Name:

Date:

B3 - Test 3
INFECTION
Intermediate

GCSE

BIOLOGY
AQA - Triple Science

Mark

Grade

Materials

For this paper you must have:

- Ruler
- Pencil and Rubber
- Scientific calculator, which you are expected to use when appropriate

Instructions

- Answer all questions
- Answer questions in the space provided
- All working must be shown

Information

- The marks for the questions are shown in brackets

1. (a) **List A** gives the names of three stages in trialling a new drug.

List B gives information about the three stages.

Draw a line from each stage in **List A** to the correct information in **List B**.

List A **Stage**	**List B** **Information**
	Used to find if the drug is toxic
Tests on humans including a placebo	
	The first stage in the clinical trials of the drug
Tests on humans using very small quantities of the drug	
	Used to find the optimum dose of the drug
Tests on animals	
	Used to prove that the drug is effective on humans

(3)

(b) Read the passage.

Daily coffee dose delays development of Alzheimer's in humans.

Alzheimer's is a brain disease that causes memory loss in elderly people. Scientists studied 56 mice that had been genetically engineered to develop Alzheimer's.

Before treatment all the mice did badly in memory tests.

Half the mice were given a daily dose of caffeine in their drinking water. The dose was equivalent to the amount of caffeine in six cups of coffee for a human.

The other mice were given ordinary water.

After two months, the caffeine-drinking mice did better in memory tests than the mice drinking ordinary water.

The headline for the passage is not justified.

Explain why as fully as possible.

(3)

(Total 6 marks)

2. Antibiotics can be used to protect our bodies from pathogens.

(a) What is a pathogen?

(1)

(b) Bacteria may become resistant to antibiotics.

How can doctors reduce the number of bacteria that become resistant to antibiotics?

_____

_____

_____

_____

(2)

(c) Scientists grow microorganisms in industrial conditions at a higher temperature than is used in school laboratories.

(i) Which temperature would be most suitable for growing bacteria in industrial conditions?

Draw a ring around the correct answer.

25 °C **40 °C** **100 °C**

(1)

(ii) What is the advantage of using the temperature you gave in part (c)(i)?

_____

_____

(1)

(Total 5 marks)

3. Microorganisms cause infections.

The human body has many ways of defending itself against microorganisms.

(a) Describe **two** ways the body prevents the entry of microorganisms.

1. _____

_____

2. _____

_____

(2)

(b) In 2014 the Ebola virus killed almost 8000 people in Africa.

Drug companies have developed a new drug to treat Ebola.

Explain what testing must be done before this new drug can be used to treat people.

(6)

(Total 8 marks)

4. Some infections are caused by bacteria.

(a) The genetic material is arranged differently in the cells of bacteria compared with animal and plant cells.

Describe **two** differences.

(2)

(b) Tuberculosis (TB) is an infection caused by bacteria.

The table below shows the number of cases of TB in different regions of southern England from 2000–2011.

Number of cases of TB per 100 000 people

Year	London	South East	South West
2000	37	5	3
2001	36	6	4
2002	42	6	6
2003	42	7	4
2004	42	7	5
2005	49	8	5
2006	44	8	3
2007	43	8	5
2008	44	8	5
2009	44	9	6
2010	42	9	5
2011	45	10	5

(i) How does the number of cases of TB for London compare with the rest of southern England?

_____

_____

_____

(1)

(ii) Describe the pattern in the data for cases of TB in the South East.

_____

_____

(1)

(iii) Describe the pattern in the data for cases of TB in the South West.

_____

_____

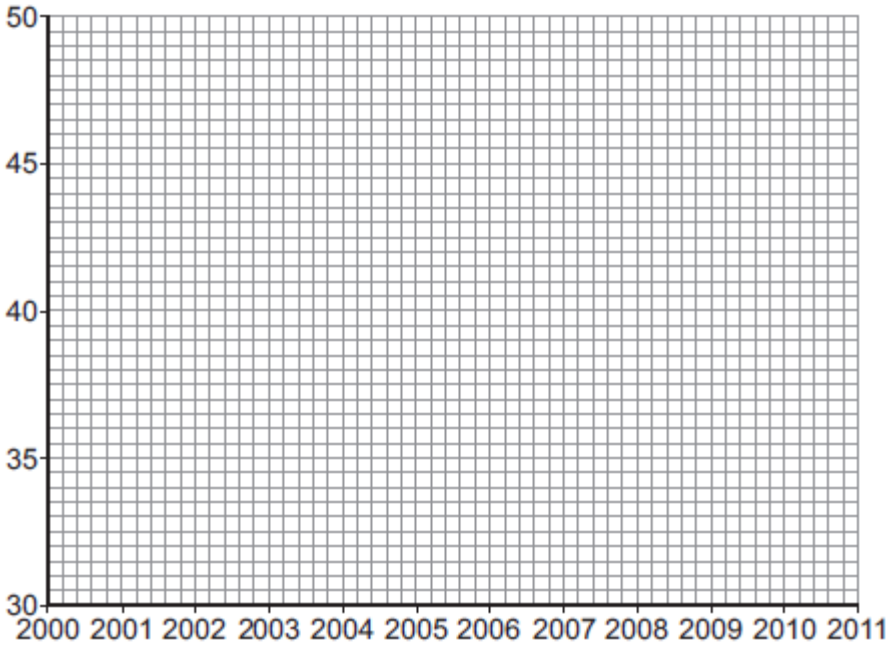
_____

_____

(2)

(c) (i) On the graph paper below:

- plot the number of cases of TB in **London**
- label both the axes on the graph
- draw a line of best fit.



(4)

(ii) Suggest why a student thought the value for 2005 in London was anomalous.

_____

_____

(1)

(d) People can be vaccinated against TB.

Suggest how a vaccination programme would reduce the number of people with TB.

Details of how a vaccine works are **not** required.

_____

_____

_____

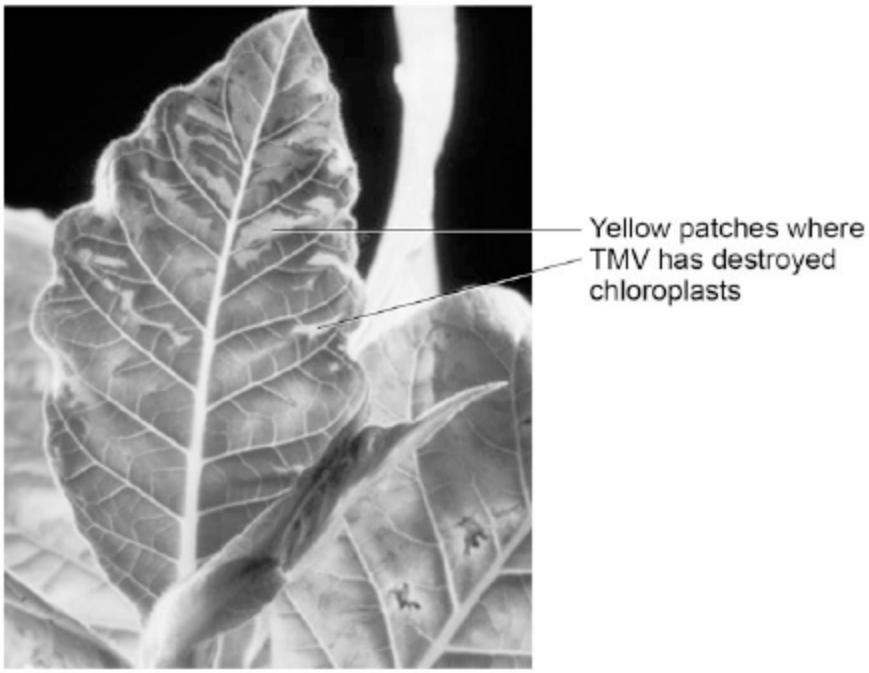
_____

(2)

(Total 13 marks)

5. Tobacco mosaic virus (TMV) is a disease affecting plants.

The diagram below shows a leaf infected with TMV.



(a) All tools should be washed in disinfectant after using them on plants infected with TMV.

Suggest why.

_____

_____

(1)

(b) Scientists produced a single plant that contained a TMV-resistant gene.

Suggest how scientists can use this plant to produce **many** plants with the TMV-resistant gene.

(1)

(c) Some plants produce fruits which contain glucose.

Describe how you would test for the presence of glucose in fruit.

(2)

(d) TMV can cause plants to produce less chlorophyll.

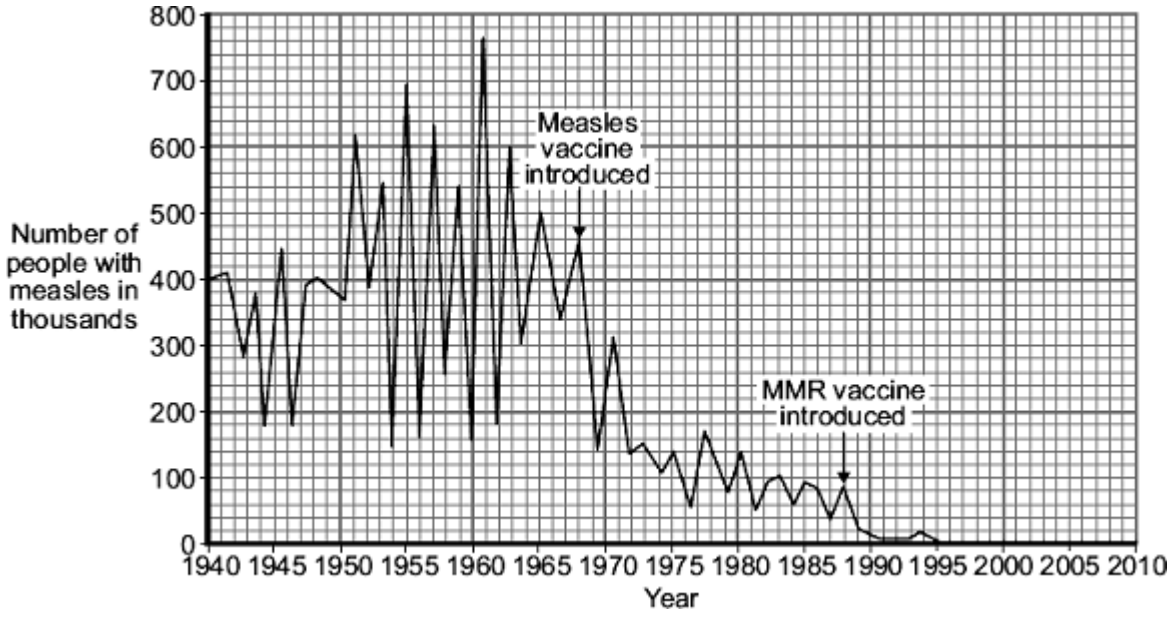
This causes leaf discoloration.

Explain why plants with TMV have stunted growth.

(4)

(Total 8 marks)

6. The graph shows the number of people with measles in the UK between 1940 and 2010.



(a) Compare how effective introducing the measles vaccine was with introducing the MMR vaccine.

Use data from the graph.

_____

_____

_____

_____

_____

_____

_____

_____

(3)

(b) The MMR vaccine was introduced in 1988.

Other than measles, which **two** diseases does the MMR vaccine protect against?

1. _____

2. _____

(2)

(c) To immunise someone against measles, a small quantity of the inactive measles pathogen is injected into the body.

Describe what happens in the body after immunisation to stop a person catching measles in the future.

(3)

(Total 8 marks)

7. A student is given a tube containing a liquid nutrient medium. The medium contains one type of bacterium.

(a) *In this question you will be assessed on using good English, organising information clearly and using specialist terms where appropriate.*

The student is told to grow some of the bacteria on agar jelly in a Petri dish.

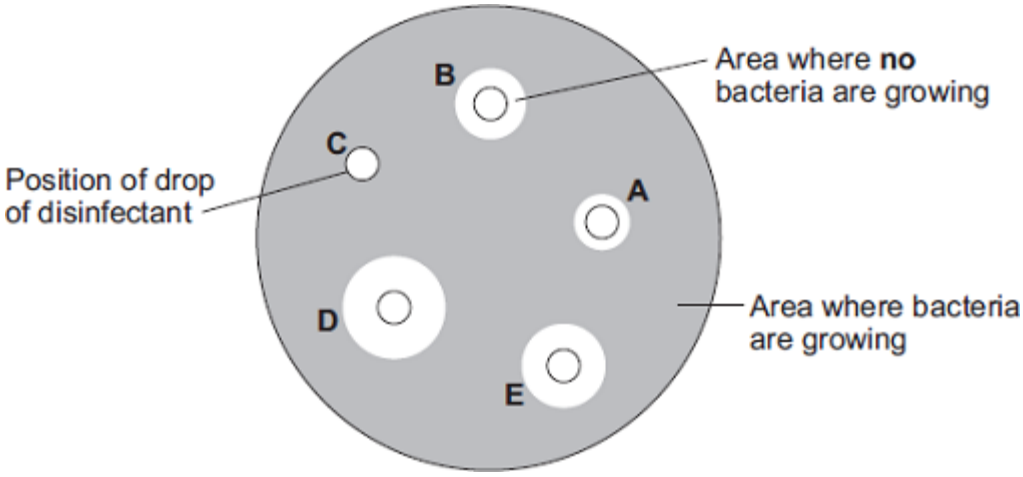
Describe how the student should prepare an uncontaminated culture of the bacterium in the Petri dish.

You should explain the reasons for each of the steps you describe.

(6)

(b) After the culture had been prepared, the student added one drop of each of five disinfectants, **A**, **B**, **C**, **D** and **E**, onto the culture.

The diagram shows the appearance of the Petri dish 3 days later.



(i) There are areas on the agar jelly where **no** bacteria are growing.

Why?

_____

_____

(1)

(ii) The student concluded that disinfectant **D** would be the best for using around the home.

Give **one** reason why the student might be correct.

_____

_____

_____

Give **one** reason why the student might **not** be correct.

_____

_____

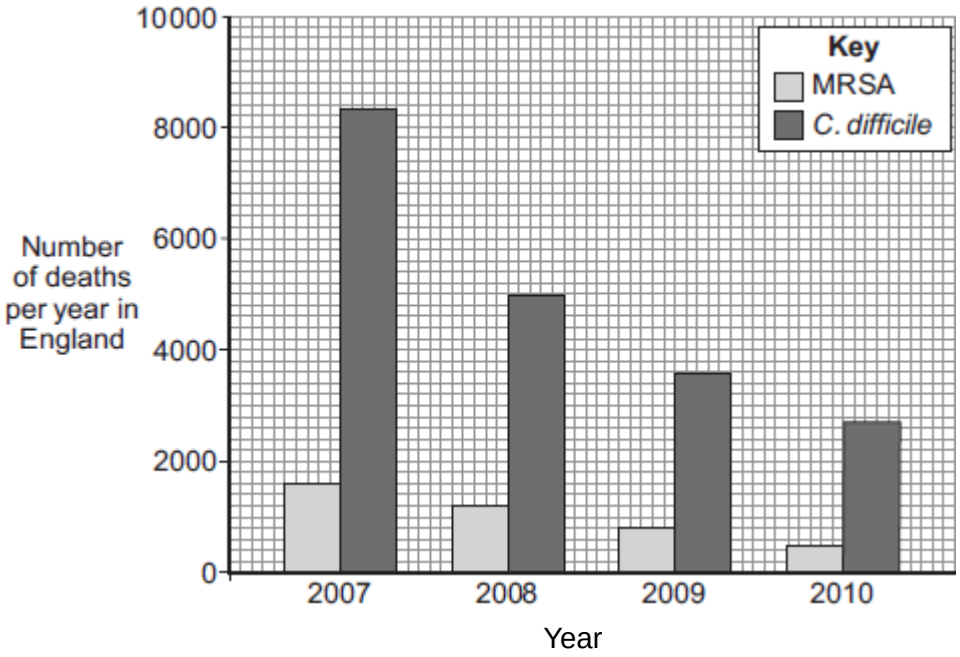
_____

(2)

(Total 9 marks)

8. Infections by antibiotic resistant bacteria cause many deaths.

The bar chart below shows information about the number of deaths per year in England from *Methicillin-resistant Staphylococcus aureus* (MRSA) and from *Clostridium difficile* (*C.difficile*) over 4 years.



(a) (i) Describe the trend for deaths caused by *C. difficile*.

_____

_____

_____

_____

(2)

(ii) Suggest a reason for the trend you have described in part **(a)(i)**.

Explain your answer.

_____

_____

_____

_____

(2)

(iii) Calculate the percentage change in deaths caused by MRSA from 2009 to 2010.

_____

_____

_____

Percentage change in deaths caused by MRSA = _____ %

(2)

(iv) Numbers have not yet been published for 2011.

When the numbers are published, scientists do **not** expect to see such a large percentage change from 2010 to 2011 as the one you have calculated for 2009 to 2010.

Suggest **one** reason why.

_____

_____

(1)

(b) Before 2007 there was a rapid increase in the number of deaths caused by MRSA.

Describe how the overuse of the antibiotic methicillin led to this increase.

_____

_____

_____

_____

_____

_____

(3)

(Total 10 marks)

9. The MMR vaccine is used to protect against measles.

(a) Apart from measles, which **two** other diseases does the MMR vaccine protect against?

_____ and _____

(1)

(b) Read the information.

> Measles is a dangerous disease caused by a virus.
> Normally, MMR vaccinations are given at 1 year old and again at 4 years old.
> Each vaccination is 90% effective in protecting against the measles virus.
>
> In April 2013, there were 630 cases of measles in children aged 4 and over in a small area of the UK. Of these cases, 504 children had not been vaccinated against MMR at all and only a few had been given a second vaccination.

(i) Calculate the percentage of the children who caught measles in April 2013 who had **not** been vaccinated against MMR.

_____

_____

_____

Percentage = _____

(2)

(ii) Suggest **one** advantage to the population as a whole of children having the second MMR vaccination.

_____

(1)

(c) (i) What does a vaccine contain?

_____

_____

(1)

(ii) Explain how a vaccination prevents infection.

_____

_____

_____

_____

_____

_____

_____

(3)

(d) (i) Antibiotics can only be used to treat some infections.

Explain why antibiotics **cannot** be used to treat measles.

_____

_____

_____

_____

(2)

(ii) Why do antibiotics become less useful at treating an infection if the antibiotic is overused?

_____

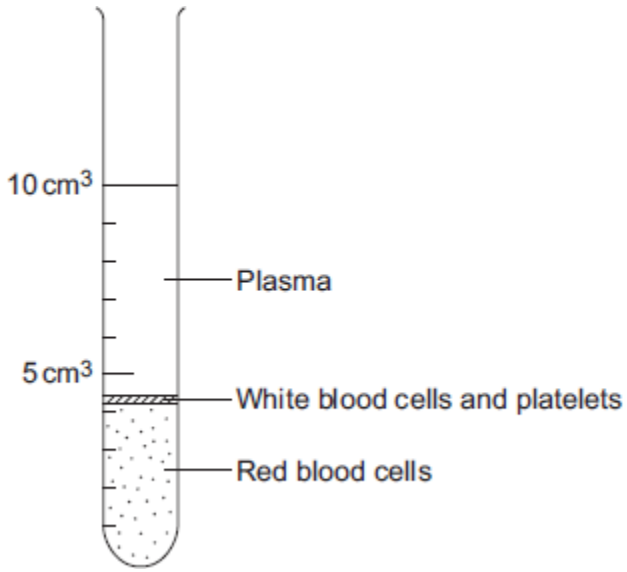
_____

(1)

(Total 11 marks)

10. The parts of the blood can be separated from each other by spinning the blood in a centrifuge.

The image below shows the separated parts of a 10 cm^3 blood sample.



(a) Calculate the percentage of the blood that is made up of plasma.

_____

_____

Answer = _____ %

(2)

(b) Name **three** chemical substances transported by the plasma.

1. _____

2. _____

3. _____

(3)

(c) **In this question you will be assessed on using good English, organising information clearly and using specialist terms where appropriate.**

White blood cells are part of the immune system. White blood cells help the body to defend itself against pathogens.

Describe how pathogens cause infections **and** describe how the immune system defends the body against these pathogens.

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

(6)

(Total 11 marks)