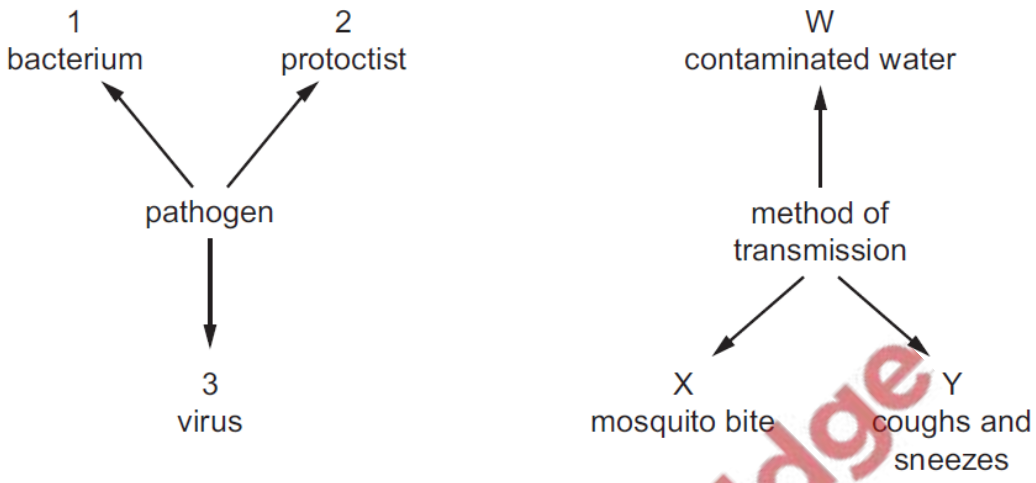
Infectious diseases – AS 9700 June 2022

1. June/2023/Paper_9700/11/No.36

The diagram shows some of the pathogens that cause disease in humans and some of the ways they are transmitted.



What is the correct pathogen and method of transmission for malaria?

A 1 and X **B** 2 and W **C** 2 and X **D** 3 and Y

2. June/2023/Paper_9700/11/No.37

Some of the processes which result in the formation of a population of bacteria that are resistant to a new antibiotic are listed.

1 change in reproductive success of bacteria

2 increase in frequency of the resistance allele in the population

3 increase in genetic variation within the population

4 random mutation occurs in bacterial DNA

What is the correct order of these processes?

A $1 \rightarrow 3 \rightarrow 2 \rightarrow 4$

B $2 \rightarrow 1 \rightarrow 3 \rightarrow 4$

C $3 \rightarrow 4 \rightarrow 1 \rightarrow 2$

D $4 \rightarrow 3 \rightarrow 1 \rightarrow 2$

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3. June/2023/Paper_9700/12/No.38

The statements refer to the disease tuberculosis (TB).

1 The pathogen is **not** accessible to the immune system.

2 The bacterial pathogen reproduces slowly.

3 The pathogen is **not** very sensitive to antibiotics.

Which statements explain why antibiotic treatment for TB takes a long time?

A 1, 2 and 3 **B** 1 and 2 only **C** 1 only **D** 2 and 3 only

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4. June/2023/Paper_9700/12/No.39

The average sizes of some pathogens are shown.

pathogen	average size / nm
HIV particle	100
Mycobacterium tuberculosis	3 000
Plasmodium	20 000
Vibrio cholerae	1 500

One type of air filter has been shown to be effective at preventing any pathogens of 1 μm or larger from entering the air system of a room.

Based on their size **and** mode of transmission, which diseases would the air filter prevent from entering the air system of a room?

	HIV infection	TB	malaria	cholera
A	✗	✓	✓	✓
B	✗	✗	✓	✓
C	✓	✗	✗	✗
D	✗	✓	✗	✗

key

✓ = prevented

✗ = not prevented

5. June/2023/Paper_9700/13/No.39

A student wrote four statements about cholera.

Which statement is **not** correct?

A It can be controlled by vaccination.

B It is caused by bacteria spread by ingestion.

C HIV/AIDS increases the risk of infection.

D It may be transmitted by animal vectors.

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6. *Trypanosoma brucei* is a unicellular organism that causes the infectious disease known as sleeping sickness. Insects known as tsetse flies pass on the organism from infected people to uninfected people when male and female tsetse flies feed on human blood.

(a) Fig. 4.1 is a transmission electron micrograph of the form of *T. brucei* found in human blood.

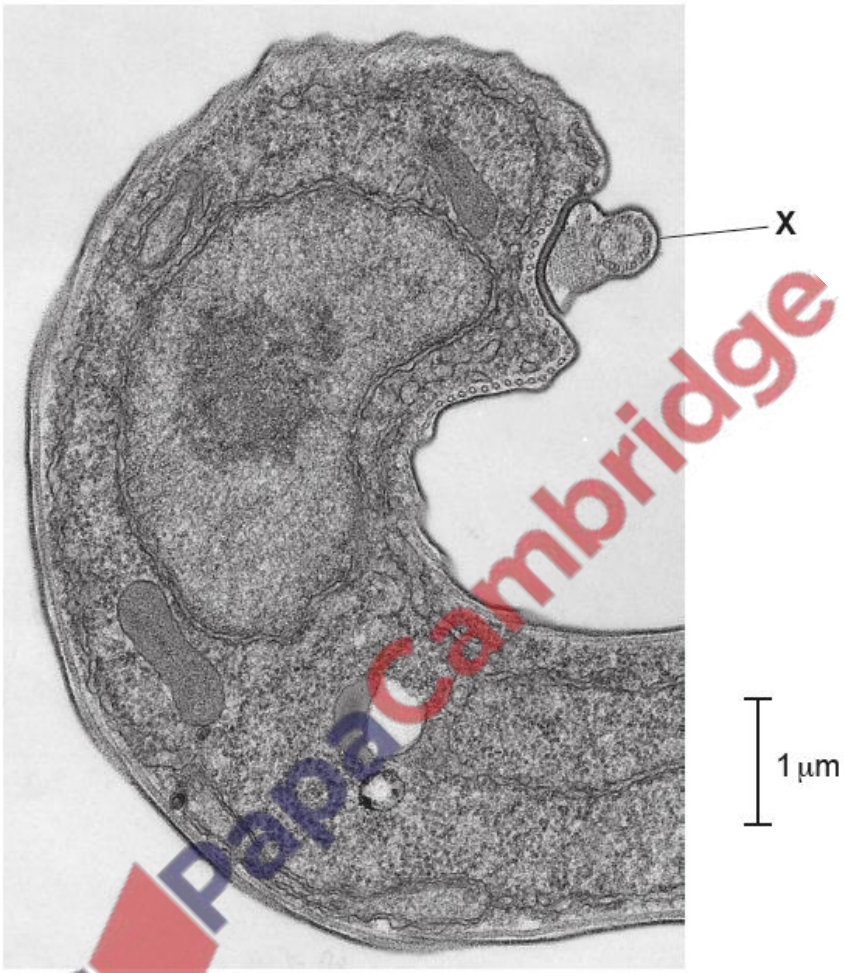

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Fig. 4.1

(i) Draw an arrow on Fig. 4.1 to indicate the location in the cell where ribosomal RNA (rRNA) and proteins are assembled to make ribosomal subunits. [1]

(ii) With reference to Fig. 4.1, explain how the structure labelled **X** provides evidence that *T. brucei* is motile (able to move).

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..... [2]

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(iii) With reference to Fig. 4.1, explain whether *T. brucei* is a eukaryote or prokaryote.

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..... [3]

(b) Malaria is an infectious disease caused by organisms belonging to the genus *Plasmodium*.

(i) State the term used to describe an organism that causes disease.

..... [1]

(ii) Name **one** of the species of *Plasmodium* that causes malaria.

Plasmodium ..... [1]

(c) Outline the similarities **and** differences between the modes of transmission of malaria and sleeping sickness.

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..... [3]

[Total: 11]

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7. June2023/Paper_9700/23/No.2

The number of cases of tuberculosis (TB) is affected by many biological, social and economic factors.

(a) The number of reported cases of TB in the USA between 1980 and 2000 is shown in Fig. 2.1.

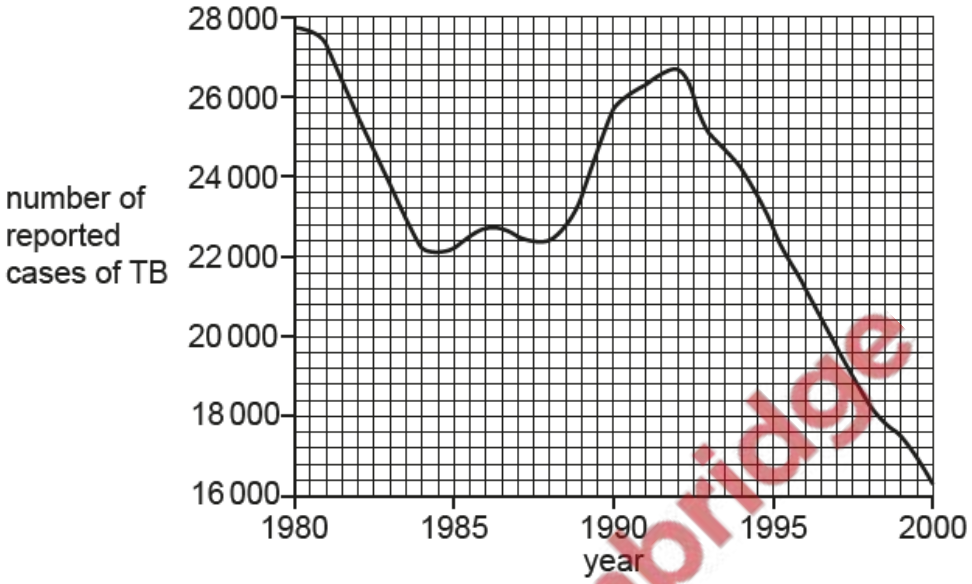

Fig. 2.1

(i) Describe the trends shown in Fig. 2.1 between 1980 and 2000.

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..... [3]

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(ii) The number of reported cases of TB between 1984 and 1992 in the USA may have been affected by an increase in the number of people infected with HIV.

Explain how an increase in the number of people infected with HIV could have affected the number of TB cases.

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..... [2]

(b) *Mycobacterium tuberculosis* is a species of bacterium that causes TB. Strains of *M. tuberculosis* have evolved resistance to some of the antibiotics used to treat the disease.

State **two** ways that the impact of antibiotic resistance can be reduced.

1 .....

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2 .....

.....

[2]

(c) TB can affect every part of the human gas exchange system, including the trachea, bronchi and alveoli.

(i) The cartilage in the bronchi can be damaged in some people with TB.

Suggest the effect that damage to cartilage may have on the bronchi.

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..... [1]

(ii) Table 2.1 shows four types of cell and three structures found in the gas exchange system.

Complete Table 2.1 to show the distribution of cell types in each structure of the gas exchange system.

Use a tick (✓) if the cell type is present in the structure and a cross (✗) if the cell type is **not** present.

Put a tick (✓) or a cross (✗) in every box.

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Table 2.1

cell type	alveolus	bronchus	trachea
ciliated epithelial cell			
goblet cell			
smooth muscle cell			
squamous epithelial cell			

[3]

[Total: 11]

8. March/2023/Paper_9700/12/No.37

What defines infectious diseases?

A Symptoms are caused by a bacterium that passes from contaminated air, soil or water to a host.

B Symptoms are caused by a pathogen that is transmitted from one host to another.

C Symptoms are caused by a microorganism that is carried by a vector.

D Symptoms are caused by a virus that mutates to infect a new species.

9. March/2023/Paper_9700/12/No.38

A hurricane destroys a large town on an island. People move away from the town and set up tents, where sanitation is poor.

Which disease is most likely to spread within a week of the change in living conditions?

A cholera

B HIV

C malaria

D TB

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10. March/2023/Paper_9700/22/No.4

Tuberculosis (TB), influenza and polio are examples of infectious diseases.

(a) **(i)** Explain what is meant by an infectious disease.

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..... [2]

(ii) Name a species of organism that causes TB.

..... [1]

(b) Immunity can be described as artificial or natural **and** passive or active.

Name the type of immunity that a mother gives to her baby through breast milk.

..... [1]

(c) The influenza virus can mutate frequently to produce different strains of the virus. A new vaccine is often necessary to stimulate the production of new antibodies to these new strains.

Explain why different antibodies need to be produced to give immunity to these new strains.

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..... [3]

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(d) Polio is a serious viral disease affecting young children. In 1996, polio caused paralysis in more than 75 000 children across Africa. A long-term vaccination programme allowed the World Health Organization (WHO) to declare that Africa was largely free of polio in 2020.

(i) Explain how vaccination programmes can help to control the spread of infectious diseases, such as polio.

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..... [3]

(ii) Antibiotics, such as penicillin, do **not** help to prevent the spread of viral diseases, such as polio.

Explain why penicillin is **not** effective against viruses.

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..... [1]

[Total: 11]

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