

1. (a) Tuberculosis is caused by the bacterium, *Mycobacterium tuberculosis*. Describe how *Mycobacterium tuberculosis* enters the human body.

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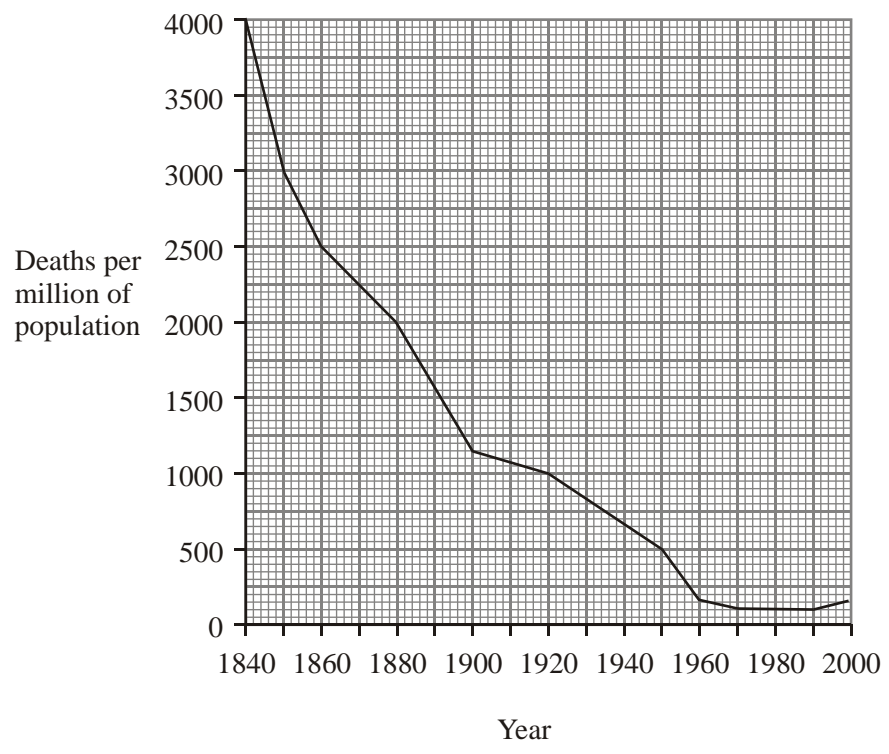
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(2)

The graph shows the death rate from tuberculosis in England and Wales.

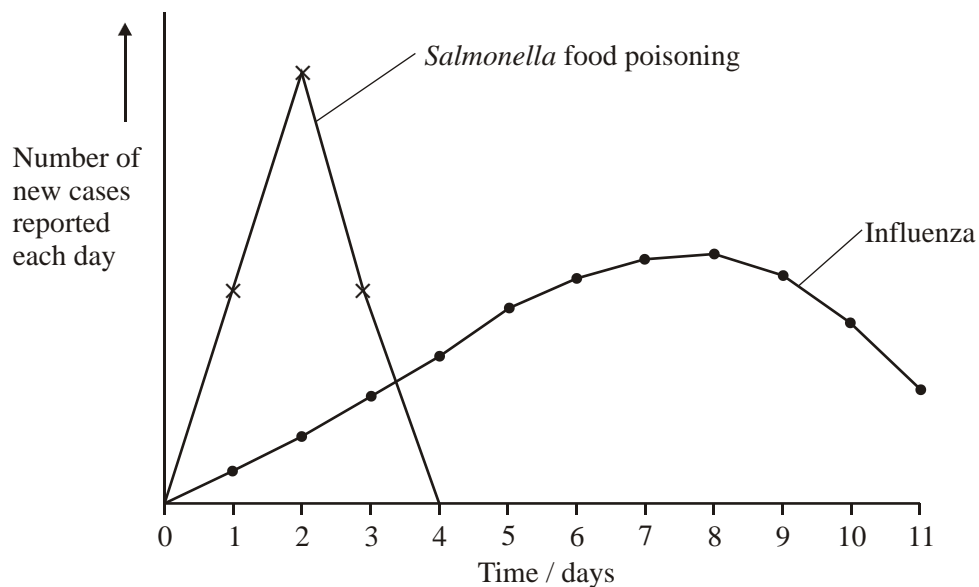


- (b) The population of England and Wales in 1860 was 20 066 000. Calculate the number of people who died of tuberculosis that year. Show your working.

Answer

(2)
(Total 4 marks)

2. (a) The graph shows the number of new cases of two diseases which occurred in two different human populations.



Explain the shape of the curve for

(i) *Salmonella* food poisoning;

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(ii) influenza.

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(2)

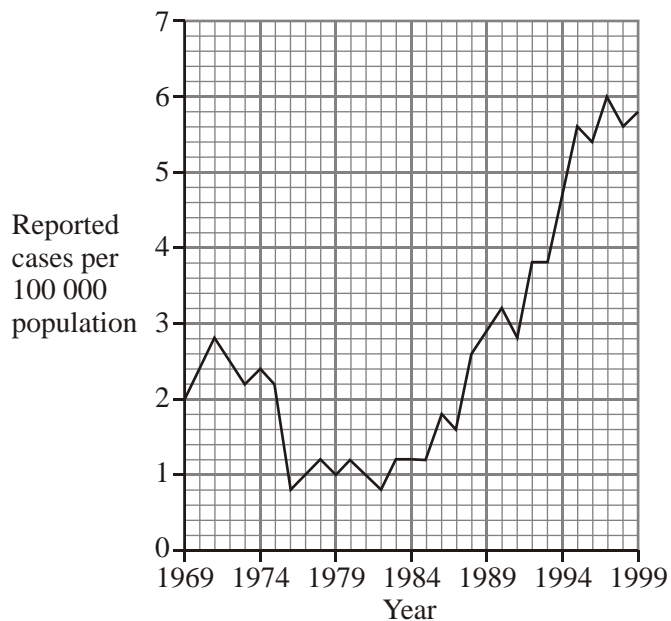
(b) Individuals with food poisoning often suffer from diarrhoea. Explain how the effects of diarrhoea on the body can be treated.

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(2)

(Total 4 marks)

3. (a) Whooping cough is a childhood respiratory disease caused by a bacterium. The graph shows the incidence of whooping cough in Central Europe from 1969 to 1999.



- (i) Calculate the percentage change in the incidence of whooping cough from 1982 to 1999. Show your working.

Answer

(2)

- (ii) Suggest **one** reason for the trend in the number of cases of whooping cough since 1982.

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(1)

- (b) Whooping cough bacteria prevent the normal functioning of cilia in the respiratory tract. Explain how this effect is linked to the persistent coughing associated with the disease.

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(2)
(Total 5 marks)

4. The table shows the results of some blood tests carried out on a patient admitted to hospital suffering from a suspected myocardial infarction (heart attack).

Substance	Concentration in patient's blood/arbitrary units	Range of concentration in blood of healthy individuals/arbitrary units
Urea	5.7	2.5–6.7
Cholesterol	8.2	3.6–6.7
Lactate dehydrogenase enzyme	2263	300 – 600
Potassium	4.3	3.4 – 5.2

- (a) A myocardial infarction results in damage to the muscle of the heart.
(i) Explain how a blood clot may cause damage to the muscle of the heart.

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(2)

(ii) Lactate dehydrogenase is an enzyme found inside healthy heart muscle cells. Suggest why the concentration of this enzyme in the blood can be used to confirm that this patient had suffered a myocardial infarction.

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(2)

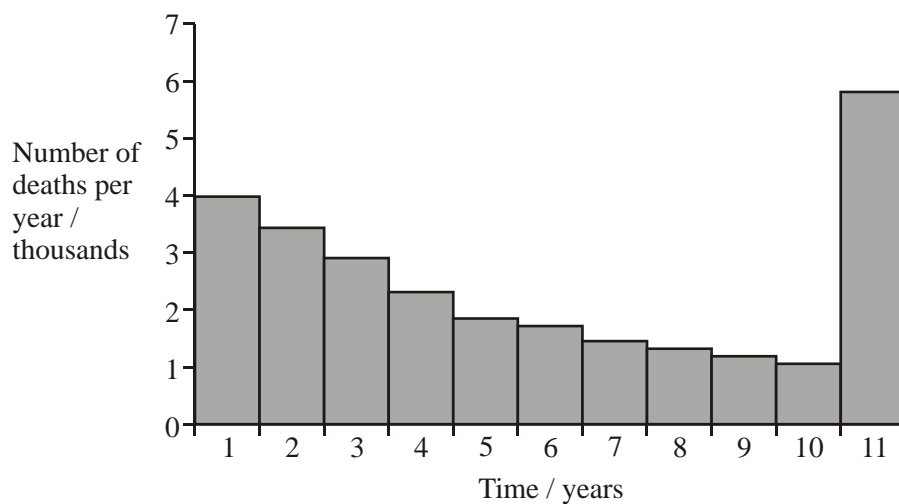
(b) Use the table to explain what is meant by a *risk factor*.

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(2)

(Total 6 marks)

5. (a) The graph shows the number of deaths from influenza per year in a developed country.



- (i) Suggest an explanation for the change in the number of deaths from influenza during the first 10 years.

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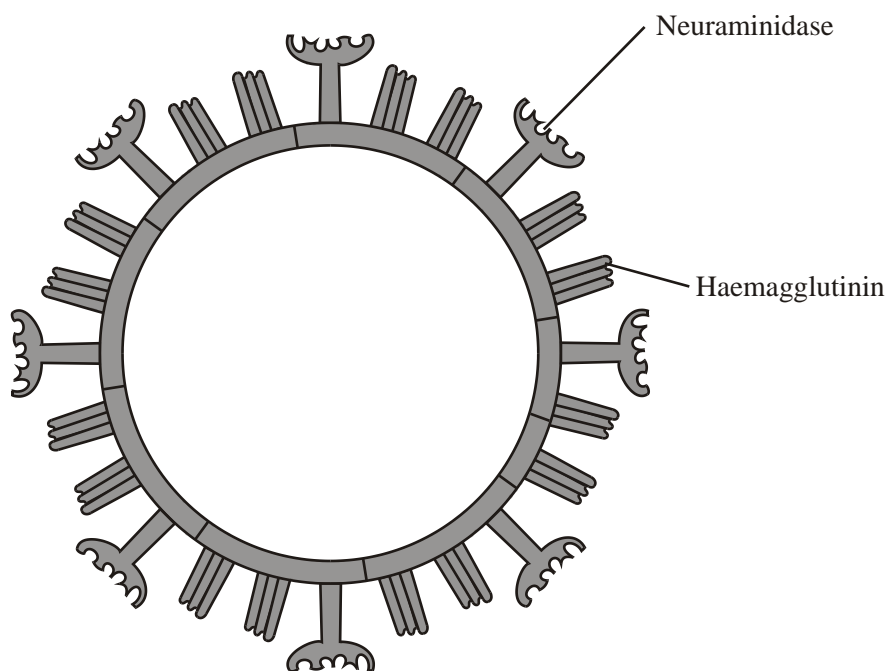
(1)

- (ii) Suggest an explanation for the large increase in the number of deaths from influenza in year 11.

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(2)

- (b) The diagram shows some of the structures on the outside of an influenza virus.



Haemagglutinin and neuraminidase are protein molecules. Haemagglutinin binds to receptor molecules on the surface of epithelial cells in the breathing system. Neuraminidase is an enzyme which breaks down molecules in the surface membrane of epithelial cells and allows the viruses to be released from the cells.

(i) Describe how T lymphocytes recognise and respond to the influenza virus.
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(2)

(ii) Describe how B lymphocytes respond to the influenza virus.
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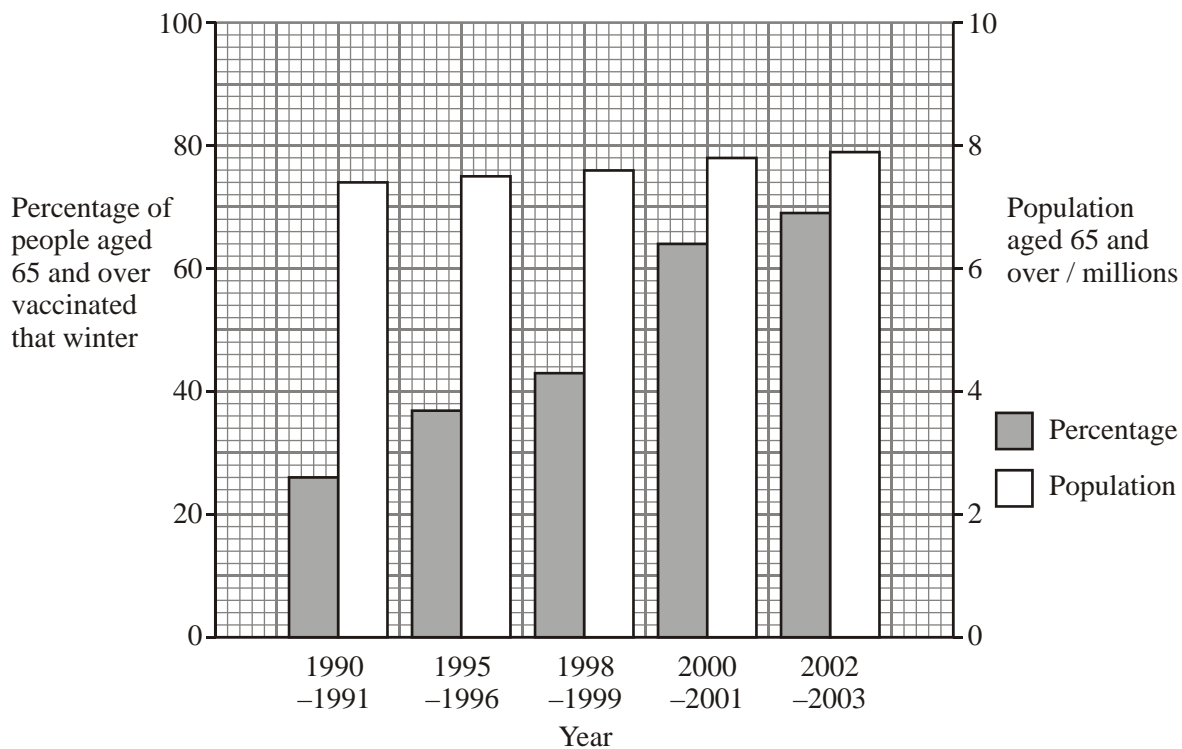
(2)

(c) New drugs have recently become available for treating influenza. One type is a neuraminidase inhibitor. Explain how this type of drug would act as a treatment for influenza.
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(2)

(Total 9 marks)

6. People considered 'at risk' are offered a vaccination against influenza each year. The bar chart shows the number of people in the UK population aged 65 and over and the percentage of those who were vaccinated against influenza each winter.



- (a) Suggest **one** reason to explain the change in the percentage of people aged 65 and over being vaccinated.

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(1)

- (b) (i) Calculate the change in the total number of people aged 65 and over being vaccinated between 1990/91 and 2000/01. Show your working.

Answer

(2)

(ii) A student suggested that some people aged 65 and over were being vaccinated every year. Explain how the information in the bar chart supports this suggestion.

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(2)

(iii) Suggest why it is advisable for people to be vaccinated against influenza every year.

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(2)

(c) An influenza virus consists of a protein coat surrounding nucleic acid. The influenza vaccine consists only of the protein coat of the virus. Explain how the influenza vaccine produces immunity in the body.

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(2)

(Total 9 marks)