Write your name here

Surname	Other names

Pearson Edexcel Certificate
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International GCSE

Centre Number | | | | | |

Candidate Number | | | | |

Biology

Unit: KBI0/4BI0
Science (Double Award) KSC0/4SC0
Paper: 1B

Tuesday 16 May 2017 – Afternoon
Time: 2 hours

Paper Reference
KBI0/1B 4BI0/1B
KSC0/1B 4SC0/1B

You must have:
Ruler
Calculator

Total Marks

Instructions

- Use **black** ink or ball-point pen.
- **Fill in the boxes** at the top of this page with your name, centre number and candidate number.
- Answer **all** questions.
- Answer the questions in the spaces provided
  – *there may be more space than you need.*
- Show all the steps in any calculations and state the units.

Information

- The total mark for this paper is 120.
- The marks for **each** question are shown in brackets
  – *use this as a guide as to how much time to spend on each question.*

Advice

- Read each question carefully before you start to answer it.
- Write your answers neatly and in good English.
- Try to answer every question.
- Check your answers if you have time at the end.

Turn over ▶

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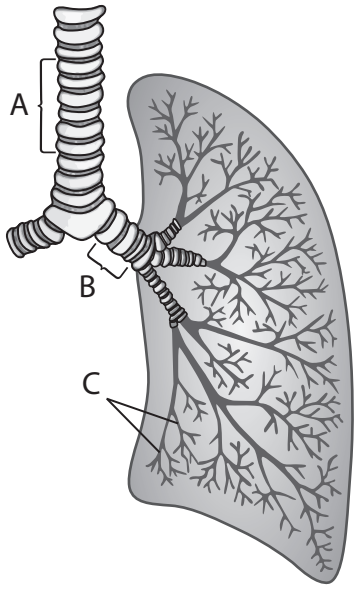
P 4 8 2 1 9 A 0 1 3 2

Pearson

Answer ALL questions.

1 The diagram shows part of the human breathing system.



(a) (i) Name the structures labelled A, B, and C.

(3)

A .....

B .....

C .....

(ii) Suggest why the lung structure is sometimes referred to as a tree.

(1)

.....

(b) Describe how ventilation of the lungs occurs when a person breathes in.

(4)

(c) Smoking cigarettes inside public buildings has been banned in many countries.

(i) Suggest why governments have banned smoking cigarettes inside public buildings.

(3)

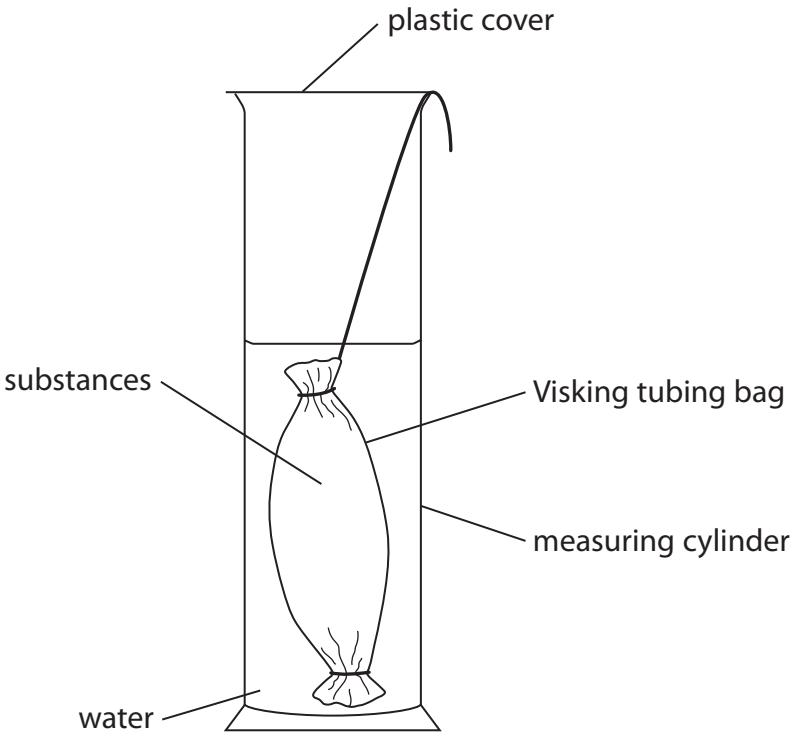
(ii) Suggest why children are particularly at risk from breathing in smoke from other people's cigarettes.

(1)

(Total for Question 1 = 12 marks)

2 A student investigates the movement of substances from the gut into the blood using a model.

The Visking tubing bag represents the gut and water represents the blood. Visking tubing is permeable to small molecules.



The student puts different solutions of various substances into the bag.

After 20 minutes he carries out food tests on the water.

(a) (i) Complete the table to show the results obtained by the student. One has been done for you.

(3)

Solutions in bag	Starch present in water	Glucose present in water
starch only	no	no
starch and glucose		
starch and maltase		
starch and boiled amylase		

(ii) Explain how the volume of the bag would change when it only contains starch solution.

(3)

(iii) Describe the test the student should use to find out if glucose is present in the water.

(3)

(b) Explain how you could use this apparatus to investigate the effect of bile on the digestion of lipid.

(3)

(Total for Question 2 = 12 marks)

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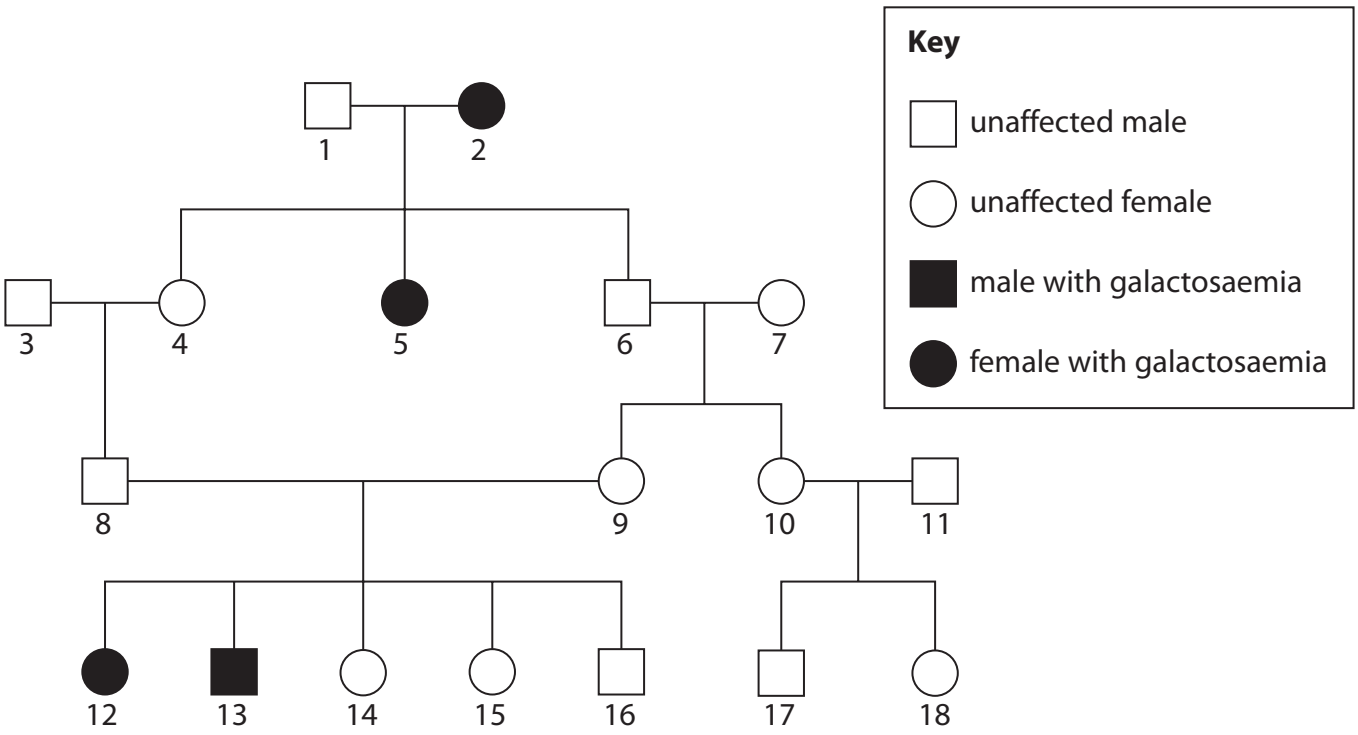
3 Galactosaemia is an inherited condition. It is caused by a mutation to a gene on chromosome 9. This gene codes for an enzyme that removes the sugar galactose from the body.

The normal allele, G, can produce the enzyme and is dominant to the recessive allele, g.

The pedigree shows the inheritance of galactosaemia in a family.



(a) (i) How many individuals in the family pedigree have an X and a Y chromosome in each of their body cells?

(1)

.....

(ii) How many individuals in the family pedigree are homozygous recessive?

(1)

.....

(iii) Give the genotype of individual 1.

(1)

.....

(iv) Individuals 8 and 9 are going to have another child.

Give the probability of this child having galactosaemia.

(1)

.....

(b) (i) What is meant by the term **mutation**?

(2)

(ii) The mutation for galactosaemia is harmful but some mutations can be beneficial.

Describe one example of a beneficial mutation.

(1)

(c) Some inherited conditions can be fatal but medical treatment is often available.

Explain what would happen to the frequency of alleles for these inherited conditions if medical treatment was not available.

(3)

(Total for Question 3 = 10 marks)

4 (a) A student reads the following statement.

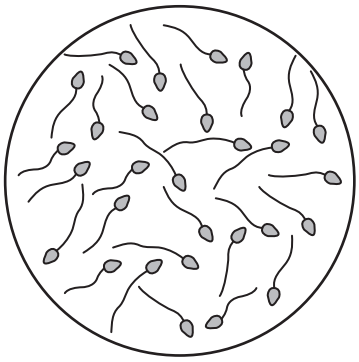
"the father determines the sex of a baby"

Explain why this statement is true.

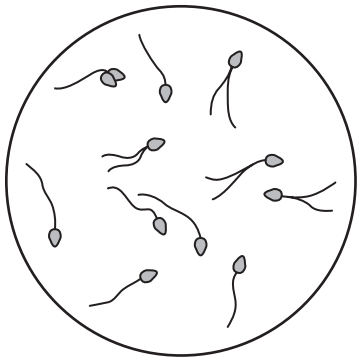
(2)

(b) The diagram shows sperm cells, viewed using a microscope, from two different men.

Man A



Man B



Use the information in the diagram to give two reasons why man A is more fertile than man B.

(2)

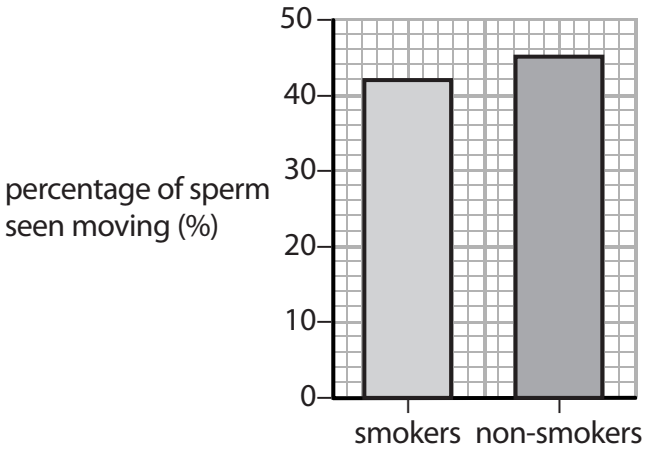
1 .....

.....

2 .....

.....

(c) The graph shows how smoking may affect the movement of sperm.



(i) The average (mean) sperm count in the semen from non-smokers is 55 million in 1 cm^3.

Calculate the number of moving sperm in 1 cm^3 of semen from the non-smokers.

(2)

number of moving sperm = ...

(ii) Use the information from the graph to explain why smoking could affect male fertility.

(2)

.....

.....

.....

.....

(Total for Question 4 = 8 marks)

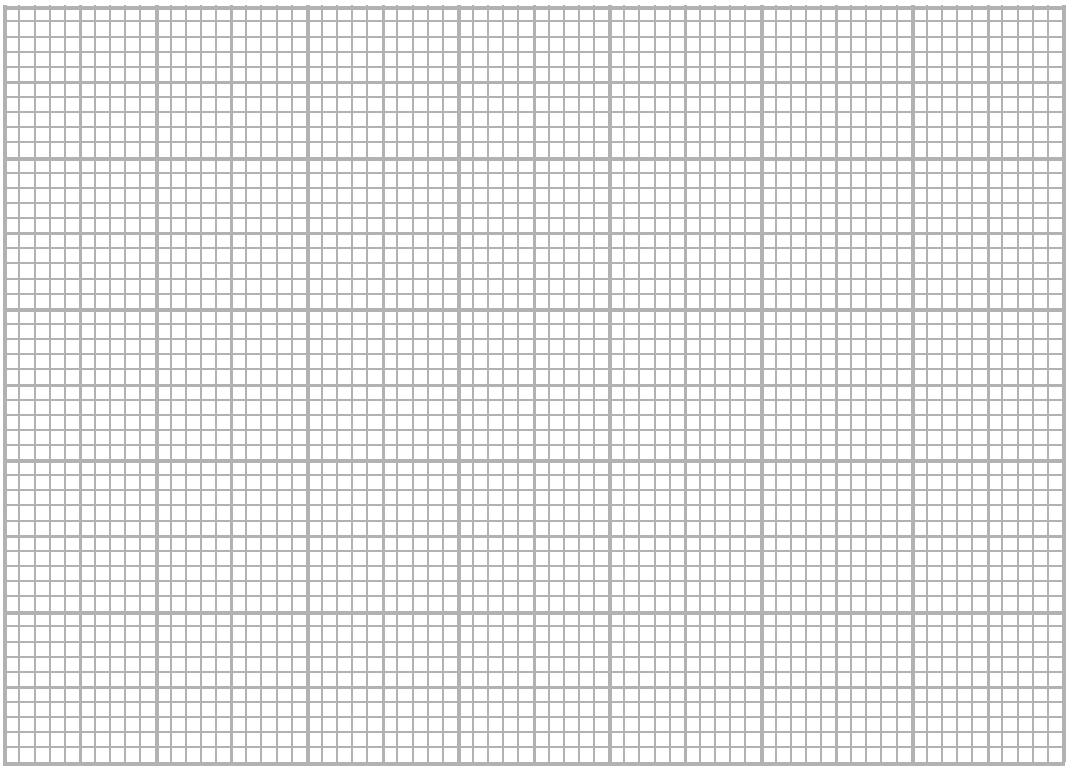
5 In a survey, people of different ages were asked if they thought that animal cloning is a good idea or a bad idea.

The table shows the results of the survey.

Age group	Percentage (%) of age group	
	Good idea	Bad idea
under 24	10.6	89.4
25 to 34	14.2	85.8
35 to 44	13.8	86.2
45 to 54	15.0	85.0
over 55	23.5	76.5

(a) Plot a bar graph to show the data in the table.

(5)



(b) Describe the relationship between age and what people think about animal cloning.

(1)

.....

.....

(c) In the 45 to 54 age group, 18 people think that cloning is a good idea.

Calculate the total number of people surveyed in this age group.

Show your working.

(2)

total number of people = ...

(d) Some people in the survey did not know anything about cloning.

The process had to be described to them before they made a decision.

Describe the process of cloning an adult animal using a named example.

(6)

(Total for Question 5 = 14 marks)

6 The amount of light falling on plant leaves is an abiotic (non-living) factor that affects photosynthesis.

(a) Give the balanced chemical equation for photosynthesis.

(2)

(b) The leaves of plants that live in the shade (low light) are different to the leaves of plants that live in full sunlight.

(i) Suggest why leaves from plants that live in the shade are darker green than leaves from plants that live in full sunlight.

(2)

(ii) Explain why leaves from plants that live in the shade are thinner than leaves from plants that live in full sunlight.

(2)

(c) The rate of photosynthesis changes during the day.

(i) Explain the factors that affect the rate of photosynthesis in the early morning.

(3)

(ii) Explain the factors that affect the rate of photosynthesis in the early afternoon.

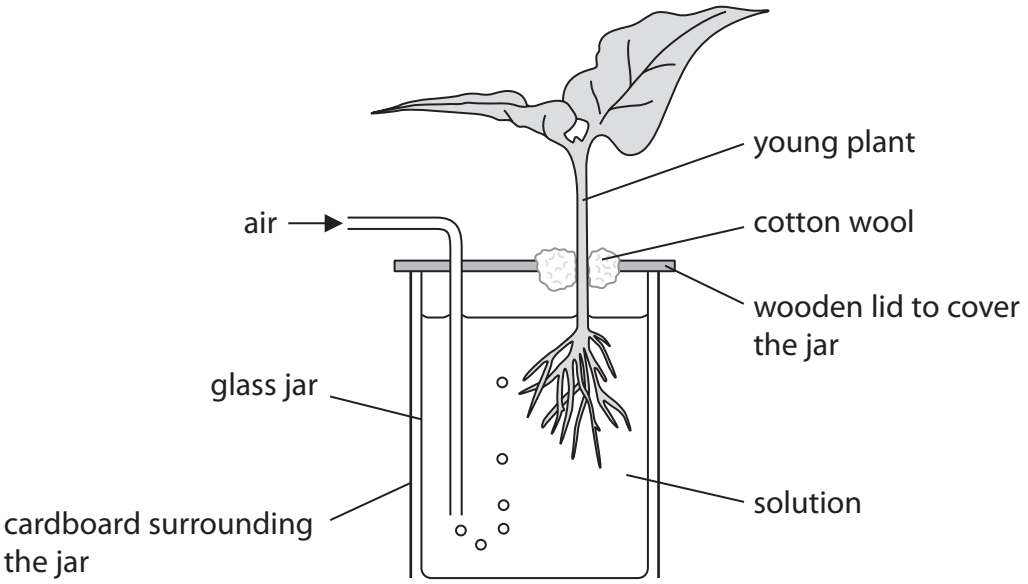
(3)

(d) Describe how you could compare the rate of photosynthesis in two different plant species.

(4)

(Total for Question 6 = 16 marks)

7 A student uses this apparatus to investigate the effect of nitrate ions on the growth of plants.



- A young plant is grown in a sterile solution containing all the mineral ions needed for growth.
- The student repeats the experiment with other young plants.
- The student also carries out the experiment with young plants grown in a sterile solution that contains all the mineral ions except nitrate.
- The student measures the length of the stem of each plant every five days.

Some of the student's results are shown in the table.

Time in days	Average (mean) length of stem in mm	
	Solution containing all mineral ions	Solution without nitrate ions
0	23	23
5	30	25
15	45	30
25	98	38
35	145	38
45	160	37
55	163	37

(a) Describe the growth of the plants in each solution.

(2)

(b) Explain why young plants absorb more mineral ions when air is bubbled through the solutions.

(3)

(c) (i) Suggest why each solution is sterilised at the start of this investigation.

(2)

(ii) Suggest why the glass jar is surrounded by cardboard during this investigation.

(2)

(d) (i) Identify the dependent variable in this investigation.

(1)

.....

(ii) Name one biotic (living) variable that should be controlled in this investigation.

(1)

.....

.....

(Total for Question 7 = 11 marks)

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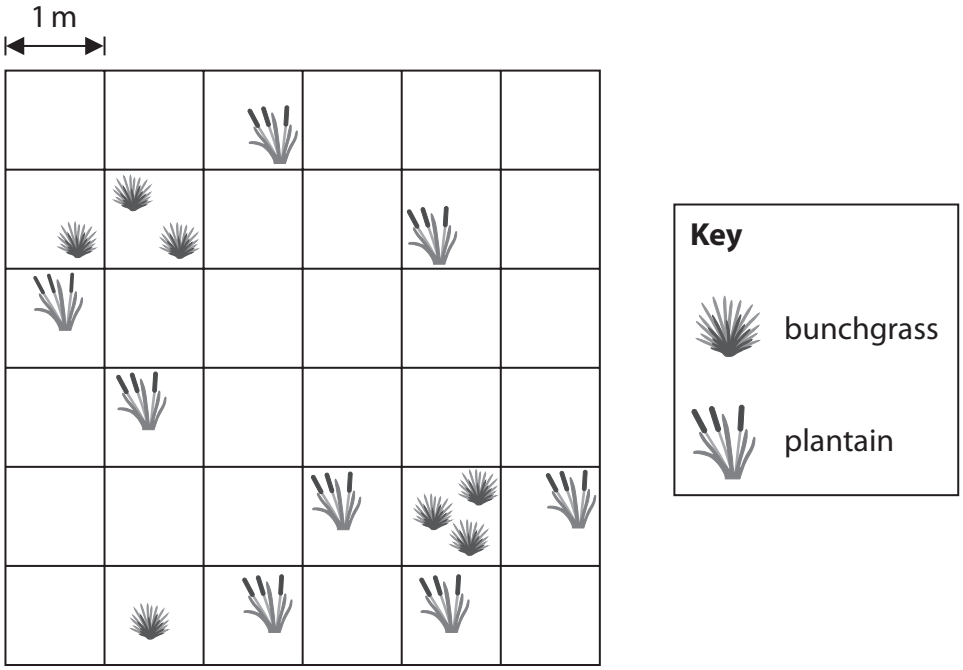
8 The diagram shows the distribution of two plant species in a small area of a field.



A student uses a square metal frame to help count all the plants in the area.

(a) What is the name given to the metal apparatus that the student uses?

(1)

(b) (i) He counts the number of plants in all of the squares he marked out in the field.

Complete the table to show the number of plants of each species and the average (mean) number of plants per m^2.

(2)

Species	Number of plants	Average number of plants per m^2
bunchgrass	7	0.19
plantain		

(ii) Frequency is another measure that can be used to study distribution.

Frequency is the number of squares that contain at least one plant of the species being counted. This value can also be expressed as a percentage of the total number of squares sampled.

Complete the table by giving the frequency and percentage of the total number of squares sampled for bunchgrass.

(2)

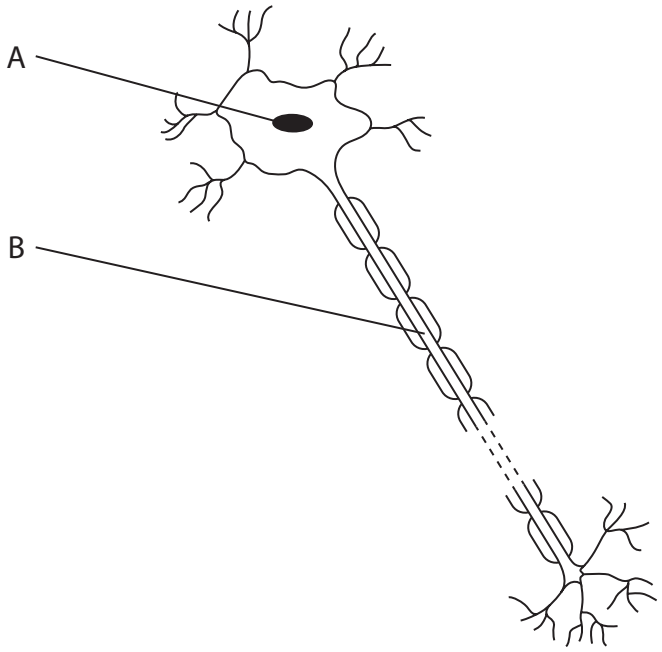
Species	Frequency	Percentage (%)
bunchgrass		
plantain	8	22

(c) Describe how the student could estimate the population size of plantain in a very large field.

(4)

(Total for Question 8 = 9 marks)

9 The diagram shows a cell from the human nervous system.



(a) (i) Name the structure labelled A.

(1)

.....

(ii) Name the structure labelled B.

(1)

.....

(iii) Draw an arrow on the diagram to show the direction of a nerve impulse.

(1)

(b) Describe the role of this neurone in a simple reflex arc.

(2)

.....

.....

.....

.....

.....

.....

(c) Nervous communication differs from hormonal communication.

State three ways that nervous communication differs from hormonal communication.

(3)

1 .....

.....

.....

2 .....

.....

.....

3 .....

.....

.....

(Total for Question 9 = 8 marks)

10 The passage describes how different organisms are classified into groups.

Complete the passage by writing a suitable word or words in each of the spaces.

(10)

Plants are multicellular organisms. They have chloroplasts to carry out photosynthesis and cell walls made of ..... . They store carbohydrate as ..... or as sucrose.

Animals are also multicellular but do not carry out photosynthesis. They are able to move from place to place and are always described as ..... in food chains. They store carbohydrate as ..... .

Bacteria are single-celled organisms. They do not have a nucleus. Instead, they contain a circular ..... and smaller circles of DNA called ..... . Most bacteria feed off other living or dead organisms but some bacteria can make their own food by ..... .

Examples of bacteria include *Lactobacillus*, used in the production of ..... from milk, and *Pneumococcus*, that acts as a ..... causing the disease ..... .

(Total for Question 10 = 10 marks)

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11 The photograph shows the logs left behind after an area of forest has been cut down.

© Calibas

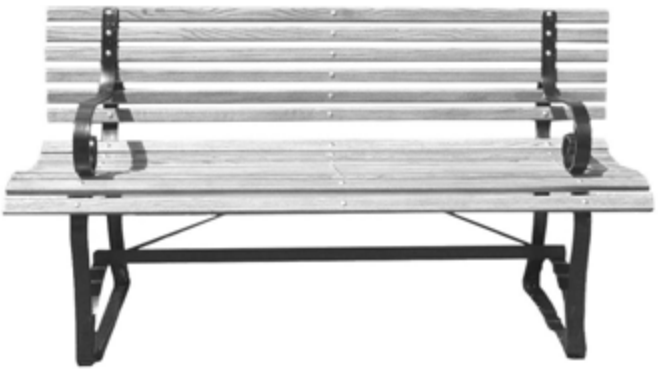
These logs are decomposed by fungi.

(a) Describe how fungi decompose tree logs.

(4)

(b) Some of the logs removed from the forest are used to make garden benches.

The photograph shows a garden bench.



© James F. Perry

The garden bench is painted with a fungicide solution.

This prevents the wood being decomposed because fungicide kills fungi.

There are different fungicides that can be used.

Design an investigation to find out which fungicide is best at preventing the decomposition of wooden logs.

Your answer should include experimental details and be written in full sentences.

(6)

(Total for Question 11 = 10 marks)

TOTAL FOR PAPER = 120 MARKS

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