



Centre Number

71	
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Candidate Number

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General Certificate of Secondary Education
2011

Science: Biology

Paper 2
Higher Tier

[G0904]



THURSDAY 2 JUNE, MORNING

TIME

2 hours.

INSTRUCTIONS TO CANDIDATES

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

Write your answers in the spaces provided in this question paper.

Answer **all eight** questions.

INFORMATION FOR CANDIDATES

The total mark for this paper is 160.

Quality of written communication will be assessed in question **2(b)(ii)**.

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

Details of calculations should be shown.

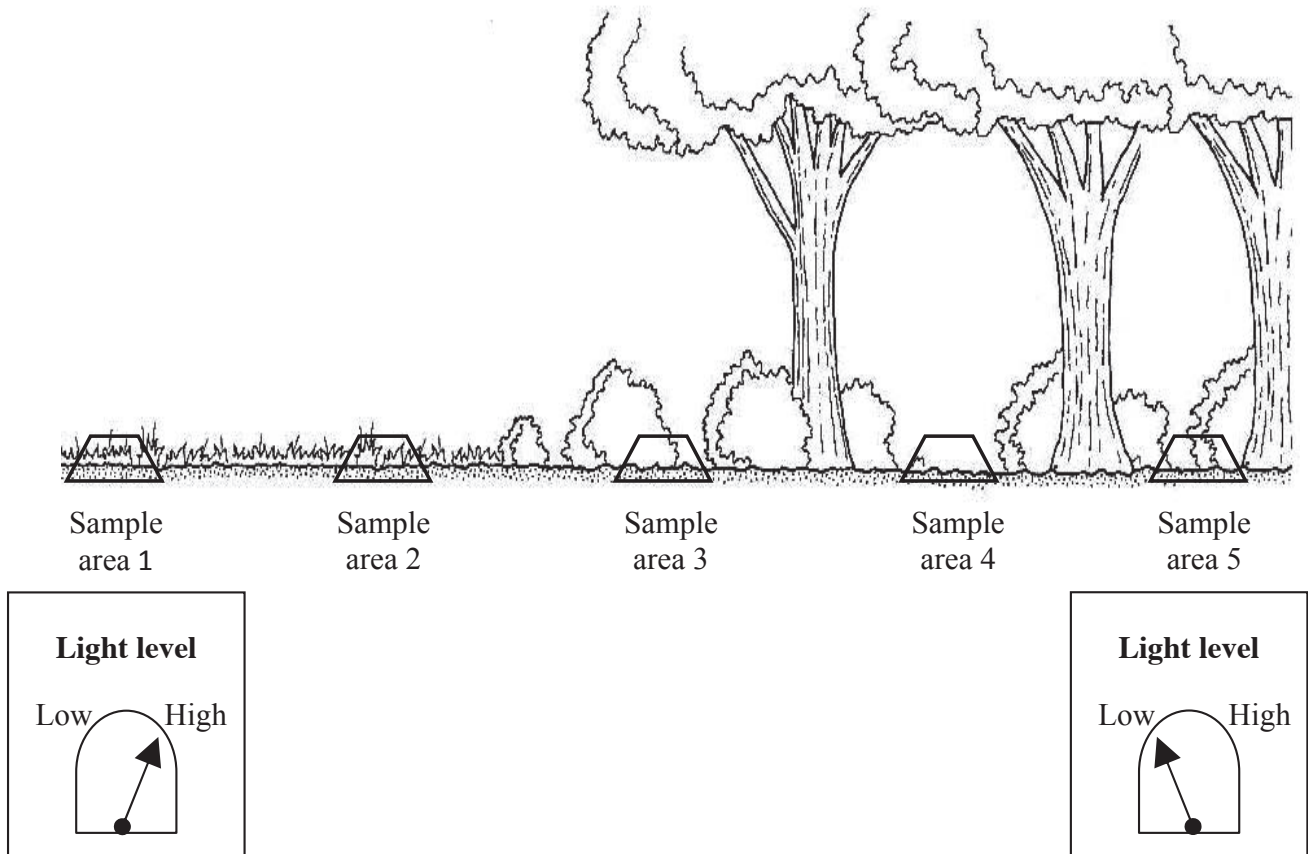
Units must be stated in numerical answers where appropriate.



For Examiner's use only	
Question Number	Marks
1	
2	
3	
4	
5	
6	
7	
8	

Total Marks	
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1 (a) The diagram shows where light measurements and samples were taken in a habitat study.



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The table shows the number of plant species in each sample area.

Sample area	1	2	3	4	5
Number of plant species	12	11	7	4	3

(i) Suggest why the number of plant species decreases from sample area 1 to sample area 5.

_____ [1]

Examiner Only	
Marks	Remark

(b) The diagram shows a sample of the animals collected during the habitat study.



A – © iStockphoto / Thinkstock
 B – © iStockphoto / Thinkstock
 C – © Brand X Pictures / Thinkstock
 D – © iStockphoto / Thinkstock
 E – © Hemera / Thinkstock

(i) Give the letters of the animals which are insects.

_____ [1]

(ii) Give **two** features of insects **not visible** in the diagram.

1. _____ [1]

2. _____ [1]

(iii) To which group do insects belong?

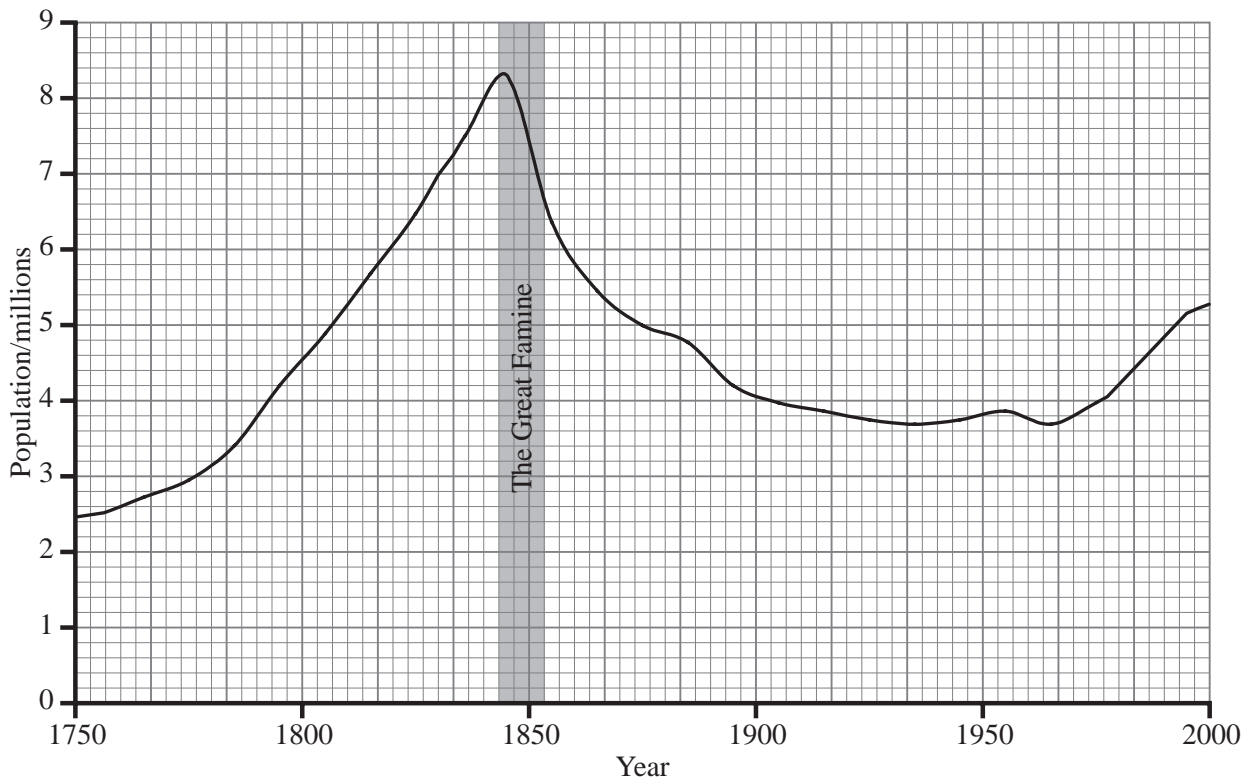
_____ [1]

(iv) Give **one** feature **visible** in the diagram, which adapts all these animals for life on land.

_____ [1]

Examiner Only	
Marks	Remark

(c) The graph shows changes in the population of Ireland between 1750 and 2000.



© Dr Wesley Johnston

(i) Explain, in terms of birth rate and death rate, the population change during the Great Famine.

_____ [2]

After the Great Famine, the population decreased mainly due to emigration.

(ii) What is emigration?

_____ [1]

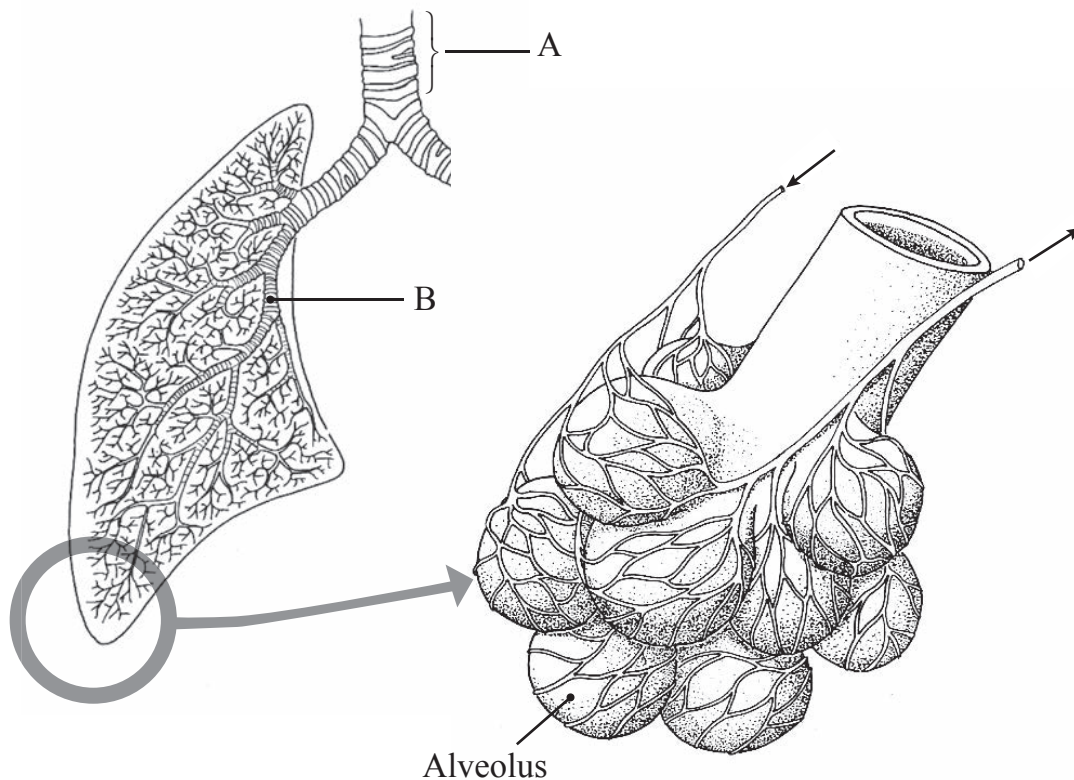
(iii) Suggest **two** reasons why the population started to increase after 1960.

1. _____ [1]

2. _____ [1]

Examiner Only	
Marks	Remark

(b) The diagrams show part of the human respiratory system.



© Introduction to Biology by D G Mackean, published by John Murray, 1978, ISBN 0719534496

(i) Name parts A and B.

A _____ [1]

B _____ [1]

(ii) Describe how an alveolus is adapted for gas exchange.

_____ [3]

Quality of written communication [2]

Examiner Only	
Marks	Remark

(c) Use this passage about smoking cigarettes, to help answer the question.

In the UK about 120,000 people per year die of smoking-related diseases. 82% of all deaths from lung cancer, 83% of all deaths from bronchitis and emphysema and about 25% of all deaths from heart disease are linked to smoking. 1

People who smoke between 1 and 14 cigarettes a day have 8 times the risk of dying from lung cancer compared to non-smokers. The risk increases the more cigarettes are smoked; those who smoke over 25 cigarettes a day have 25 times this risk. 5

Many smokers would like to quit. Ten years after stopping smoking the risk of getting lung cancer has fallen to half that of a smoker and the risk of having a heart attack is the same as never having smoked. 10

(i) How many people die of smoking-related diseases each year?

_____ [1]

(ii) Complete the table. (Lines 2–4)

Cause of death	Percentage linked to smoking	
Bronchitis and emphysema		[1]
	25	[1]
		[1]

(iii) Describe the difference in the risk of smoking 10 cigarettes per day compared to 30 cigarettes per day. (Lines 5–8)

 _____ [2]

(iv) Which chemical in cigarette smoke can cause lung cancer?

_____ [1]

(v) Suggest why people who smoke cigarettes find it hard to stop.

_____ [1]

Examiner Only	
Marks	Remark

3 (a) Complete the table on cell structure by placing a ✓ or an ✗ in the boxes.

✓ = present ✗ = absent

Cell structure	Plant cell	Animal cell
Cell wall	✓	
Cytoplasm		
Chloroplast		
Vacuole		✗

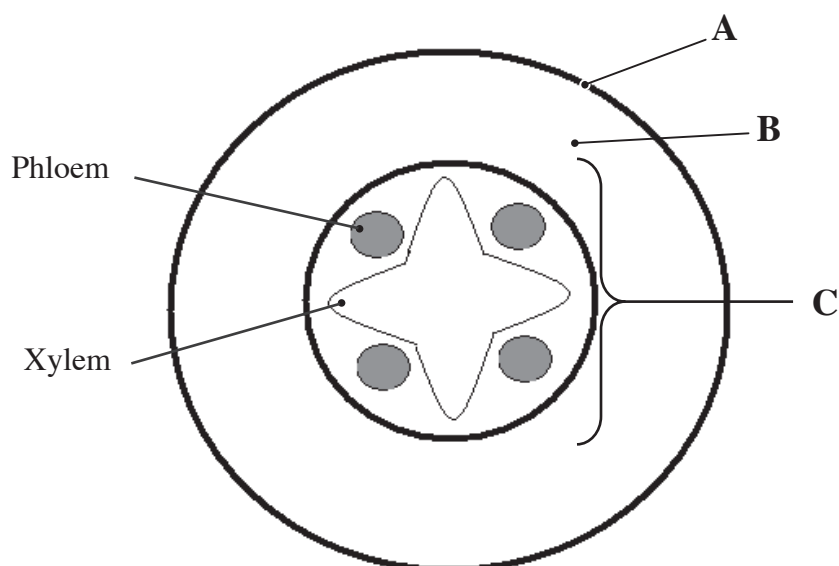
[1]

[1]

[1]

[1]

(b) The diagram shows a section through a plant root.



(i) Name parts A, B and C.

A _____

[1]

B _____

[1]

C _____

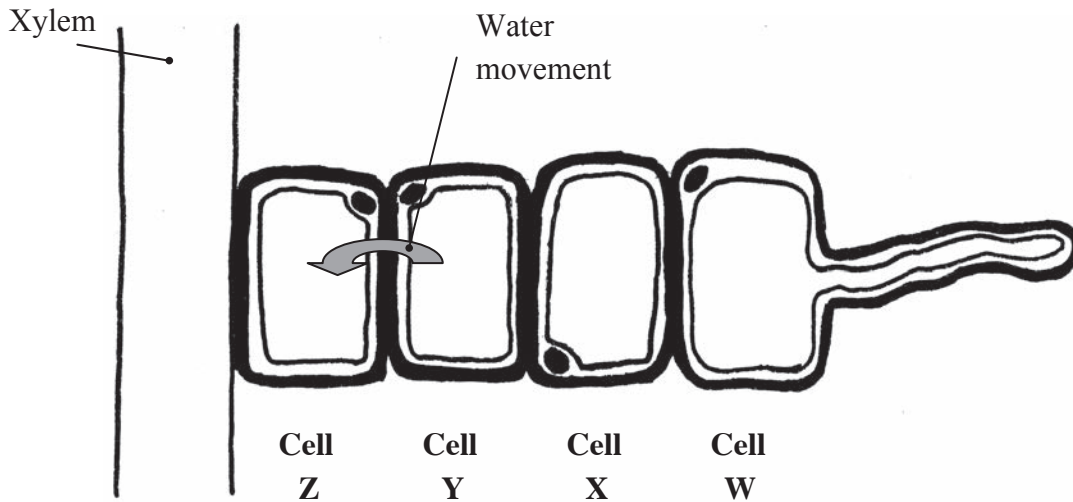
[1]

Examiner Only	
Marks	Remark

(ii) Describe the function of phloem.

_____ [2]

The diagram shows an enlarged section through part of the plant root.



(iii) On the diagram draw an arrow to show the direction water moves in the xylem. [1]

(iv) Give the name of this movement of water in the xylem. [1]

(v) Name the process by which water diffuses from cell Y to cell Z. [1]

Examiner Only	
Marks	Remark

- 4 (a) The table shows the information given on a box of wholegrain breakfast cereal.

	Amount per 100 g
Energy/kJ	1520
Protein/g	9.5
Carbohydrate/g	70.9
Fat/g	5.3
Fibre/g	9.4
Salt/g	0.18
Iron/mg	11.9

- (i) Calculate the amount of energy in a 40g serving of this breakfast cereal.
Show your working.

_____ kJ [2]

- (ii) Use the table to name the food group which
can be an immediate source of energy for the body.

_____ [1]

is made up of long chains of amino acids.

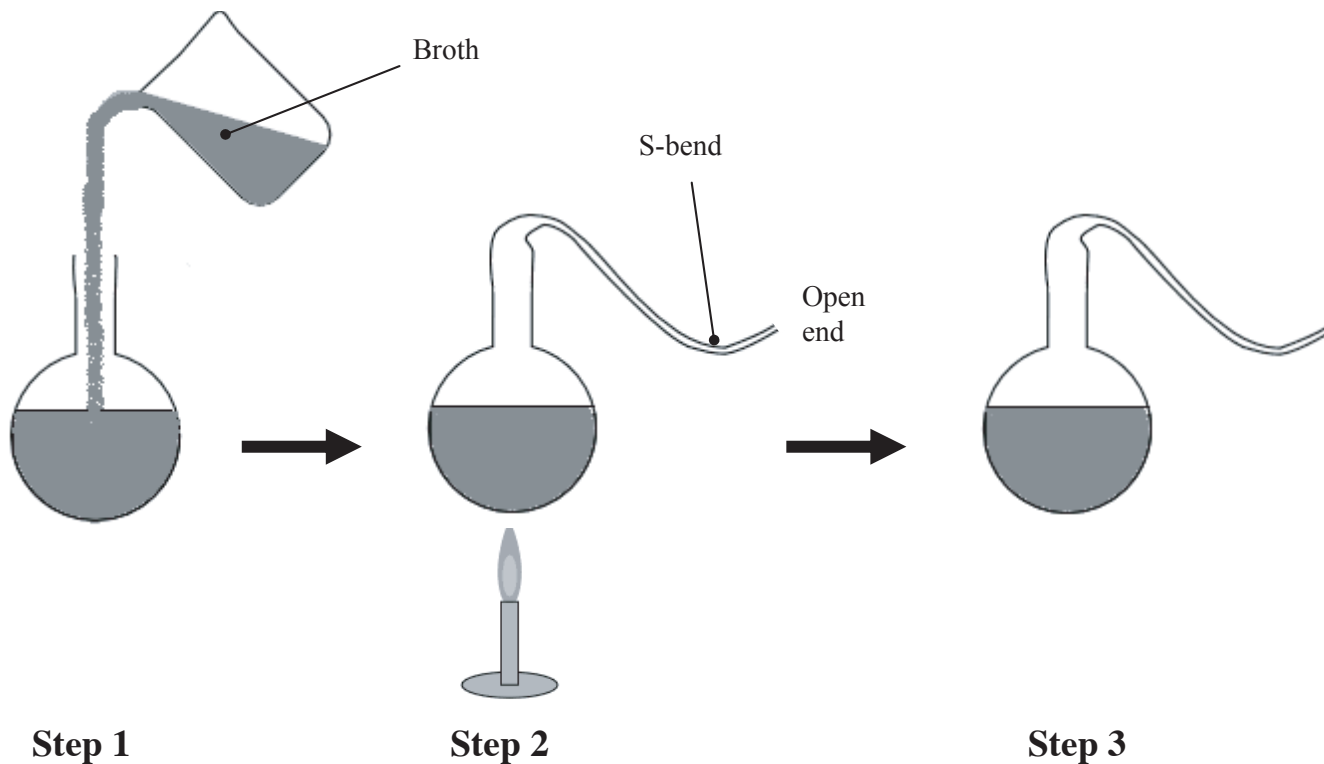
_____ [1]

- (iii) Explain why children need more protein in their diet than an adult.

_____ [1]

Examiner Only	
Marks	Remark

(b) The diagrams show an experiment carried out by Louis Pasteur.



(i) Explain what is meant by spontaneous generation.

_____ [2]

In step 2, Pasteur drew the neck of the flask into a long S-shape leaving it open at the end.

(ii) Explain the purpose of the

S-bend. _____

_____ [1]

open end. _____

_____ [1]

Examiner Only	
Marks	Remark

(iii) What would be a suitable control for this experiment?

_____ [1]

(iv) Explain why a bottle of milk remains fresh for longer when it is kept in the fridge.

_____ [2]

(c) The photograph shows a compost bin.



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(i) Suggest a reason for the holes in the sides.

_____ [1]

(ii) Give **two other** conditions needed for decomposition.

1. _____ [1]

2. _____ [1]

Examiner Only	
Marks	Remark

(iii) Suggest **two** items of kitchen waste which could be composted.

1. _____ [1]

2. _____ [1]

(iv) Name one invertebrate detritus feeder, which may be found in a compost bin.

_____ [1]

Examiner Only	
Marks	Remark

5 (a) Complete the table of diseases caused by microorganisms.

Disease	Type of organism	Method of transfer	Prevention or cure
	H I Virus	Sexual intercourse	
Rubella		Droplet infection	Vaccination
	Bacteria		Cooking food to a high temperature

[5]

(b) (i) Name the antibiotic discovered by Alexander Fleming.

_____ [1]

(ii) Describe how he discovered the antibiotic.

_____ [2]

(c) Give **three** ways the body prevents microorganisms from entering.

1. _____ [1]

2. _____ [1]

3. _____ [1]

Examiner Only	
Marks	Remark

(d) The vaccine for Rubella contains an inactivated form of the microorganisms which cause the disease.

(i) Explain what happens when inactivated Rubella microorganisms are injected into the bloodstream.

[2]

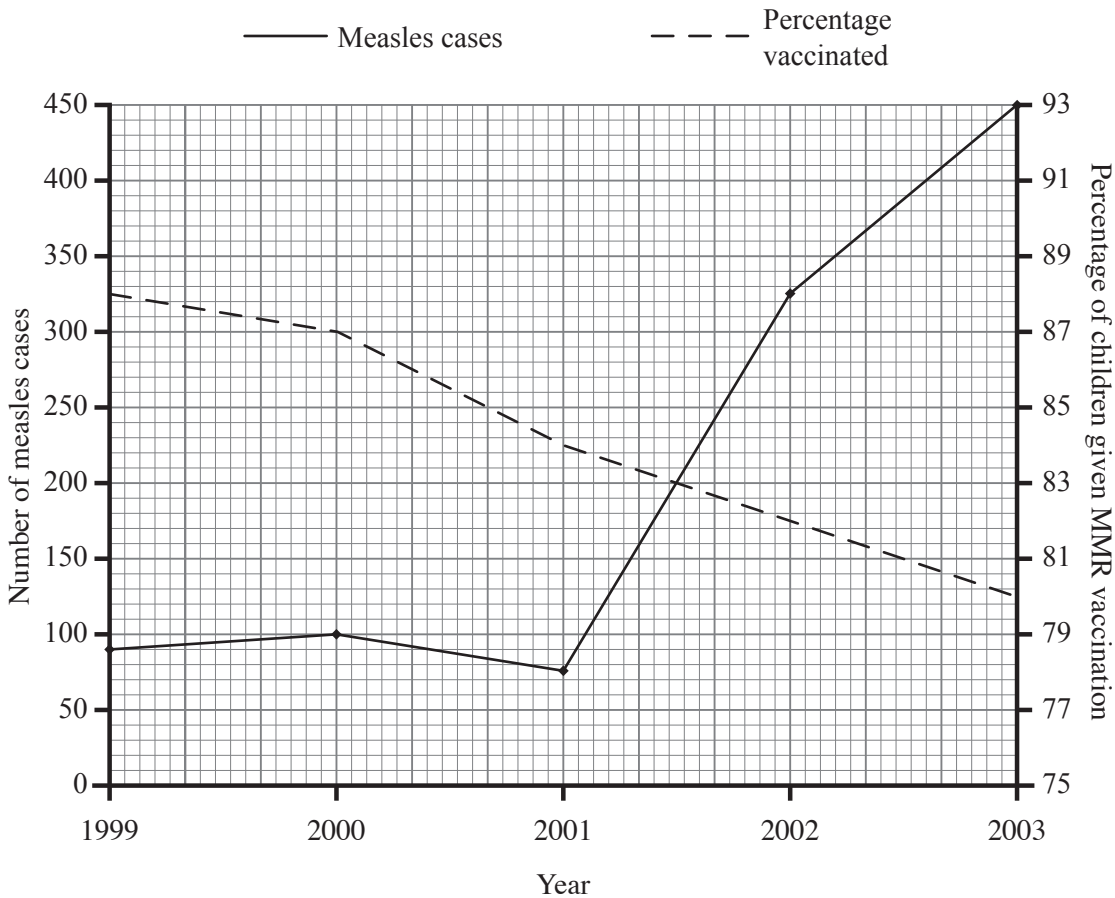
(ii) Explain why it is important to give women the Rubella vaccine before they become pregnant.

[1]

Examiner Only	
Marks	Remark

Rubella vaccine is usually given in combination with vaccines for measles and mumps, known as the MMR vaccine.

The graph shows changes in the percentage of children given the MMR vaccination and the numbers of measles cases in the UK between 1999 and 2003.



(e) (i) What percentage of children were given the MMR vaccination in 2001?

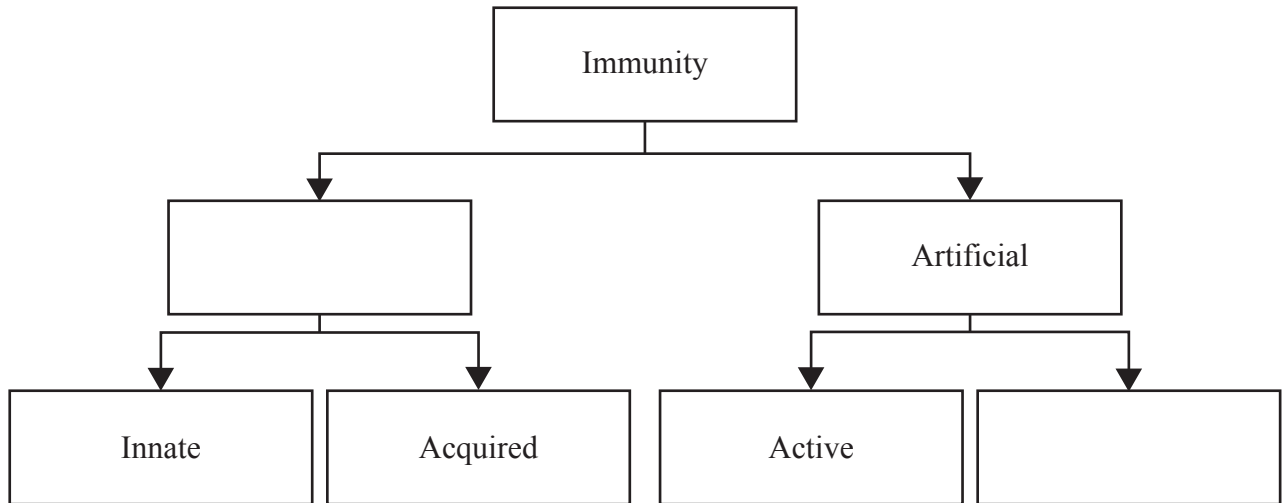
_____ [1]

(ii) Calculate the percentage increase in measles cases between 2001 and 2003.
Show your working.

Answer _____ [2]

Examiner Only	
Marks	Remark

(f) (i) Complete the diagram summarising different types of immunity.



[2]

Examiner Only

Marks	Remark

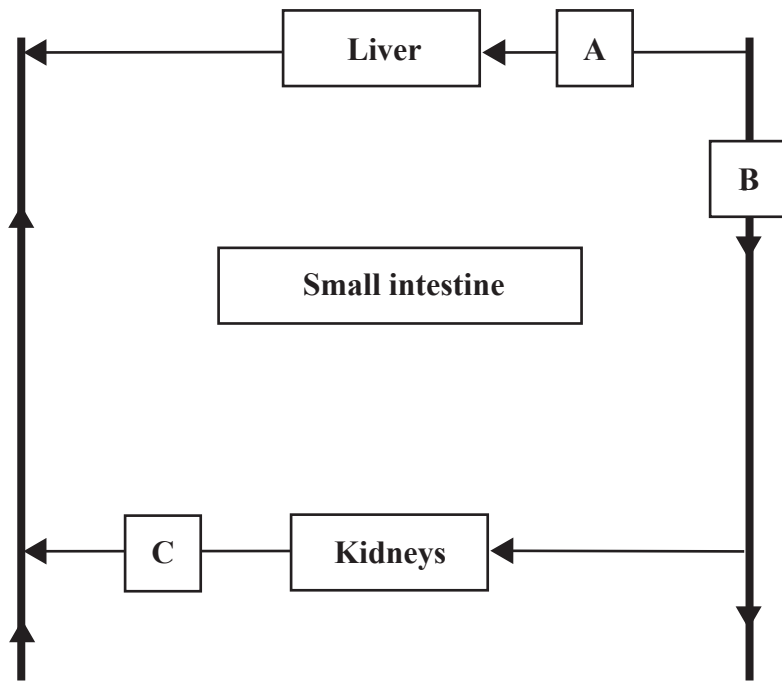
(ii) Give **two** similarities between acquired and active immunity.

_____ [2]

(iii) Explain innate immunity.

_____ [1]

(b) The diagram shows the blood supply to part of the human abdomen.



(i) Complete the diagram to show the blood supply to and from the small intestine. [3]

(ii) Name blood vessels A, B and C.

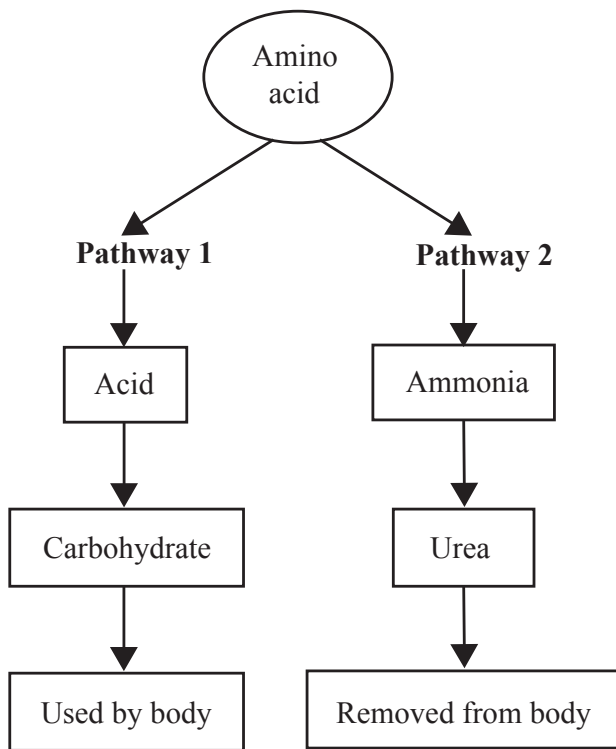
A _____ [1]

B _____ [1]

C _____ [1]

Examiner Only	
Marks	Remark

(c) The diagram summarises the breakdown of excess amino acids.



(i) Name the process which breaks down excess amino acids.
 _____ [1]

(ii) Name the organ where this process occurs. _____ [1]

(iii) Use the diagram to help explain what happens to the part of the amino acid broken down in Pathway 1.

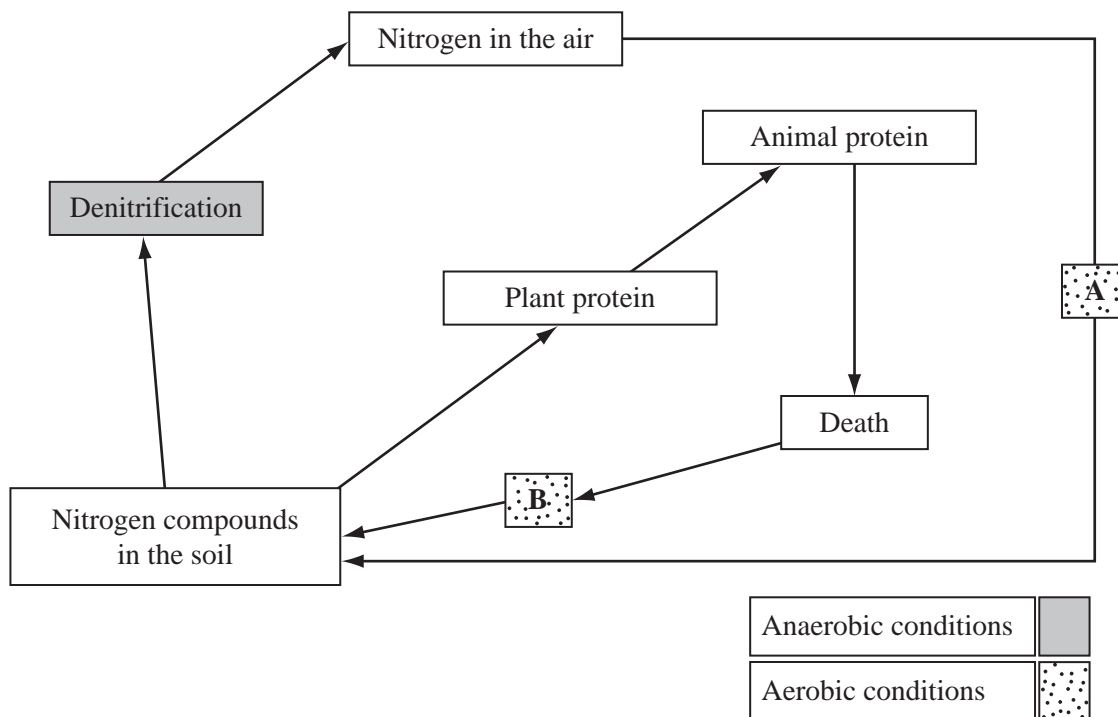
 _____ [2]

(iv) Suggest why urea is removed from the body and describe how this occurs.

 _____ [3]

Examiner Only	
Marks	Remark

7 (a) The diagram shows part of the nitrogen cycle.



(i) Name the processes A and B.

A _____ [1]

B _____ [1]

(ii) Use the diagram to help suggest how flooding decreases the concentration of nitrogen compounds in the soil.

_____ [2]

Examiner Only	
Marks	Remark

(ii) Give **two** reasons why some farmers use artificial fertilizer instead of natural fertilizer.

1. _____
_____ [1]

2. _____
_____ [1]

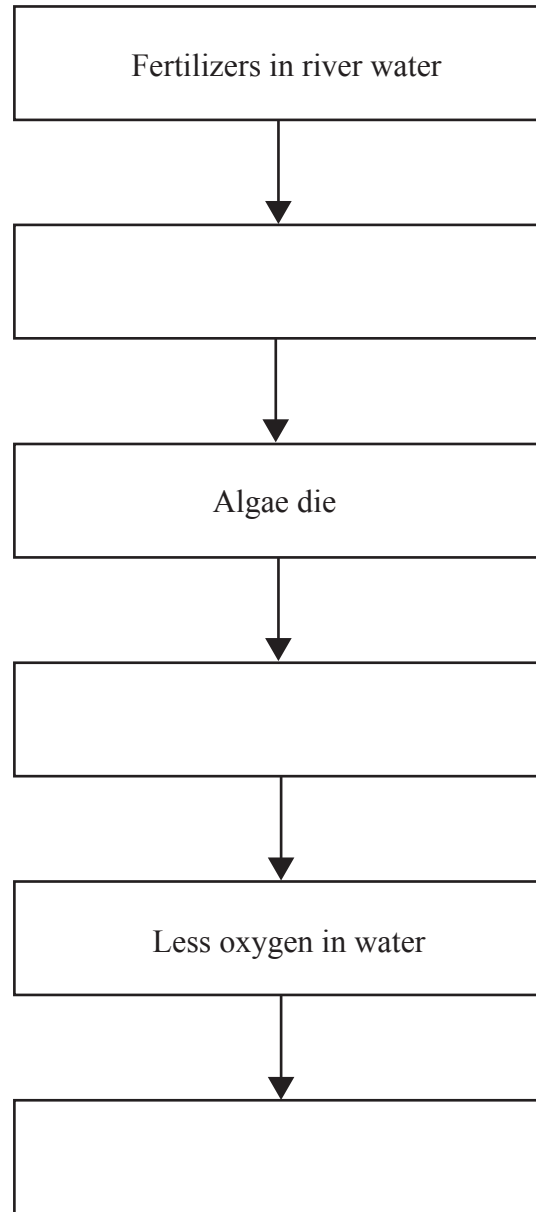
Application of excess fertilizers may cause water pollution.

(iii) Explain how fertilizers can enter river water.

_____ [2]

Examiner Only	
Marks	Remark

(iv) Complete the diagram showing the effects of applying an excess of fertilizers.



[3]

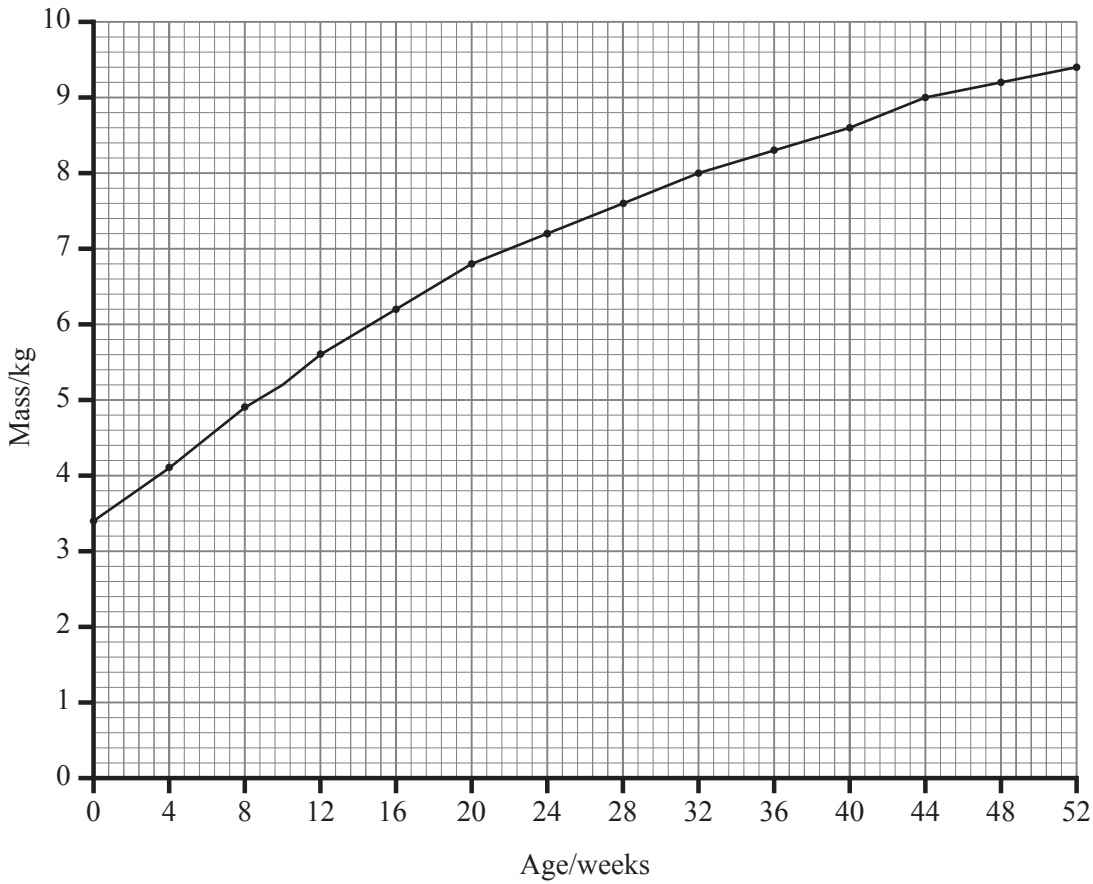
(v) Name this type of water pollution.

_____ [1]

Examiner Only	
Marks	Remark

8 (a) Mass can be used as a measure of growth.

The graph shows how the mass of a baby girl increases from birth to one year old.



- (i) Calculate the **rate** of increase in mass over the first 10 weeks.
Show your working.

Answer _____ [2]

- (ii) Describe what happens to the **rate** of growth over the 52 weeks.

_____ [1]

Examiner Only	
Marks	Remark

(iii) Name the **mineral** needed for the growth of bones.

_____ [1]

(iv) Describe the most appropriate way to measure the growth of a

tree. _____ [1]

population of single-celled organisms such as yeast.

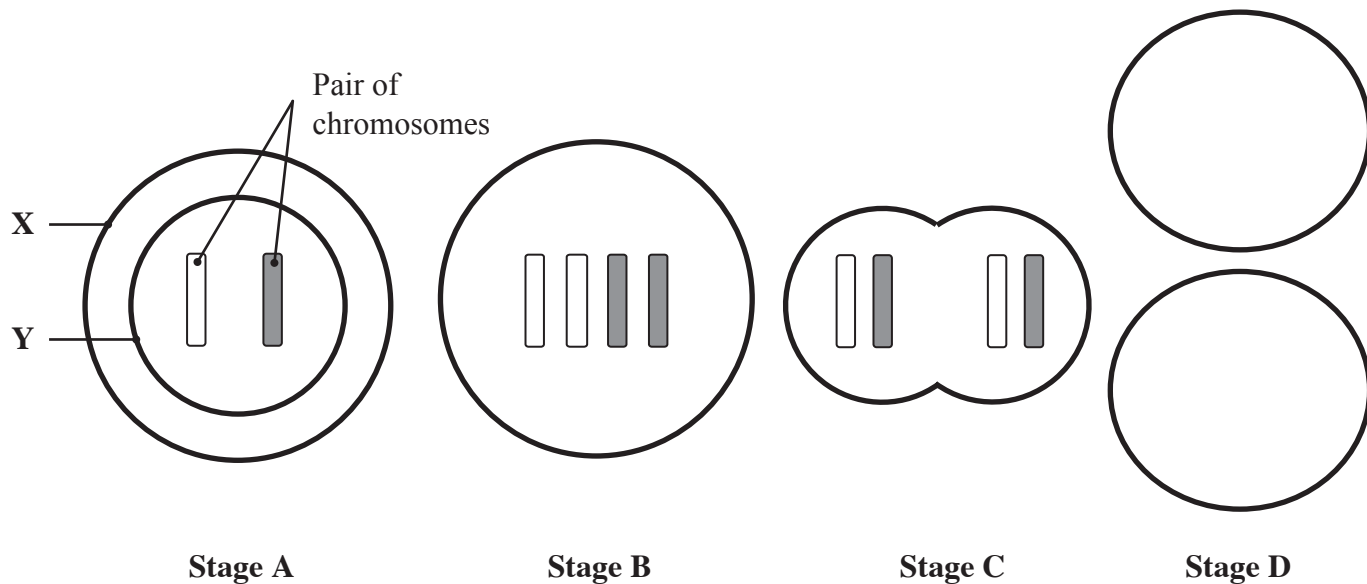
_____ [1]

Examiner Only	
Marks	Remark

(b) (i) Name the type of cell division involved in growth.

_____ [1]

The diagrams show different stages during the division of a growing animal cell containing one pair of chromosomes.



(ii) Complete the diagram to show the cells at stage D.

[2]

(iii) Name parts X and Y.

X _____

[1]

Y _____

[1]

(iv) Describe **two** differences between the cell at stages A and B.

_____ [2]

Examiner Only	
Marks	Remark

(v) Suggest **one** advantage of the HGH protein being released from the bacterial cells into the growth medium (lines 10 and 11).

[1]

(vi) Suggest **two** advantages of using bacteria, rather than other organisms, for genetic engineering.

[2]

THIS IS THE END OF THE QUESTION PAPER

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