2

(b)

 52 nm (±5 nm); (*units required*) 2

(c) antibiotics block specific metabolic pathways /  cell production in bacteria; viruses reproduce using the host cell metabolic pathways; (host cell) pathways are not affected by antibiotics; viruses do not have metabolic pathways; 3 max

(d) some bacteria are resistant to an antibiotic /  variation within bacterial populations includes antibiotic resistance; genes for antibiotic resistance originate as mutations (not caused by antibiotics); transfer of resistance genes (can occur) from strain to strain /  species to species; bacteria that are resistant survive when an antibiotic is used and others die; resistant bacteria pass on their genes for resistance to offspring; proportion of resistant bacteria increases in each generation in the population / species; natural selection for bacteria that are resistant; 3 max

**[10]**

**1.** D

**[1]**

**2.** B

**[1]**

**3.** D

**[1]**

**4.** (a) (i) 1967 1

(ii) (death rate = 5 per 100,000 / yr, total number of deaths would be 5 times 198 =) 990 deaths 1

(b) death rate in Canada is always lower than United Kingdom;

 highest death rate in United Kingdom approx 40 per 100,000 whereas in Canada never above 15;

no death from influenza recorded in Canada in 1957 but some in the

United Kingdom;

 highest death rate for United Kingdom recorded in 1953 but in Canada in 1958;

both countries have very low / zero death in 1954 and 1957;

between 1953 and 1963 patterns are very similar; 3 max

(c) viruses consist of nucleic acid and a protein coat;

DNA double stranded or single stranded;

RNA double stranded or single stranded;

protein coat contains receptors specific for target organism; 2 max

**[7]**