C3.2 Defence against disease

What the Cell · DP Biology · worksheet · SL and HL

Name _____ **Date** _____ **Total** _____ / 70

About 70 minutes, or one section at a time. A calculator is allowed. The number of marks shows how many separate points to make. Look at the bold command term: "state" needs a brief answer, while "explain" needs reasons.

Section A: Recall

10 marks

1 **Outline** two structural differences between a bacterium and a virus. C3.2.1 **[2]**

2 **State** one physical defence and one chemical defence provided by the skin. C3.2.2 **[2]**

3 **State** the type of white blood cell in the innate immune system that engulfs pathogens. C3.2.4 **[1]**

4 **Distinguish** between an antigen and an antibody. C3.2.7 **[2]**

5 **State** what is meant by immunity. C3.2.10 **[1]**

6 **State** two ways in which HIV can be transmitted. C3.2.11 **[2]**

Section B: Understanding

17 marks

7 **Outline** how a blood clot forms once clotting factors have been released. C3.2.3 **[3]**

8 **Describe** how a phagocyte reaches and destroys a bacterium. C3.2.5 **[4]**

9 **Explain** how a B-cell is activated and how the body then produces enough antibody to fight an infection. C3.2.6, 8, 9 **[4]**

10 C3.2.13

a **Explain** why an antibiotic can kill bacteria in a patient without harming the patient's own cells. **[2]**

b **Explain** why antibiotics do not control viral infections. **[1]**

11 **Compare and contrast** the innate and adaptive immune systems. C3.2.4 **[3]**

Innate	Adaptive

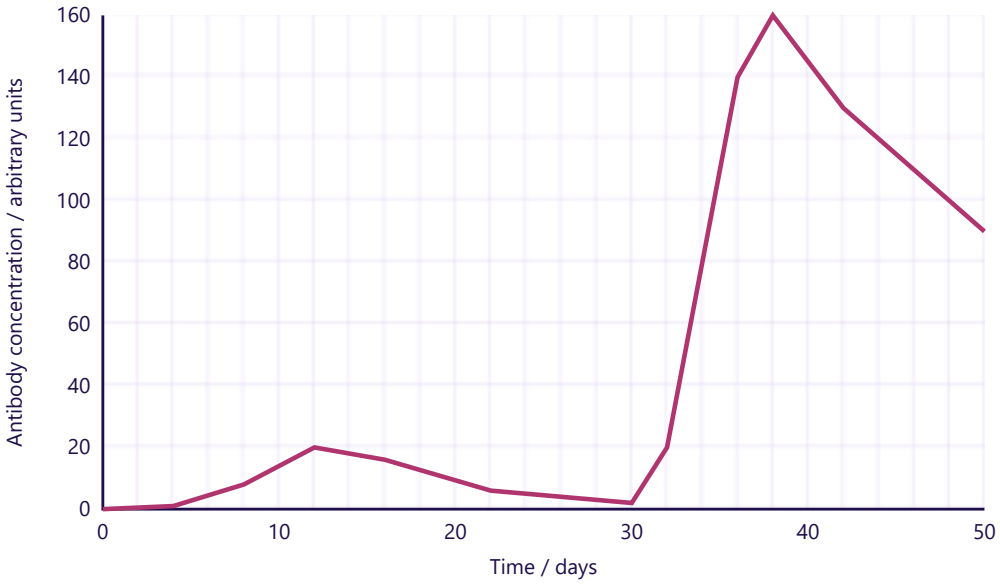
Section C: Working with data

34 marks

All data in this section are invented for practice. The patterns are realistic, but they do not describe real people or places.

12 C3.2.10

A person was exposed to a pathogen on day 0 and to the same pathogen again on day 30. The graph shows the concentration of the specific antibody in their blood.



a **State** the peak antibody concentration after the first exposure. **[1]**

b **State** how many days it took to reach the peak after each exposure. **[1]**

c **Calculate** the percentage change from the first peak to the second peak. **[2]**

d **Explain** the difference between the two responses. **[3]**

13 C3.2.14

A hospital laboratory recorded the percentage of *Staphylococcus aureus* samples that were resistant to one antibiotic.

Year	2010	2012	2014	2016	2018	2020
Resistant samples / %	8	11	16	21	27	30

a **Describe** the trend in the data. **[1]**

b **Calculate** the percentage change in resistant samples from 2010 to 2020. **[2]**

c **Explain** how natural selection could produce this rise. **[4]**

d **Suggest** two actions that could slow this rise. **[2]**

14 C3.2.17

The table shows measles vaccination coverage and measles cases in a fictional country.

Year	2000	2005	2010	2015	2020
Vaccination coverage / %	60	75	88	94	95
Cases per 100 000 people	420	150	35	6	4

a **Describe** the relationship between coverage and cases. **[1]**

b **Calculate** the percentage change in cases from 2000 to 2015. **[2]**

c **Explain** why people who were not vaccinated also became less likely to catch measles. **[2]**

d **Evaluate** the claim that these data prove vaccination caused the fall in cases. **[2]**

15 C3.2.18

The table shows weekly COVID-19 cases per 100 000 people in two fictional countries.

	Start of month	End of month
Country A	300	240
Country B	not given	160

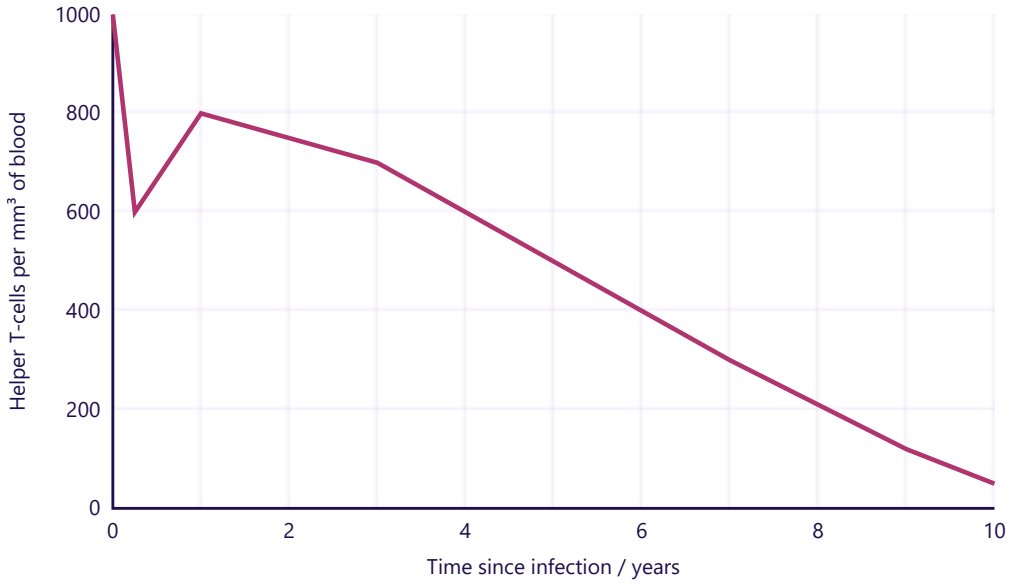
a **Calculate** the percentage change in cases in Country A during the month. **[2]**

b **Calculate** the percentage difference between Countries A and B at the end of the month. **[2]**

c **Suggest** two reasons, other than the spread of the virus, why the reported figures might differ. **[2]**

16 C3.2.12

The graph shows the helper T-cell count of a person with untreated HIV infection.



a **State** the helper T-cell count 5 years after infection. **[1]**

b **Deduce** when the count first falls below 200 cells per mm^3. **[1]**

c **Explain** why this fall makes the person more likely to develop opportunistic infections. **[3]**

Section D: Longer answers

9 marks

17 **Outline** how two named zoonoses reach humans, including the type of pathogen and the animal source of each. C3.2.15 **[4]**

18 **Explain** how a vaccine gives long-term immunity without causing the disease. C3.2.16 **[5]**

Original questions written for What the Cell. Textbook reference: Biology for the IB Diploma (Hodder, 2023), pp. 517–547. Not an official IB resource.