



General Certificate of Secondary Education
2015–2016

Centre Number

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Candidate Number

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Science: Single Award

Unit 1 (Biology)
Higher Tier

[GSS12]



TUESDAY 17 MAY 2016, AFTERNOON

TIME

1 hour 15 minutes, plus your additional time allowance.

INSTRUCTIONS TO CANDIDATES

Write your Centre Number and Candidate Number in the spaces provided at the top of this page.

You must answer the questions in the spaces provided.

Do not write outside the boxed area on each page or on blank pages.

Complete in blue or black ink only.

Answer **all ten** questions.

INFORMATION FOR CANDIDATES

The total mark for this paper is 75.

Figures in brackets printed down the right-hand side of pages indicate the marks awarded to each question or part question.

Quality of written communication will be assessed in Questions **3** and **10(a)**.

1 Rhododendron is an example of a competitive invasive species in Northern Ireland.

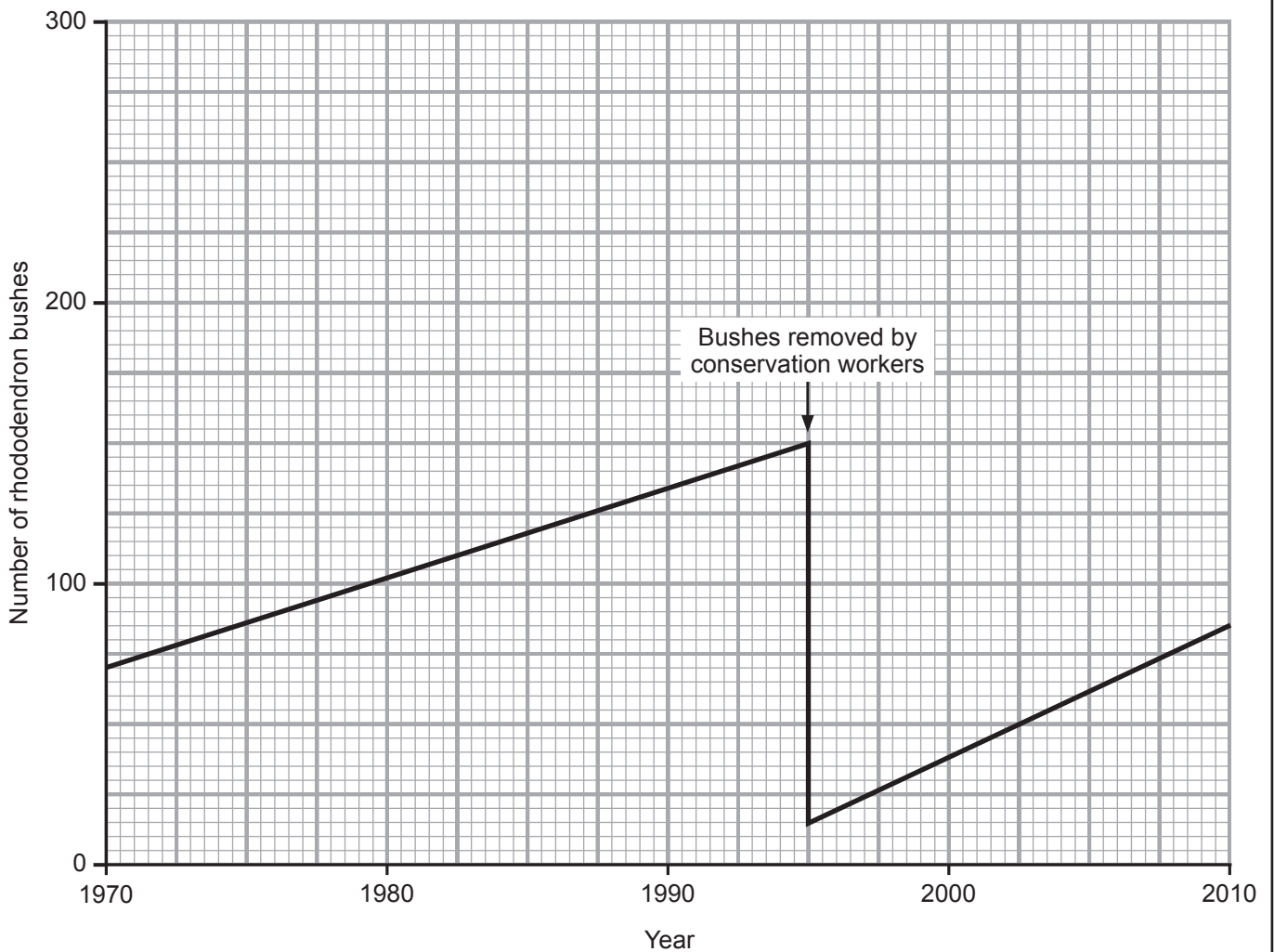
(a) Give **two** features that 'competitive invasive species' have in common.

1. _____

 2. _____

- [2]

(b) The graph below shows how the number of rhododendron bushes in an area of heathland has changed over a 40 year period.



(i) Calculate how many rhododendron bushes were removed in 1995.

Show your working out.

_____ [2]

(ii) Calculate the percentage of bushes that were not removed in 1995.

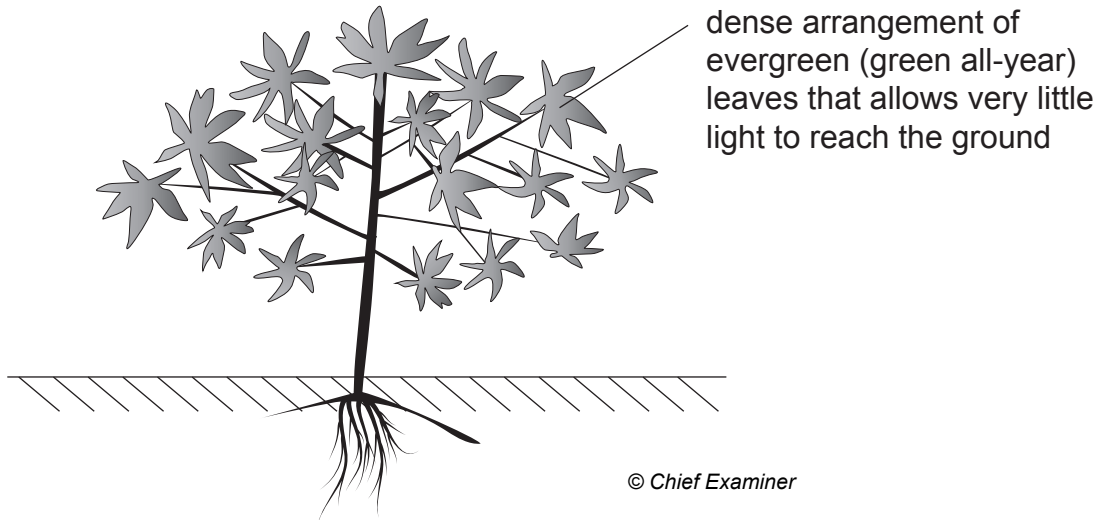
_____ % [1]

(iii) Predict how many rhododendron bushes there would have been in 2010 if no bushes had been removed.

_____ [1]

[Turn over

(c) The drawing below represents a rhododendron bush.



Using the information provided and your knowledge, answer the following questions.

(i) Suggest the effect a rhododendron bush has on other species of plants growing close to it. Explain your answer.

[3]

(ii) Suggest the effect on biodiversity, if any, the removal of rhododendron bushes will have in the heathland.

[1]

(d) Name **one** other competitive invasive species.

[1]

2 (a) There are many different strains (types) of virus that cause flu. Flu viruses **mutate** easily making many new virus strains (types) that cause flu.

(i) Explain the term **mutation**.

[2]

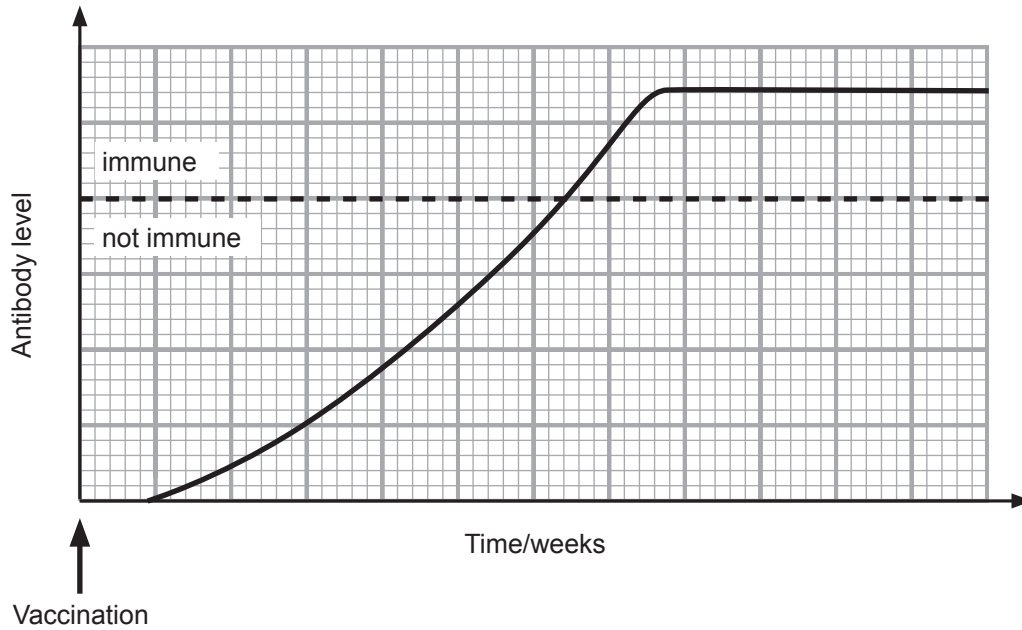
Many people in the UK get a flu vaccination each year.

(ii) Describe fully what a flu vaccination contains.

[2]

[Turn over

The graph below shows the effect of a flu vaccination on a person's antibody level.



When developing the flu vaccination in any particular year, scientists have to predict (guess) which strain of virus is likely to infect the most people. They then develop the flu vaccination against this particular strain.

Using the information provided, answer the questions below.

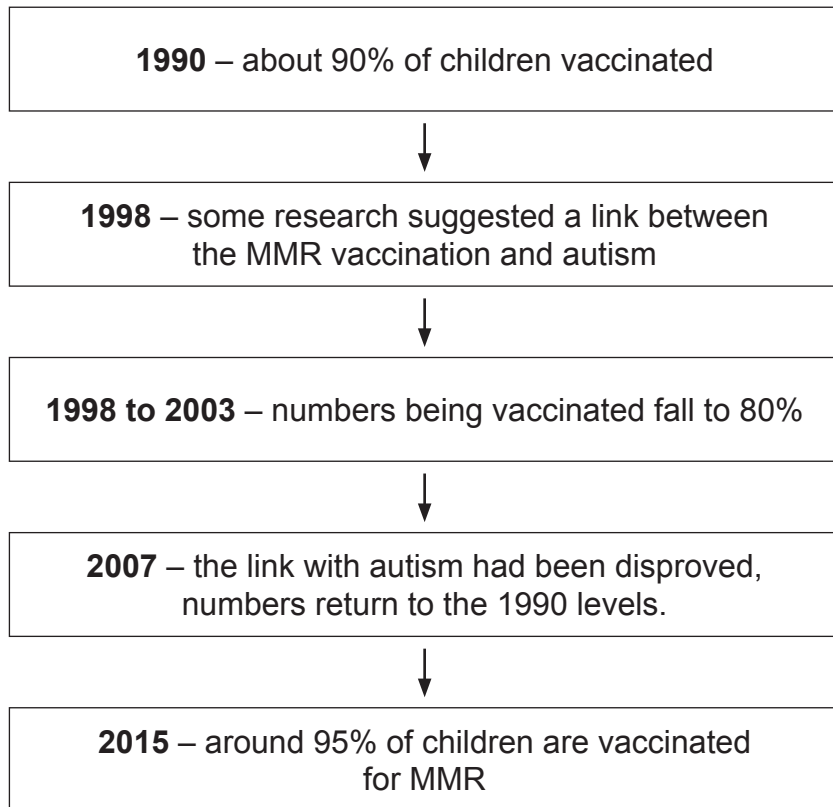
(iii) Use the graph to suggest why people get the flu vaccination many weeks before they are expected to be infected by the flu virus.

[1]

(iv) Suggest why some people who get the flu vaccination might get flu many months later.

[1]

(b) The flow chart below summarises how the number of children being vaccinated for MMR has changed since 1990.



(i) Describe fully the trend in the number of children being vaccinated for MMR between **2003 and 2015**. Use data from the flow chart to support your answer.

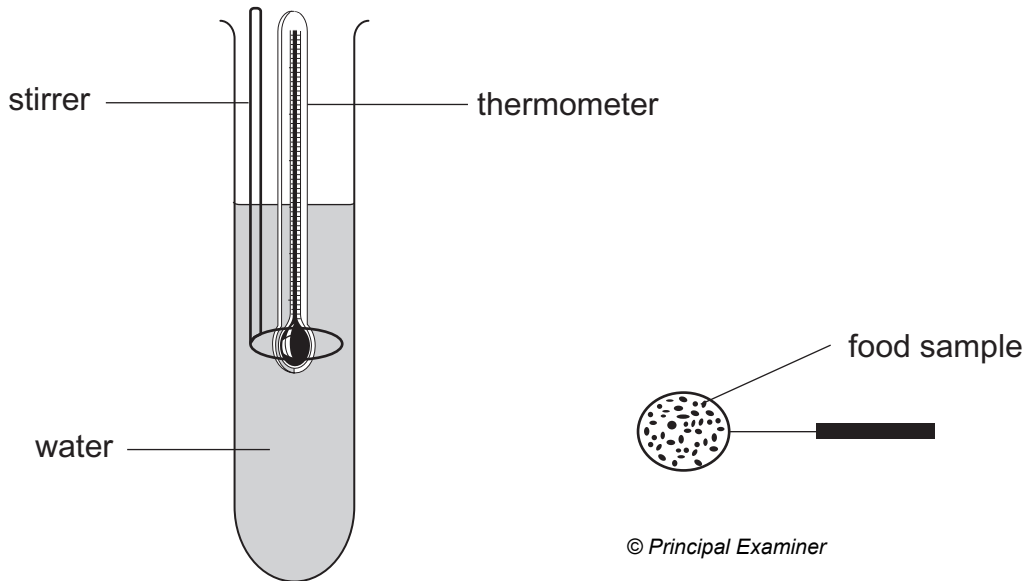
[2]

(ii) Suggest why there are still some parents who do not have their children vaccinated for MMR.

[1]

[Turn over

3 Energy released from different foods can be compared using the apparatus shown in the diagram.



Describe how you would compare the amount of energy released from a biscuit to the amount of energy released from bread, using the apparatus above.

Your answer should include:

- **two** variables to be controlled to make the investigation fair
- **one** reason why the results obtained are likely to be less than the actual amount of energy in the foods

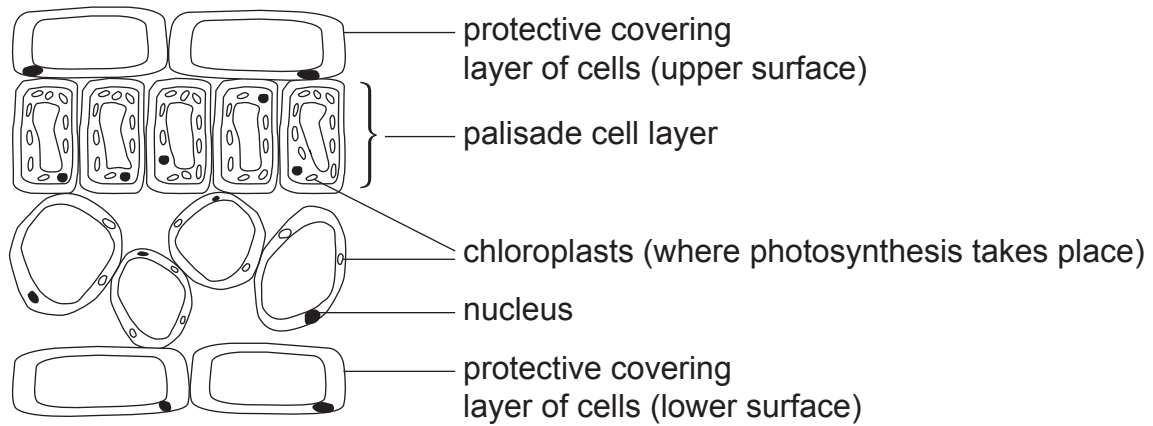
In this question you will be assessed on your written communication skills including the use of specialist scientific terms.



[6]

[Turn over

4 (a) The diagram below represents a section through a leaf.



© Chief Examiner

Using only the information in the diagram, give **two** reasons why most photosynthesis in a leaf takes place in the palisade cells.

1. _____

2. _____
_____ [2]

(b) To show that photosynthesis has taken place, a leaf can be tested with iodine to see if starch is present.

(i) Describe how you would remove chlorophyll from a leaf when testing for starch.

- _____

_____ [2]

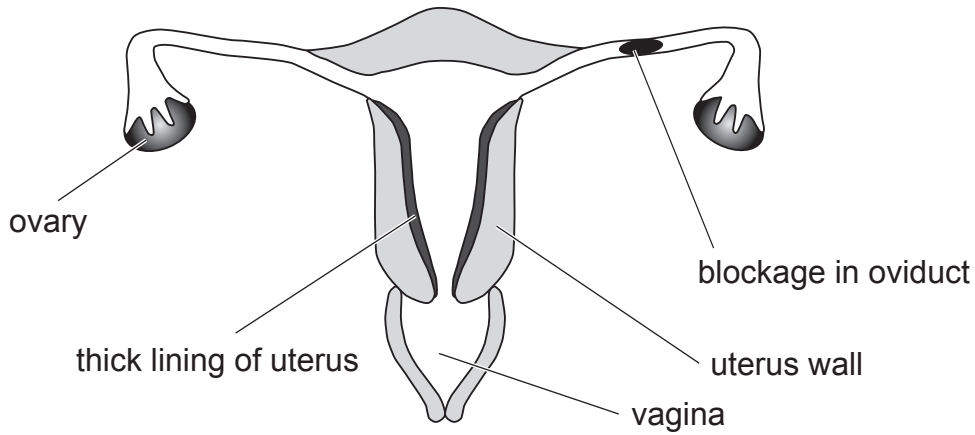
(ii) State the colour change in iodine if starch is present.

- _____ to _____ [1]



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(Questions continue overleaf)

- 5 (a) The diagram below represents the female reproductive system with one of the oviducts blocked due to an infection.



Source: Chief Examiner

- (i) What is the evidence from the diagram that menstruation has **not** occurred in the last few days?

[1]

- (ii) Suggest the effect a blocked oviduct will have on the chances of a female becoming pregnant. Explain your answer.

[2]

(b) Oestrogen and progesterone are hormones involved in the menstrual cycle.

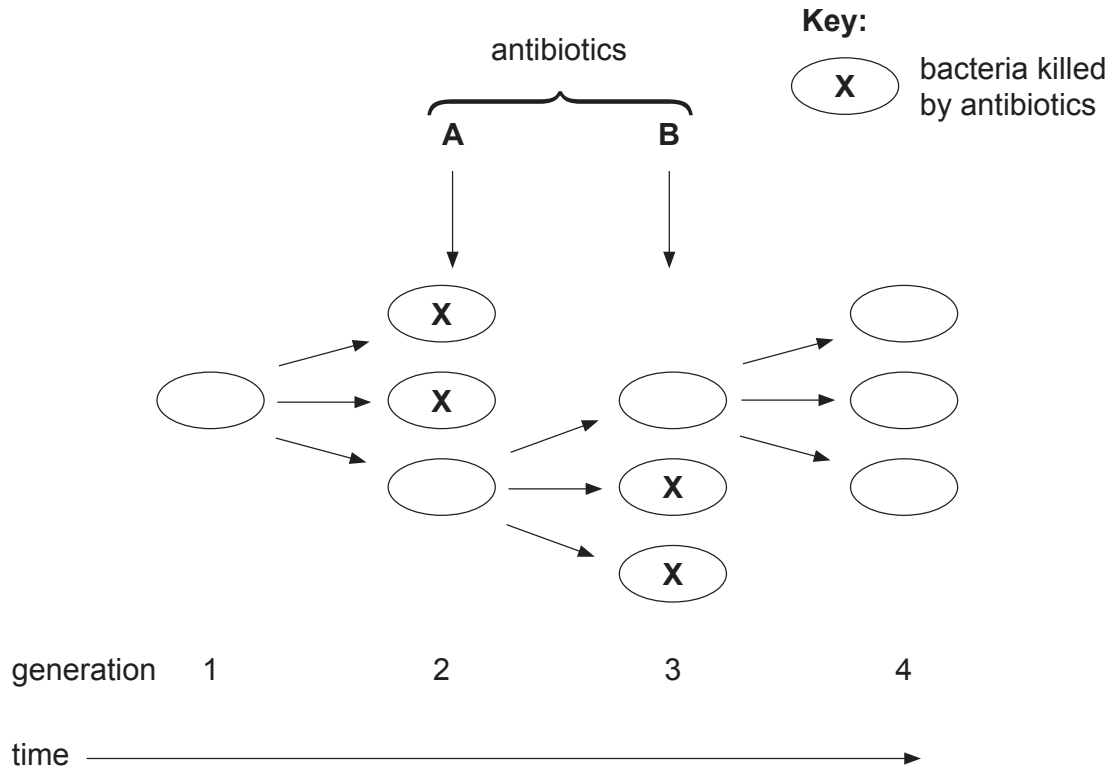
(i) Define **hormone**.

[2]

(ii) State **one** function of oestrogen in the menstrual cycle.

[1]

- 6 (a) The diagram below shows the effects of two different antibiotics on one type of bacteria over a period of time.



(i) On the diagram, circle one of the bacteria that is resistant to antibiotic **B**. [1]

(ii) Explain how the diagram shows natural selection in action.

[2]

(b) MRSA is also antibiotic resistant and it has made many hospital patients very ill.

(i) Suggest **two** reasons why MRSA is a particular problem in hospitals.

1. _____

2. _____ [2]

(ii) Suggest **one** reason why the number of patients with MRSA in hospitals has decreased in recent years.

_____ [1]

- 7 (a) The table below shows the average recovery times after exercise for three hockey players over a period of six weeks. Each player exercised for the same length of time. Recovery time was recorded as the time taken for heart rate to return to normal.

| Hockey player | Recovery time/s | | | | | |
|---------------|-----------------|--------|--------|--------|--------|--------|
| | Week 1 | Week 2 | Week 3 | Week 4 | Week 5 | Week 6 |
| Jane | 211 | 205 | 198 | 144 | 121 | 115 |
| Sorca | 278 | 268 | 271 | 271 | 242 | 221 |
| Kellie | 171 | 166 | 141 | 122 | 115 | 115 |

Use the information and your knowledge to answer the questions below.

- (i) State **one** way the trend shown for each hockey player is similar.

[1]

- (ii) Which hockey player is the fittest? Explain your answer.

[2]

- (b) Exercise helps strengthen the heart. This means that each time the heart beats it can pump more blood. Explain fully the advantage of the heart pumping more blood per beat.

[2]

- (c) We can also help the heart and circulatory system by being careful about what we eat.

We can eat less food. Write down **another** dietary change people can make to help protect against heart disease.

_____ [1]

8 (a) Each year many animals are used to test new medical drugs.

(i) Give **one** advantage of using animals when testing drugs.

[1]

(ii) Give **one** reason why it is necessary to test new drugs on human volunteers before a drug is licensed.

[1]

(iii) Why do many countries allow medical drugs, but not beauty products, to be tested on animals?

[1]

(b) Carbon monoxide in cigarette smoke can cause people to be short of energy.

Explain fully why people who smoke may be short of energy.

[3]

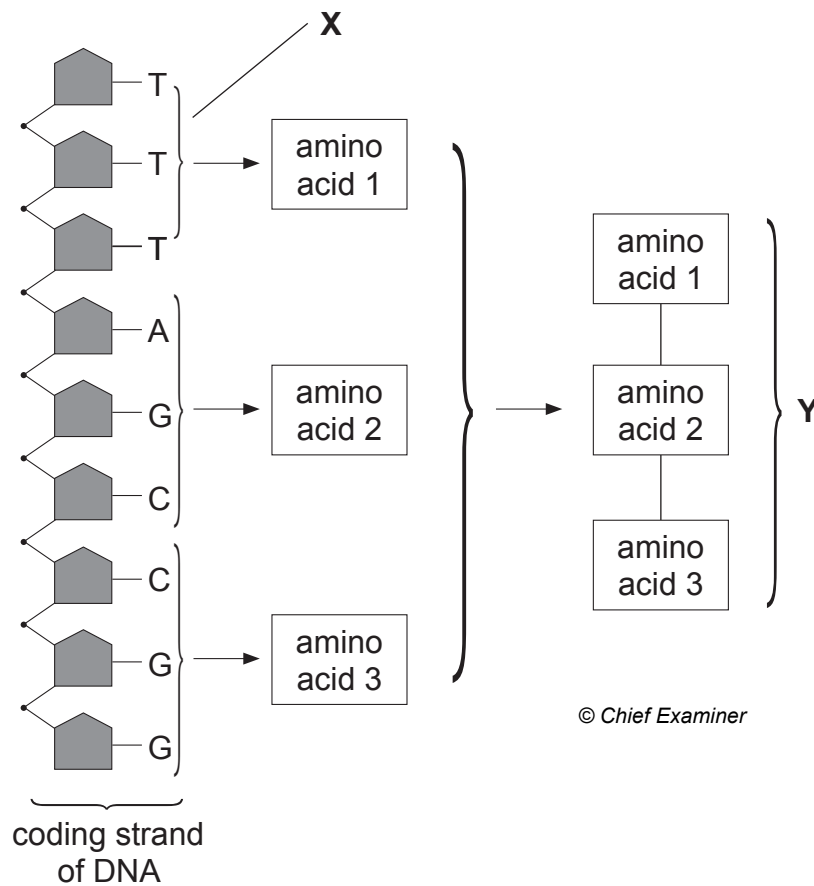
9 The table below shows the percentage of guanine bases in a section of DNA.

(a) Complete the table to show the percentage of the other bases.

| base | adenine | cytosine | guanine | thymine |
|------|---------|----------|---------|---------|
| % | | | 20 | |

[2]

(b) The diagram below summarises the coding role of DNA in cells.



(i) State the term that is used to describe the group of three bases labelled X.

[1]

(ii) Name the structure labelled Y.

[1]

[Turn over

- (c) Franklin and Wilkins, Watson and Crick, and Chargaff were all involved in working out the structure of DNA.

Which scientist(s) investigated the structure of DNA first?

_____ [1]

- (d) Cystic fibrosis is an inherited genetic condition. The cystic fibrosis allele (**f**) is recessive to the normal allele (**F**).

- (i) Explain what is meant by **recessive**.

_____ [1]

- (ii) Use the Punnett square to show how two parents who do **not** have the condition can have a child who has cystic fibrosis.

| | | |
|--|--|--|
| | | |
| | | |
| | | |

[2]

- (iii) What is the probability of a child from these parents having cystic fibrosis?

_____ [1]

(e) The digestive system, lungs and some other parts of the body are damaged in individuals who have cystic fibrosis. Gene therapy can be used to treat individuals with cystic fibrosis. This involves spraying normal alleles into the lungs using aerosols. Any lung cells that the spray reaches and enters will then function normally.

Using the information provided and your knowledge, give **two** reasons why gene therapy only has limited success in the treatment of cystic fibrosis.

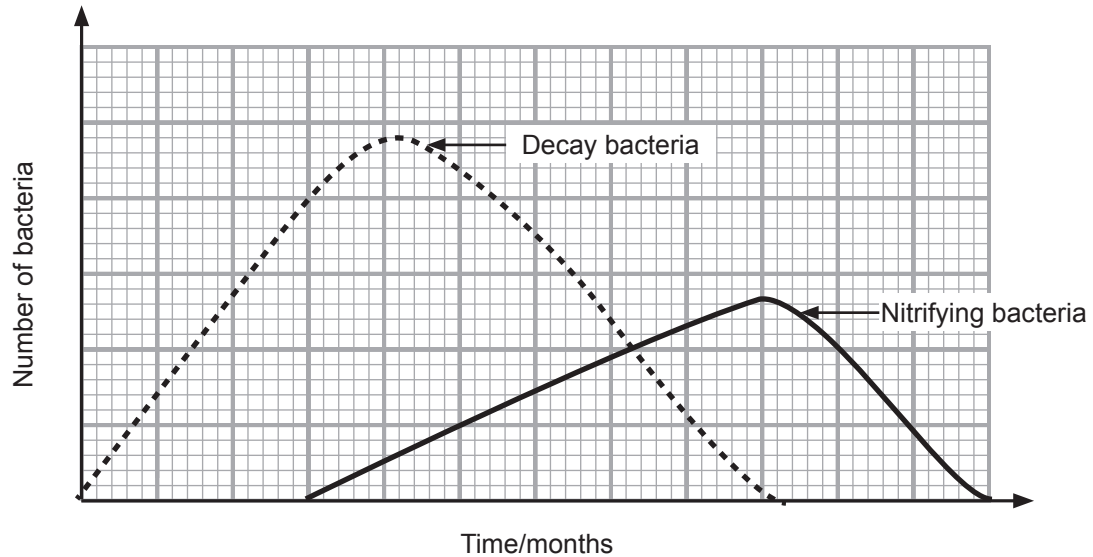
1. _____

2. _____

_____ [2]

[Turn over

10 (a) The nitrogen cycle is used to explain how nitrogen in organic material is made available to plant roots by bacteria. The graph below shows how the numbers of decay bacteria and nitrifying bacteria change over time during the recycling of nitrogen in grass cuttings in a compost heap.



Use this information and your knowledge to describe and explain the trends shown in the graph. Describe in detail how the nitrogen in the cuttings is eventually recycled to become nitrogen in plant protein again.

In this question you will be assessed on your written communication skills including the use of specialist scientific terms.



[6]

- (b) Carbon is another element that is needed for life on Earth. However, unlike the nitrogen cycle, the carbon cycle can be described as being **unbalanced**.

Why can the carbon cycle be described as being **unbalanced**?
Explain ways humans have contributed to it being **unbalanced**.

[3]

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| For Examiner's use only | |
|-------------------------|-------|
| Question Number | Marks |
| 1 | |
| 2 | |
| 3 | |
| 4 | |
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| 7 | |
| 8 | |
| 9 | |
| 10 | |

| | |
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| Total Marks | |
|--------------------|--|

Examiner Number

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