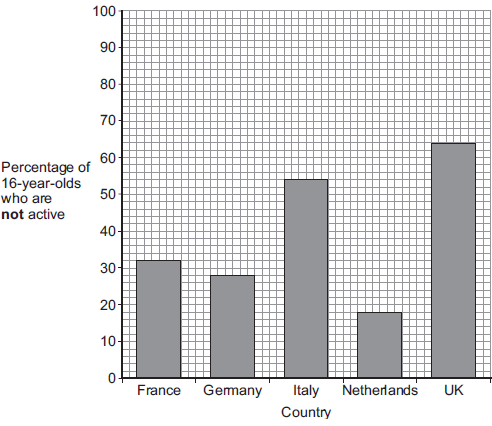
**Q1.**Scientists investigated the effect of different factors on health.

(a)     People who are **not** active may have health problems.

The graph shows the percentage of 16-year-olds in some countries who are **not** active.



(i)      What percentage of 16-year-olds in the UK are **not** active?

.......................... %

**(1)**

(ii)     What percentage of 16-year-olds in the UK are **active**?

.......................... %

**(1)**

(iii)    A newspaper headline states:



Information in **Figure 1** does **not** support the newspaper headline.

Suggest **one** reason why the newspaper headline may be wrong.

...............................................................................................................

............................................................................................................... (1)

(b)     Doctors gave a percentage rating to the health of 16-year-olds.  
100% is perfect health.

The table shows the amount of exercise 16-year-olds do and their health rating.

|  |  |  |
| --- | --- | --- |
|  | **Amount of exercise done in minutes every week** | **Health rating as %** |
|  | Less than 30 | 72 |
|  | 90 | 76 |
|  | 180 | 82 |
|  | 300 | 92 |

What conclusion can be made about the effect of exercise on health?

Use information from the table.

........................................................................................................................

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**(1)**

(c)     Inherited factors can also affect health.

Give **one** health problem that may be affected by the genes someone inherits.

Draw a ring around the correct answer.

|  |  |  |  |
| --- | --- | --- | --- |
|  | **being malnourished** | **having a high cholesterol level** | **having a deficiency disease** |

**(1)**

(d)     White blood cells are part of the immune system.

Use the correct answer from the box to complete each sentence.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **antibiotics** | **antibodies** | **pathogens** | **vaccines** |

(i)      When we are ill, white blood cells produce .............................................. to kill microorganisms.

**(1)**

(ii)     Many strains of bacteria, including MRSA, have developed resistance to drugs called

...............................................................................................................

**(1)**

**(Total 7 marks)**

**Q2.**Pathogens cause infectious diseases in animals and plants.

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

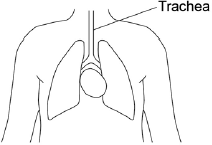
|  |  |  |  |
| --- | --- | --- | --- |
|  | **Disease** |  | **Type of pathogen** |
|  |  |  | Bacterium |
|  | Gonorrhoea |  |  |
|  |  |  | Fungus |
|  | Malaria |  |  |
|  |  |  | Protist |
|  | Measles |  |  |
|  |  |  | Virus |

**(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.

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**(4)**

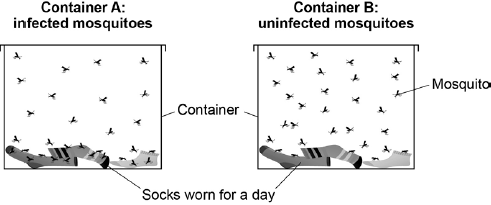
(c)     Malaria is a serious disease that can be fatal.

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.

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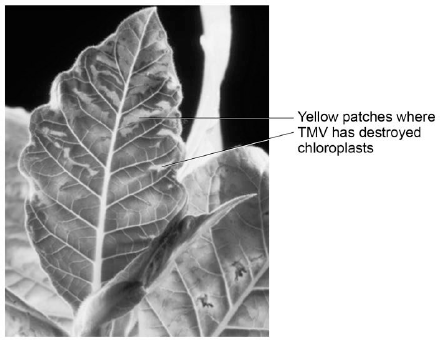
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**(2)**

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

**Figure 3** shows a leaf infected with TMV.

**Figure 3**

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© Nigel Cattlin/Getty Images

TMV destroys chloroplasts in the leaf.

Explain how this could affect the growth of the plant.

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**(3)**

**(Total 14 marks)**

**Q3.**Pathogens are microorganisms that cause infectious disease.

(a)     Draw **one** line from each disease to the way the disease is spread.

|  |  |  |  |
| --- | --- | --- | --- |
|  | **Disease** |  | **Way the disease is spread** |

|  |  |  |  |
| --- | --- | --- | --- |
|  |  |  | Animals that draw blood |
|  |  |  |  |
|  | Cholera |  | Drinking contaminated water |
|  |  |  |  |
|  | Cold |  | Droplets in the air when people cough or sneeze |
|  |  |  |  |
|  | Malaria |  | Eating food that is contaminated |
|  |  |  |  |
|  |  |  | Breathing air polluted with carbon dioxide |

**(3)**

(b)     One way the human body protects itself against the entry of pathogens is by producing antimicrobial chemicals.

Antimicrobial chemicals kill pathogens.

Give **two** other ways the human body protects itself against the **entry** of pathogens.

1 .....................................................................................................................

........................................................................................................................

2 .....................................................................................................................

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**(2)**

(c)     Measles is a childhood disease caused by a microorganism.

Measles is **not** treated by antibiotics.

Give the reason why.

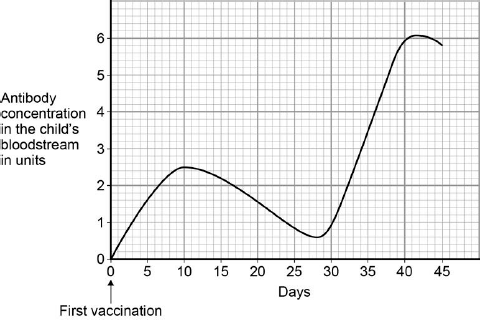
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**(1)**

(d)     Vaccinations help people become immune to infections.

In 2013, 92% of children in the UK had two vaccination injections against measles.

The figure below shows how the concentration of antibodies in the blood changes after each measles vaccination.



Suggest what day the second vaccination was given.

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**(1)**

(e)     What is the highest concentration of antibodies produced by the first vaccination?

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**(1)**

(f)     How will the number of children getting measles change as more children are vaccinated against measles?

Give a reason for your answer.

Change   ........................................................................................................

Reason ..........................................................................................................

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**(2)**

**(Total 10 marks)**

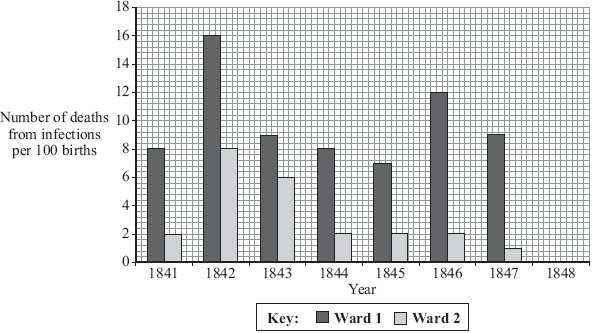
**Q4.**          In the 19th century, Dr Semmelweiss investigated infection in a hospital.

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.

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**(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?

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**(1)**

(iii)     Suggest an explanation for this effect.

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**(1)**

**(Total 6 marks)**

**Q5.**          Controlling infections in hospitals has become much more difficult in recent years.

(a)     Explain why MRSA is causing problems in many hospitals.

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**(2)**

(b)     The pioneer in methods of treating infections in hospitals was Ignaz Semmelweiss. He observed that women whose babies were delivered by doctors in hospital had a death rate of 18% from infections caught in the hospital. Women whose babies were delivered by midwives in the hospital had a death rate of 2%. He observed that doctors often came straight from examining dead bodies to the delivery ward.

(i)      In a controlled experiment, Semmelweiss made doctors wash their hands in chloride of lime solution before delivering the babies. The death rate fell to about 2% – down to the same level as the death rate in mothers whose babies were delivered by midwives.

Explain why the death rate fell.

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**(1)**

(ii)     Explain how Semmelweiss’s results could be used to reduce the spread of MRSA in a modern hospital.

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**(2)**

**(Total 5 marks)**

**Q6.**          Many strains of bacteria have developed resistance to antibiotics.

The table shows the number of people infected with a resistant strain of one species of bacterium in the UK.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Year** | **2004** | **2005** | **2006** | **2007** | **2008** |
| Number of people infected with the resistant strain | 3499 | 3553 | 3767 | 3809 | 4131 |

(a)     Calculate the percentage increase in the number of people infected with the resistant strain between 2004 and 2008.

Show clearly how you work out your answer.

........................................................................................................................

........................................................................................................................

                      Percentage increase = ..................................................

**(2)**

(b)     Explain, in terms of natural selection, why the number of people infected with the resistant strain of the bacterium is increasing.

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**(3)**

**(Total 5 marks)** 

**Q7.**          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.

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**(2)**

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

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**(3)**

**(Total 5 marks )**

**Q8.**          Pathogenic bacteria and viruses may make us feel ill if they enter our bodies.

(a)     Why do bacteria and viruses make us feel ill?

Bacteria .....................................................................................................................

....................................................................................................................................

Viruses .......................................................................................................................

..................................................................................................................................(2)

(b)     Most drugs that kill bacteria cannot be used to treat viral infections.

Explain why

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**(2)**

(c)     Antibiotic-resistant strains of bacteria are causing problems in most hospitals.

          Explain, as fully as you can, why there has been a large increase in the number of antibiotic-resistant strains of bacteria.

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**(4)(Total 8 marks0**