



1.

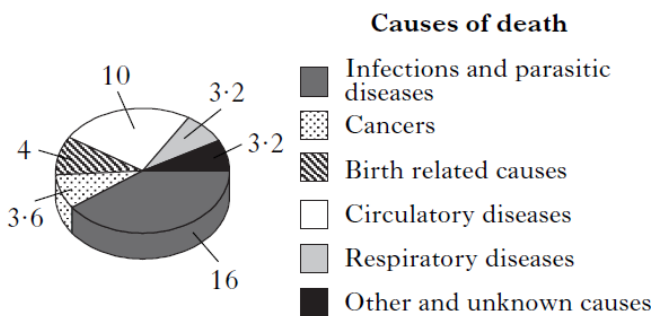
The table below contains information about the populations of four countries in the year 2000.

In which country did the population decrease?

Country	Number per 1000 inhabitants			
	Births	Deaths	Immigrants	Emigrants
A	9.3	10.1	1.0	0.1
B	9.7	10.3	1.3	0.4
C	10.1	9.9	0.2	0.5
D	10.8	10.5	0.1	0.3

2.

The diagram below shows the number of people dying from different causes in a developing country. (Figures are in millions.)



What percentage of deaths is due to birth related causes?

- A 4%
- B 8%
- C 10%
- D 11%

3. The table below contains information about the number of cases of influenza in a city over five years.

Year	Influenza cases in January	Influenza cases in July
2001	580	120
2002	620	345
2003	1200	350
2004	120	145
2005	400	100

3 Which of the following conclusions can be drawn from the data in the table?

- A There are always more cases of influenza in January than in July.
- B The number of cases of influenza decreased by 75% between January and July of 2005.
- C The greatest percentage decrease in influenza cases occurred between January and July of 2003.
- D The greatest percentage increase in influenza cases occurred between July

4.

The table below contains information about the number of cases of influenza in a city over five years.

Year	Influenza cases in January	Influenza cases in July
2001	580	120
2002	620	345
2003	1200	350
2004	120	145
2005	400	100

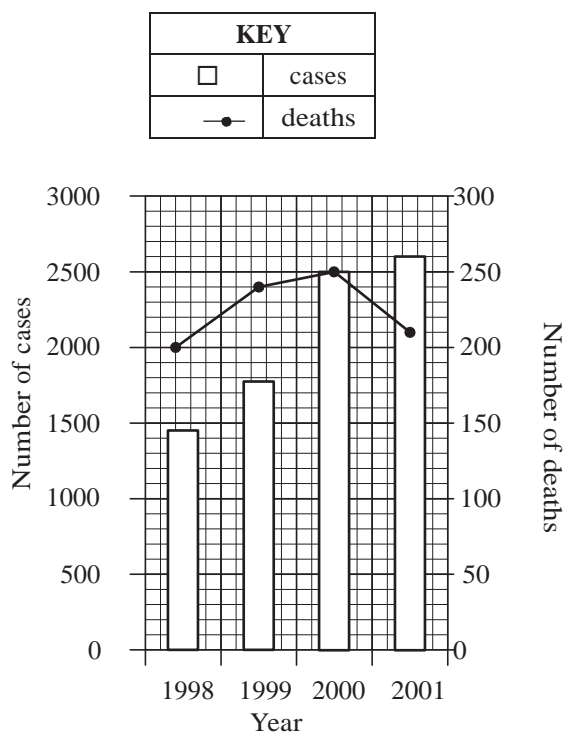
Which of the following conclusions can be drawn from the data in the table?

- A There are always more cases of influenza in January than in July.
- B The number of cases of influenza decreased by 75% between January and July of 2005.
- C The greatest percentage decrease in influenza cases occurred between January and July of 2003.
- D The greatest percentage increase in influenza cases occurred between July 2002 and January 2003.

5. Which line in the table below classifies correctly the terms which describe the spread of infectious diseases?

	<i>Regular cases in an area</i>	<i>Occasional cases in an area</i>	<i>High number of cases in an area</i>	<i>Cases occur in many countries</i>
A	Endemic	Sporadic	Epidemic	Pandemic
B	Epidemic	Sporadic	Pandemic	Epidemic
C	Endemic	Epidemic	Sporadic	Pandemic
D	Pandemic	Endemic	Epidemic	Sporadic

6. The graph below shows the number of cases of meningitis and deaths due to meningitis in the UK from 1998 to 2001.



In which year was the number of deaths from meningitis less than 10% of the number of cases?

- A 1998
- B 1999
- C 2000
- D 2001

7. In a clinical trial of a vaccine, researchers placed volunteers into two groups.

Each group contained individuals of matched ages.

The researchers then gave group A an injection of the vaccine and group B an injection of a dilute sugar solution.

Which of the following protocols was used in this trial?

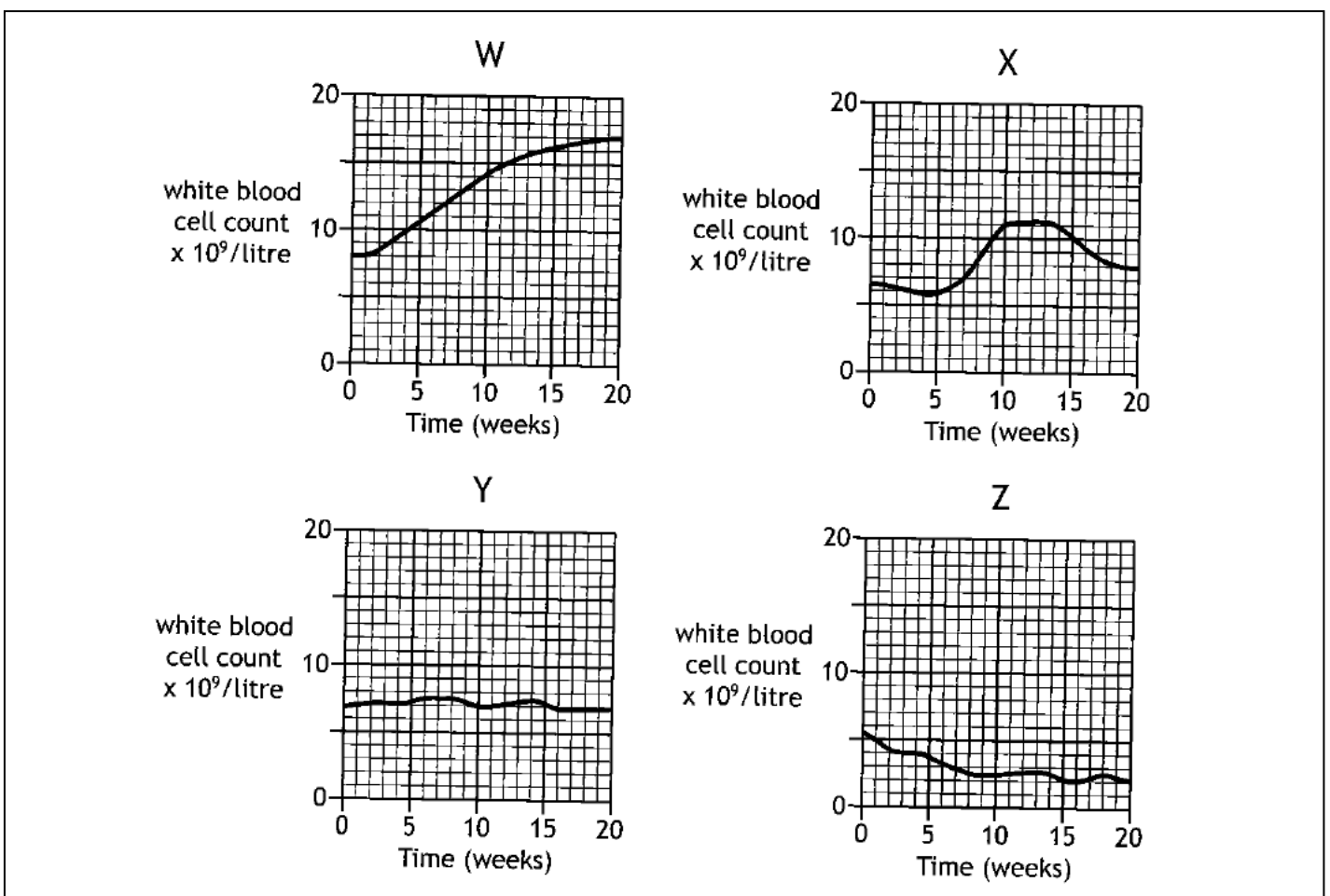
- A Placebo controls
- B Pedigree analysis
- C Double blind design
- D Randomised allocation

## Section B

1. Blood tests to measure the number of white blood cells (leucocytes) are often used to indicate infection and/or illness.

- Leucopenia, due to starvation or malnutrition, is indicated by white blood cell numbers dropping below  $4 \times 10^9$  /litre.
- Leucocytosis, due to fever or tissue damage, is indicated by white blood cell numbers temporarily increasing to  $11 \times 10^9$  /litre.
- Leukaemia, due to DNA damage and cell division, is indicated by white blood cell numbers permanently increasing.

The following graphs show the white blood cell count of four patients over 20 weeks.



From the graphs, identify the patients.

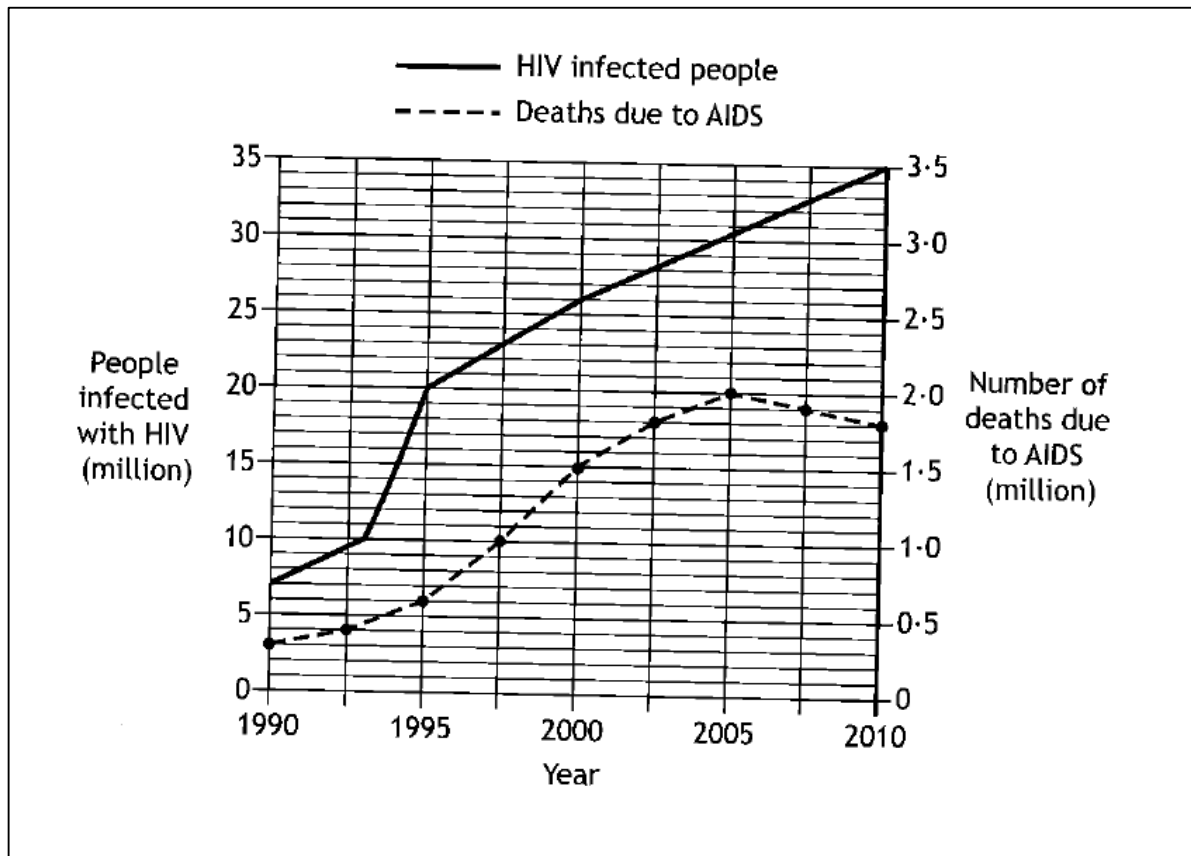
	<i>Leukaemia</i>	<i>Leucocytosis</i>	<i>Leucopenia</i>
A	y	X	z
B	z	w	y
c	w	X	z
D	w	y	X

2. HIV is a virus which invades the cells of the immune system.

People infected with HIV may not show symptoms for many years.

AIDS is the condition which may develop from HIV infection, resulting in death.

The graph below shows the number of people in the world infected with HIV, from 1990 to 2010. It also shows the number of people who died from AIDS during this period.



(a) State how many people were infected with HIV in the year 2000.

1

- (b) State how many people died from AIDS when 20 million people in the world were infected with HIV. 1

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- (c) Calculate the percentage of HIV-infected people who died from AIDS in 2010. 1

*Space for calculation*

- (d) Describe the evidence from the graph which suggests that the rate of people becoming infected with HIV was greatest between 1993 and 1995.

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3. A scientist investigated the effectiveness of four different types of influenza vaccine.

- A total of 2000 volunteers from a Scottish community were divided into four groups.
- Each group was injected with a different vaccine.
- The number who developed influenza during the following years was recorded.

The results are shown in the table below.

<i>Type of influenza vaccine</i>	<i>Developed influenza</i>	<i>Did not develop influenza</i>	<i>Total</i>
p	35	495	530
Q	25	455	480
R	24	496	520
S	17		

- a) (i) Suggest **one** way in which the scientist could minimise variation between the four groups of volunteers. 1

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- (ii) **Complete the table** for the volunteers who received type S vaccine.

**1**

- (iii) State which of the vaccines P, Q or R was most effective in this investigation. 1

\_\_\_\_\_

- (b) Explain why vaccines usually contain an adjuvant. 1

\_\_\_\_\_  
\_\_\_\_\_

- (c) In 1918 fifty million people died in a global outbreak of influenza. State the term used to describe such an outbreak. 1

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4. The Ebola virus is an aggressive pathogen that causes hemorrhagic fever. The virus enters the body through mucous membranes and broken skin. Ebola initially targets the immune system by attacking white blood cells resulting in cell death and circulatory shock.

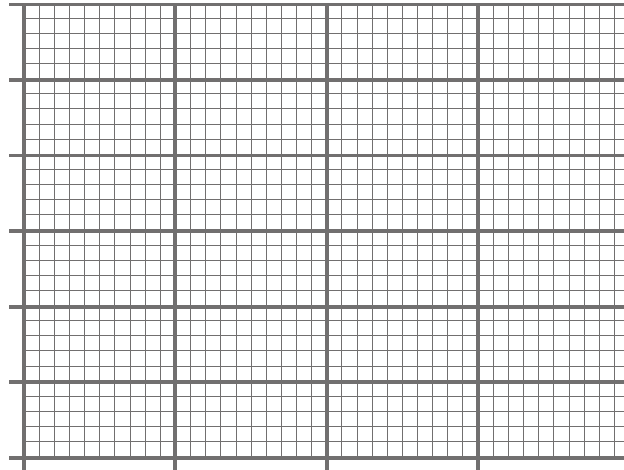
- a) The following information relates to the number of probable, suspected and confirmed cases of Ebola as of October 2014.

Country	Number of cases	Number of deaths	Percentage deaths (%)
Guinea	1298	768	59
Liberia	3924		54
Sierra Leone	2789	879	32
Nigeria	20	8	40

- (i) Complete the table by calculating the number of deaths from Ebola in Liberia.

Space for calculation

- (ii) Construct a bar graph using the data in the table to illustrate the percentage of deaths from Ebola in 2014.



2

- (b) The fatality rate of Ebola changes each time there is an outbreak. The fatality rate in 2003 was 90%. The fatality rate of the 2014 outbreak so far is 55%. Express as a simple whole number ratio the percentage fatality rate in 2003 and 2014.

Space for calculation

\_\_\_\_\_ : \_\_\_\_\_ 1

5. Typhoid fever is a bacterial infection that can spread throughout the body, affecting many organs. Serious complications can occur if not treated quickly and it is often fatal. An infected person passes the bacteria out of their body in faeces and urine.

(a) (i) Describe what can be done by the community and the individual to control transmission of the pathogen to others.

Community \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

1

Individual \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

1

(ii) State one other way that infectious disease can be transmitted.

\_\_\_\_\_

1

(b) Bacteria can be found in a variety of different shapes and sizes. Spirochaeta plicadillia is one of the largest bacteria with a length of .25 millimeters(mm).



Express this length in millimeters ( $\mu\text{m}$ ).

Space for calculation

\_\_\_\_\_  $\mu\text{m}$

1



6. Trials are carried out on vaccinations to evaluate their safety before being given to patients.

(a) (i) Describe what is meant by a double blind trial.

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(ii) How do researchers increase the statistical significance of the results in such a trial.

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(b) Pathogens are often mixed with an adjuvant when making a vaccine. Explain why an adjuvant is used.

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(c) The organisms which cause influenza have evolved mechanisms that evade the specific immune system which means vaccines have to be given every year.

Explain why these organisms are able to evade the specific immune system on re-infection.

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## Essay

Give an account of infectious diseases under the following headings:

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|---|-------------|
| (i) the classification of the spread of diseases; | 3           |
| (ii) the transmission of disease;                 | 3           |
| (iii) the control of disease transmission.        | 4           |
|   | <b>(10)</b> |