OCR GCSE 21ST CENTURY BIOLOGY B · J257

BIOLOGY



EXAM QUESTION PACK

B2.2 HOW DO ORGANISMS PROTECT THEMSELVES AGAINST PATHOGENS? (HIGHER)

SCORE	PERCENTAGE
/30	%

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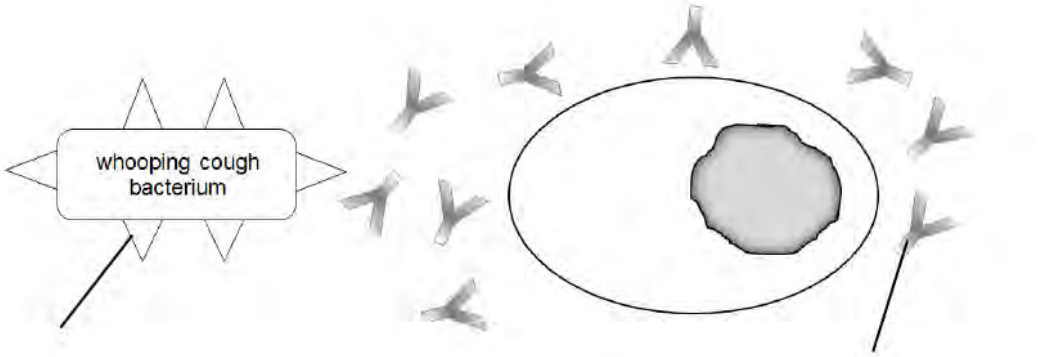
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1. Whooping cough is a non-communicable bacterial infection.

The diagram below shows the blood of a person infected with whooping cough.

Label the two structures in the diagram.



(i) .....

(ii) .....

[2]

(iii) People can be vaccinated against whooping cough.

There are two types of vaccine:
Type 1 uses whole bacterial cells
Type 2 uses parts of bacterial cells.

Some people are concernd about using the Type 1 vaccine with whole bacterial cells.

Suggest why.

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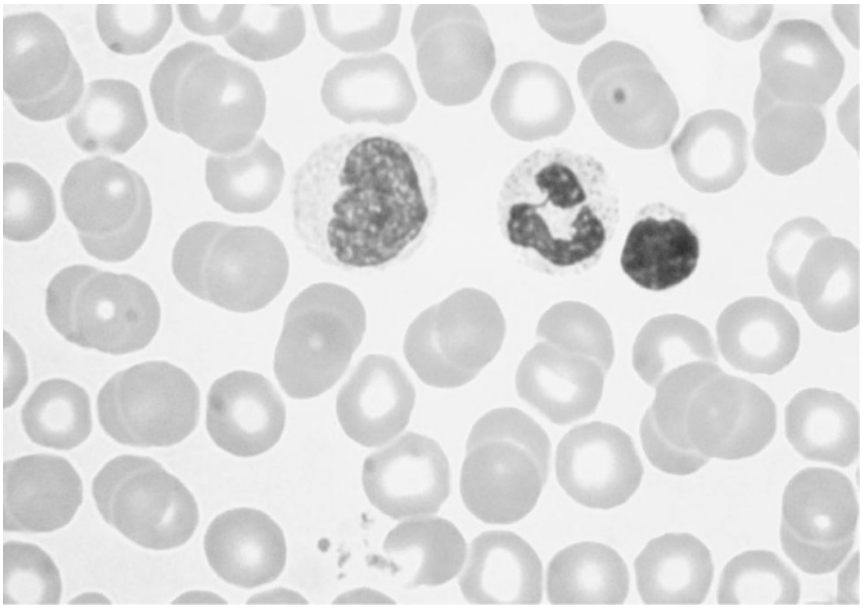
[1]

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2. Blood is made up of cells, plasma and platelets.

The picture below is of blood cells as seen down a microscope.



Draw a labelled scientific drawing of a white blood cell in the space below.

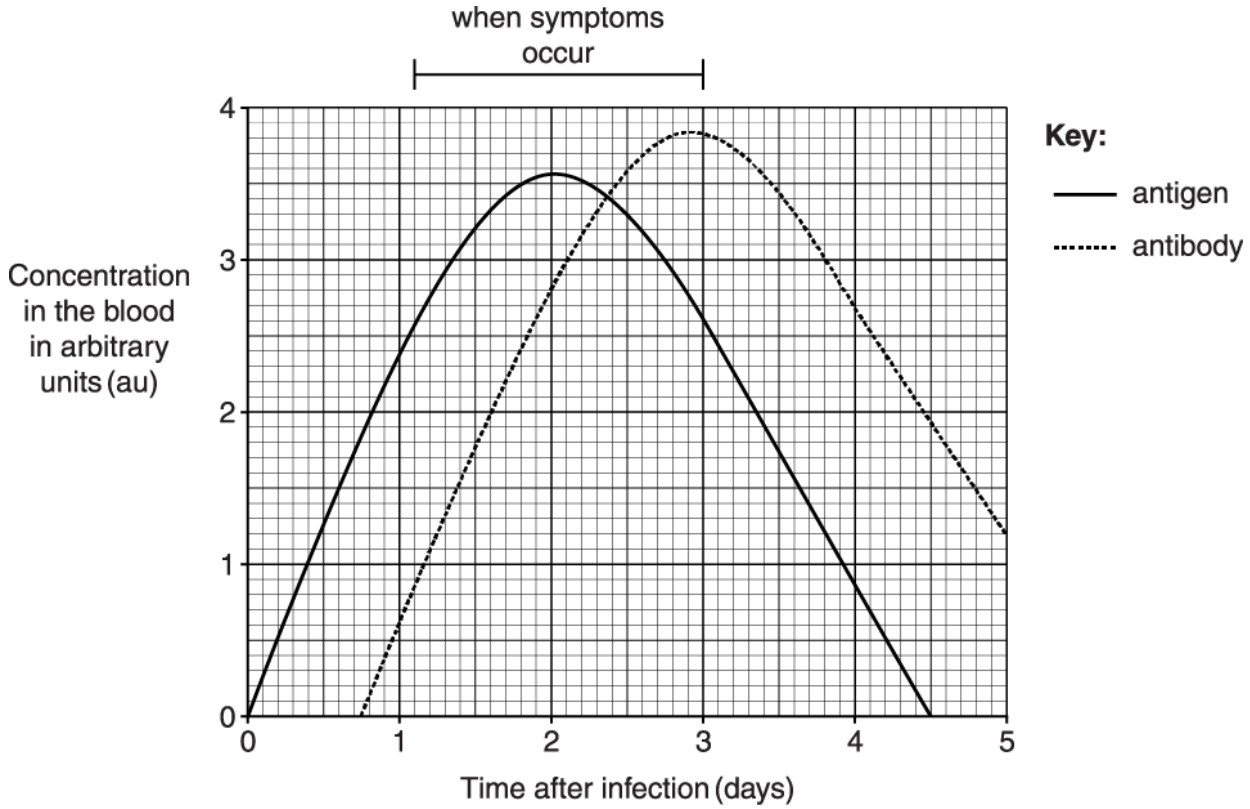
Label the nucleus and cell membrane.

[4]

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3(a). The graph shows data collected from a person infected with a microorganism.



Why does the concentration of **antigen** increase during the first two days after infection?

---

[1]

Use the graph to help you answer the following questions.

(b). For how many days does the infection last?

answer = _____ days **[1]**

(c). Describe the relationship between the concentration of **antigen** and the presence of symptoms.

---

[1]

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(d). What is the minimum concentration of **antibody** required to destroy microorganisms at a faster rate than they are produced?

concentration = _____ au **[1]**

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4(a). Human blood contains four main components.

One of these is red blood cells.

Name and explain the functions of the other **three** main components.

1

2

3

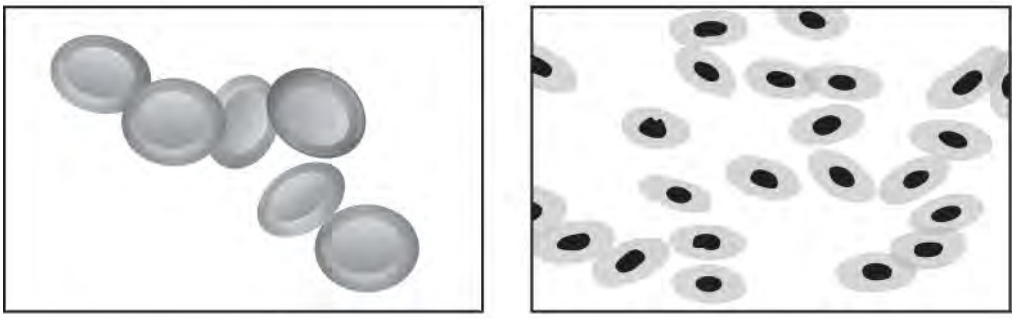
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[3]

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(b). Look at the diagrams.

show human red blood cells and frog red blood cells.



Human red blood cells

Frog red blood cells

Human red blood cells are better adapted to the job that they do than frog red blood cells.

Use the diagrams to suggest how.

--- [2]

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5. Blood consists of many different components.

The table shows the normal level of three different blood components.
It also shows the level in three different people, **A**, **B** and **C**.

	Red blood cell haemoglobin g per 100 cm^3	White blood cells per mm^3	Platelets per mm^3
normal level	15	8500	250 000
person **A**	15	3000	255 000
person **B**	9	9000	245 000
person **C**	15	8000	130 000

What is the consequence of this data for the health of each person?

Explain your answer.

person **A** _____

person **B** _____

person **C** _____

[3]

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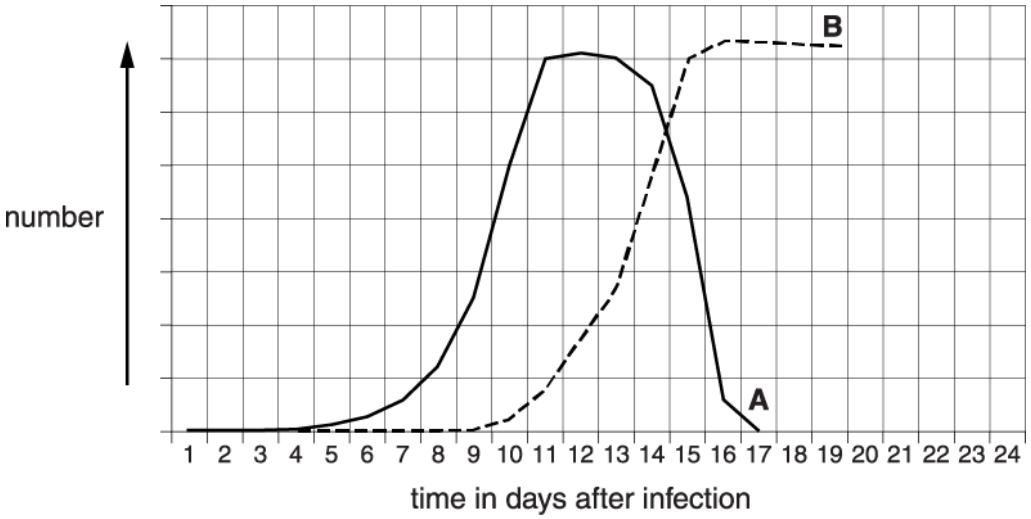
6(a). When harmful bacteria entered Jake's body, he responded by producing antibodies to destroy these bacteria.

Jake had not come into contact with this type of bacteria before.

The graph shows the number of bacteria and antibodies in Jake's blood over a twenty-four-day period.

One line shows the number of bacteria.

The other line shows the number of antibodies.



Which line, **A** or **B**, shows the number of bacteria?

Explain your answer.

--- [1]

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(b). Jake's white blood cells are used to destroy the invading bacteria.

How can Jake's white blood cells do this?

Put ticks (✓) in the boxes next to the correct answers.

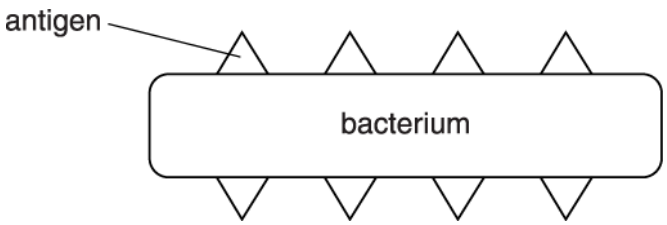
engulf the bacteria	☐
stop the bacteria entering the body	☐
cause the bacteria to mutate	☐
cause the bacteria to reproduce	☐
digest the bacteria	☐
produce antibodies against the bacteria	☐

[2]

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(c). The diagram shows one of the bacteria that entered Jake's body.



In the space below, draw a diagram of an antibody that Jake would produce to destroy the bacteria.

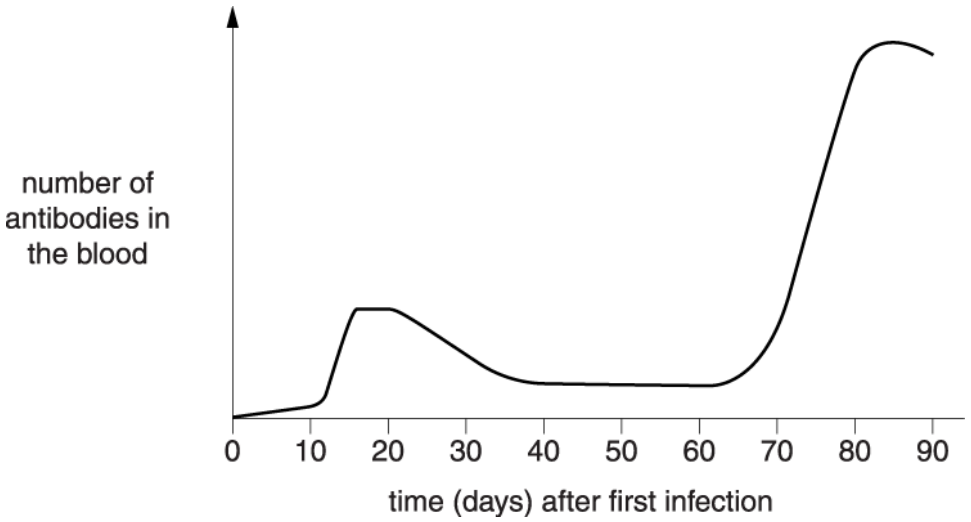
Explain your answer.

[2]

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(d). Sometime later, Jake gets a second infection of the same bacteria.

The graph shows the level of antibodies in Jake's blood.



(i) How many days after the first infection did Jake get the second infection?

_____ days **[1]**

(ii) Name the type of cell that enables a much stronger response to the second infection.

_____ **[1]**

(iii) A student looked at Jake's graph.

He made these conclusions.

After the first infection, Jake was immune to the harmful bacteria. The doctor gave Jake some antibiotics on day 83.

Evaluate the conclusions made by the student and explain the reasons for your judgement.

_____

_____

_____

_____ **[2]**

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7. Plants can be infected by communicable diseases, so they need to protect themselves against pathogens.

Describe **one** chemical defence and **one** physical defence that plants have against pathogens.

Chemical defence _____

Physical defence _____

[2]

END OF QUESTION PAPER

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