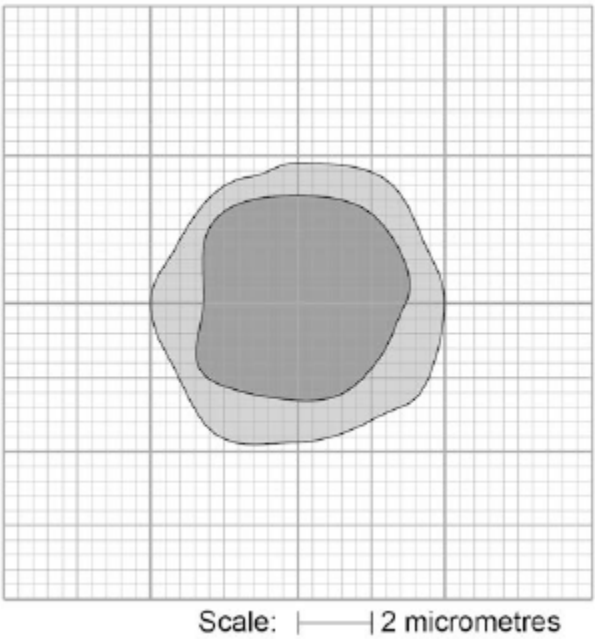
1 The figure below shows a scale drawing of one type of cell in blood.



(a) Use the scale to determine the width of the cell.

Give your answer to the nearest micrometre.

.....

.....

Width of cell = ... micrometres

(1)

(b) Complete the table below.

Part of the blood	Function
	Carries oxygen around the body
	Protects the body against infection
Plasma	

(3)

(c) Platelets are fragments of cells.

Platelets help the blood to clot.

Suggest what might happen if the blood did **not** clot.

.....

.....

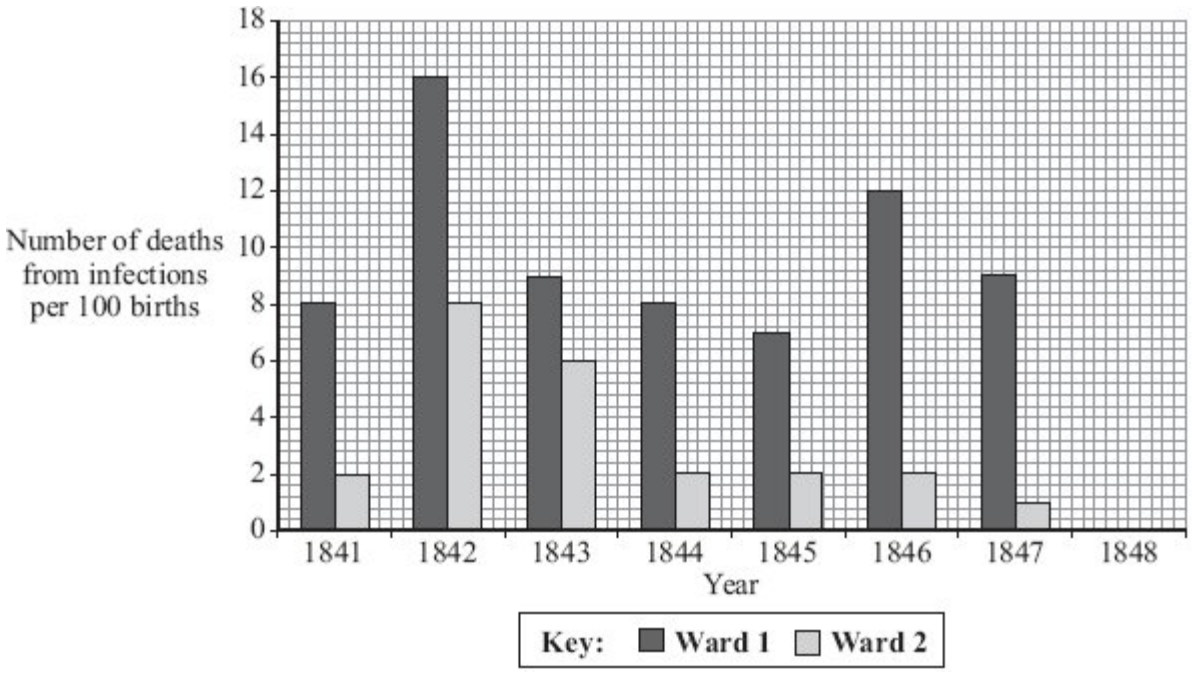
(1)
(Total 5 marks)

2 In the 19th century, Dr Semmelweiss investigated infection in a hospital.

He compared the number of deaths of mothers on two maternity wards.

- On **Ward 1**, babies were delivered mainly by doctors. These doctors worked on many different wards in the hospital.
- On **Ward 2**, babies were delivered by midwives. The midwives did **not** work on other wards.

The bar chart shows the results of his investigations.



(a) (i) 600 mothers gave birth on **Ward 2** in 1845.

How many mothers died from infections on **Ward 2** in 1845?

Show clearly how you work out your answer.

.....

.....

Number of mothers who died .....

(2)

(ii) Which was the safer ward on which to have a baby?

Draw a ring around your answer. **Ward 1** / **Ward 2**.

Using data from the bar chart, give a reason for your answer.

.....

.....

(1)

(b) In January 1848, Dr Semmelweiss asked all doctors to wash their hands before delivering babies.

The table shows the number of deaths on the two wards in 1848.

Ward	**Number of deaths from infections per 100 births**
Ward 1	3
Ward 2	1

(i) Plot this data on the bar chart above.

(1)

(ii) What was the effect on the death rate on **Ward 1** of doctors washing their hands before delivering babies?

.....

.....

(1)

(iii) Suggest an explanation for this effect.

.....

.....

(1)
(Total 6 marks)

3 Pathogens cause infectious diseases in animals and plants.

(a) Draw **one** line from each disease to the type of pathogen that causes the disease.

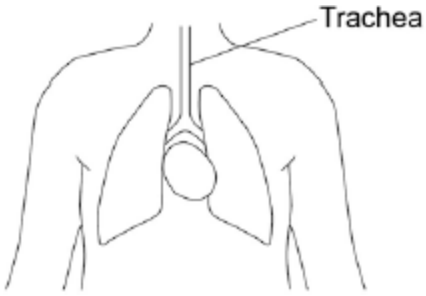
Disease	**Type of pathogen**
Gonorrhoea	Bacterium
Malaria	Fungus
Measles	Protist
	Virus

(3)

(b) Some parts of the human body have adaptations to reduce the entry of live pathogens.

Look at **Figure 1**.

Figure 1



Explain how the trachea is adapted to reduce the entry of live pathogens.

.....

.....

.....

.....

.....

.....

.....

.....

.....

(4)

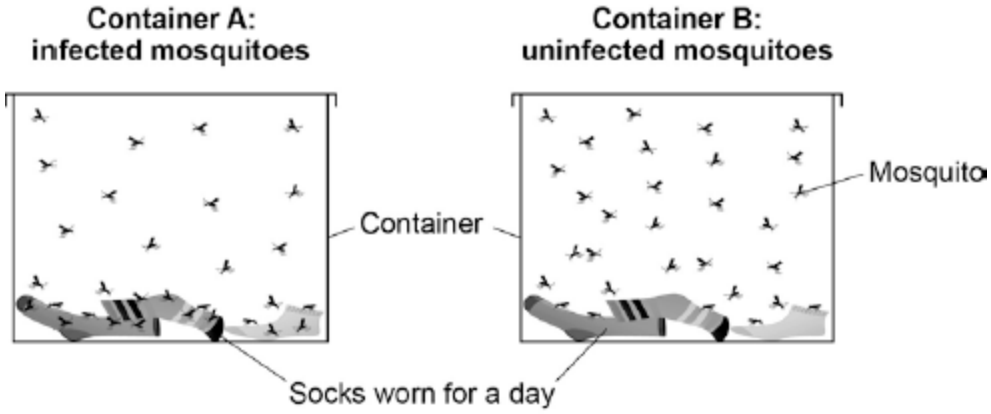
(c) Malaria is a serious disease that can be fatal.

Malaria is spread to humans by infected mosquitoes.

Scientists investigated the behaviour of mosquitoes to understand how the spread of malaria could be controlled.

Figure 2 shows the equipment the scientists used.

Figure 2



This is the method used.

1. 30 mosquitoes **infected with malaria** were placed in Container **A**.

2. 30 **uninfected** mosquitoes were placed in Container **B**.

3. The total number of times the mosquitoes landed on the socks was recorded.

Name the dependent variable and suggest **one** control variable in this investigation.

Dependent variable .....

.....

Control variable .....

.....

(2)

(d) Infected mosquitoes landed on the socks three times more often than uninfected mosquitoes.

Explain how this information can be used to reduce the spread of malaria.

.....

.....

.....

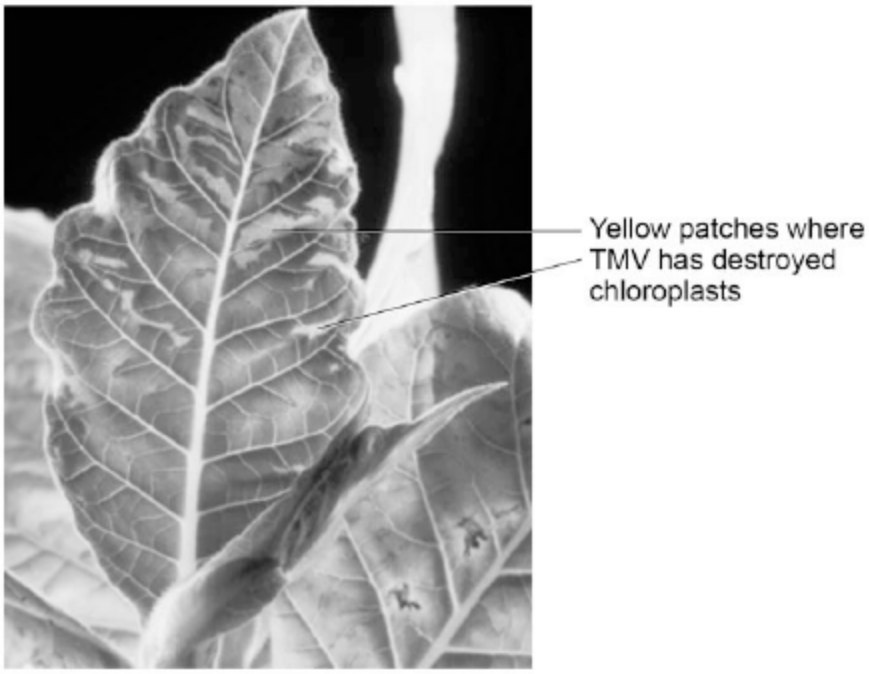
.....

(2)

(e) Tobacco mosaic virus (TMV) affects many species of plant.

Figure 3 shows a leaf infected with TMV.

Figure 3



TMV destroys chloroplasts in the leaf.

Explain how this could affect the growth of the plant.

.....

.....

.....

.....

.....

.....

(3)
(Total 14 marks)

4 Read the article.

> Parents all over the world advise children to 'wrap up warm or you'll catch a cold'.
>
> Scientists at Cardiff University recruited 180 volunteers to take part in an investigation to find out if the advice was true. The investigation took place during the city's common cold season.
>
> Half of the volunteers put their feet in bowls of ice cold water for 20 minutes. The other volunteers sat with their feet in empty bowls.
>
> Over the next few days, almost a third of the volunteers who put their feet into cold water developed colds. Fewer than one in ten of the other volunteers developed colds.

(a) Draw a ring around the correct answer to complete the sentence.

The advice 'wrap up warm or you'll catch a cold' is an example of

- hearsay.
- a hypothesis.
- a prediction.

(1)

(b) What was the experimental control in the investigation?

.....

(1)

(c) The scientists did **not** prove that the advice 'wrap up warm or you'll catch a cold' is true.

Explain why.

.....

.....

.....

.....

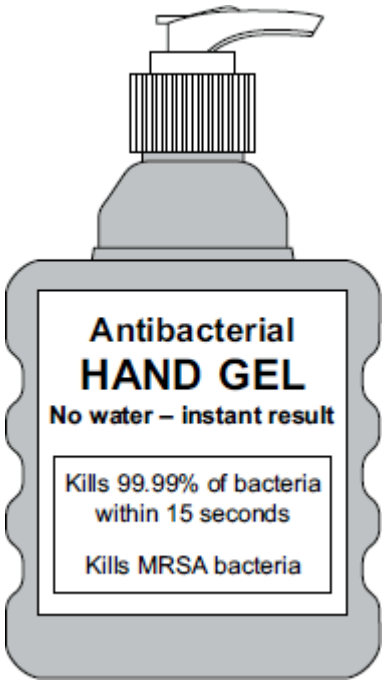
.....

.....

(3)
(Total 5 marks)

5 MRSA strains of bacteria are causing problems in many hospitals.

(a) The diagram shows a hand-gel dispenser.



Hand-gel dispensers are now placed at the entrance of most hospital wards.

Explain why.

.....

.....

.....

.....

(2)

(b) Explain, as fully as you can, how MRSA strains of bacteria became difficult to treat.

.....

.....

.....

.....

.....

.....

(3)
(Total 5 marks)

6 People may be immunised against diseases using vaccines.

(a) (i) Which part of the vaccine stimulates the body's defence system?

.....

.....

.....

.....

(2)

(ii) A person has been vaccinated against measles. The person comes in contact with the measles pathogen. The person does **not** catch measles.

Explain why.

.....

.....

.....

.....

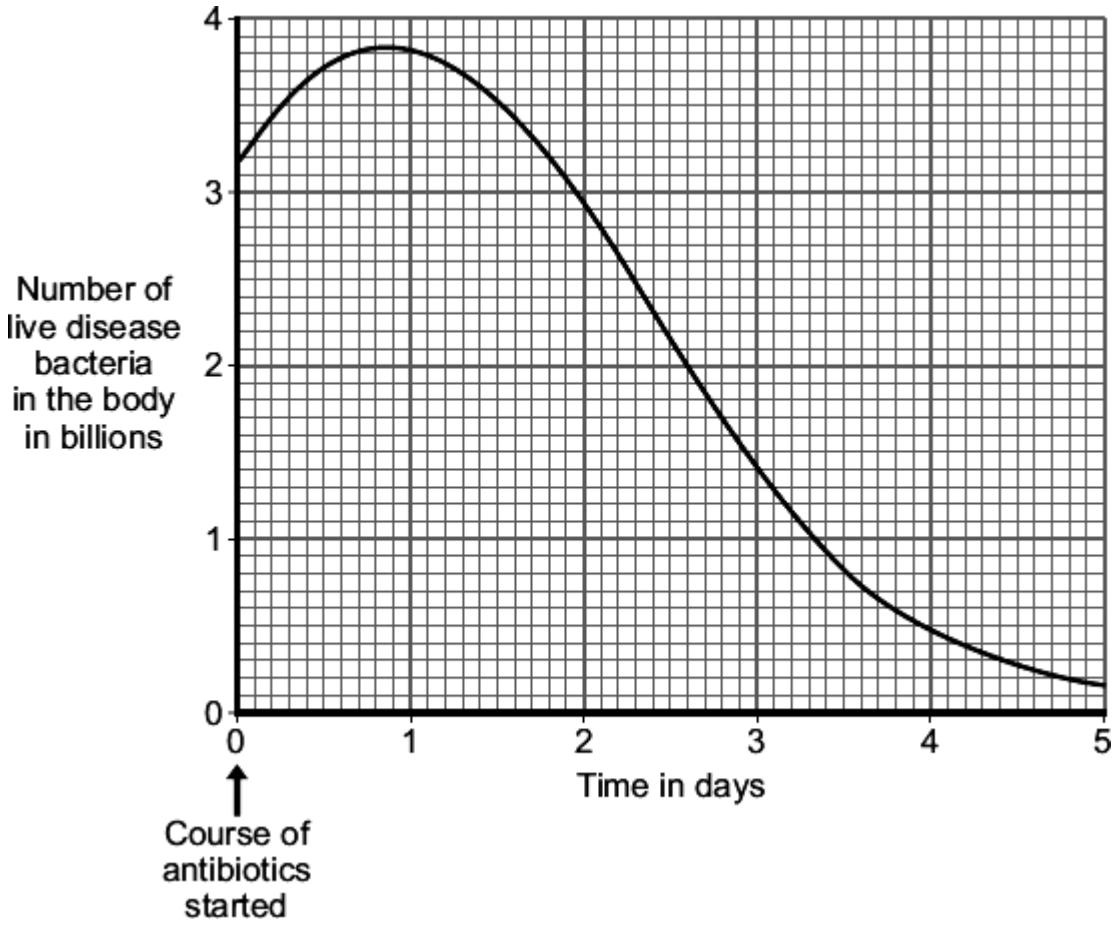
.....

.....

(3)

(b) A man catches a disease. The man has **not** been immunised against this disease. A doctor gives the man a course of antibiotics.

The graph shows how the number of live disease bacteria in the body changes when the man is taking the antibiotics.



(i) Four days after starting the course of antibiotics the man feels well again.
It is important that the man does **not** stop taking the antibiotics.

Explain why.

Use information from the graph.

.....

.....

.....

.....

(2)

(ii) Occasionally a new, resistant strain of a pathogen appears.

The new strain may spread rapidly.

Explain why.

.....

.....

.....

.....

.....

.....

(3)
(Total 10 marks)

1 (a) 8 (micrometres)

1

(b) red blood cell(s)

1

white blood cell(s)

accept named cell

eg phagocyte / lymphocyte

1

(plasma)
transports proteins / dissolved substances / food (molecules) / urea / hormones / blood cells

1

(c) any **one** from:

- you could lose a lot of blood
- bleed internally

allow bleeding would not stop

allow could bleed to death

1

[5]

2 (a) (i) 12

*correct answer with **or** without working*

*if answer incorrect evidence of (number of deaths) × 6 **or** 2 seen gains **1** mark*

2

(ii) (ward 2)

more deaths / infections on ward 1

or

less deaths / infections on ward 2

1

(b) (i) **both** bars correctly plotted

*ie plots in spaces between 2.8 and 3.2 **and** 0.8 and 1.2*

ignore width and shading

1

(ii) less deaths / infections

1

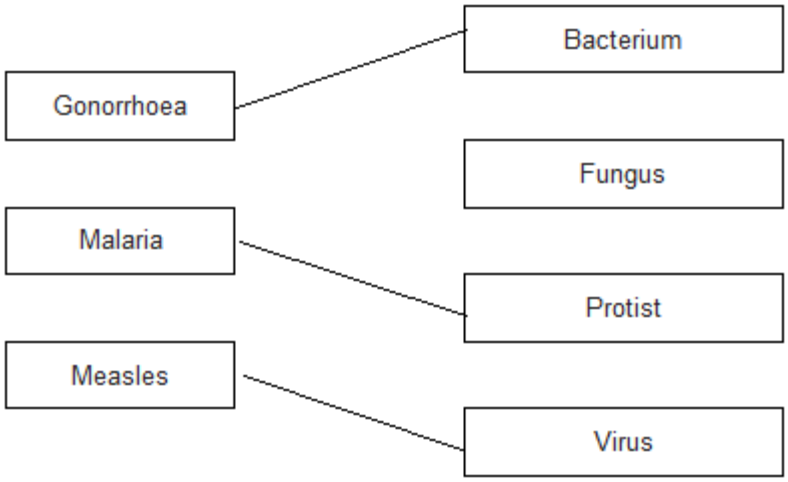
(iii) bacteria / germs / microbes / infection killed / washed off

accept less infections passed on

1

[6]

3 (a)



3

(b) (trachea) has mucus

1

to trap pathogens

1

(trachea) has cilia

1

to move mucus out of trachea

1

(c) **dependent variable:**
number of times mosquitoes landed on socks

1

control variable:
any **one** from:

- number of mosquitoes in each container
- length of time socks worn
- dampness of socks
- same type of socks
- size of container
- time
- temperature
- species of mosquito
- age of mosquito

1

(d) use worn socks
or
use chemical from worn socks

1

to attract / trap infected mosquitoes

1

or accept:
wear clean socks / change socks regularly (1)
to reduce the chance of attracting mosquitoes (1)

(e) less chlorophyll present

1

(so) less light absorbed

1

(so) reduced photosynthesis
or
(so) less sugar / food made

1

[14]

4 (a) hearsay

1

(b) (volunteers with feet in) <u>empty</u> bowls

accept bowl with no (iced) water
*do **not** accept mention of bowl with iced water*

1

(c) any **three** from:

ignore control variables, eg age, gender

- only some of those whose feet were in cold water caught colds
- some controls caught colds
- only feet were cold in experimental group

  allow (control) not wrapped up warm
- only kept feet in cold water for 20 minutes
- insufficient evidence for 'proof' / only showed increased risk

  allow small sample size
- don't know activities of individuals before / after the investigation (eg exposure to cold virus) / reference to immune system

  allow investigation done in 'cold season'

3

[5]

5

(a) kills / destroys bacteria / MRSA

*do **not** allow germs*

1

prevents / reduces transfer

allow stops MRSA entering ward

1

(b) mutation

*do **not** accept antibiotics causes mutation*

1

(causes) resistance

allow not effective

ignore immunity

1

to antibiotics

1

[5]

6

(a) (i) dead / inactive / weakened

allow antigen / protein

ignore ref to other components

ignore small amount

1

pathogen / bacterium / virus / microorganism

ignore germs / disease

1

(ii) *antigen / antibiotic instead of antibody = max 2*

white blood cells produce / release antibodies

accept lymphocytes / leucocytes / memory cells produce antibodies
*do **not** accept phagocytes*

1

antibodies produced quickly

1

(these) antibodies destroy the pathogen

allow kill
*do **not** accept antibodies engulf pathogens*

1

(b) (i) (live) bacteria still in body

ignore numbers

1

would reproduce

ignore mutation / growth

1

(ii) antibiotics / treatment ineffective **or** resistant pathogens survive

accept resistant out compete non-resistant

1

these reproduce

1

population of resistant pathogens increases

allow (resistant pathogens reproduce) rapidly

1

[10]