Write your name here

Surname	Other names

Edexcel IGCSE

Centre Number	Candidate Number

Biology

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

Thursday 19 May 2011 – Afternoon
Time: 2 hours

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

You must have:
Ruler
Candidates may use a 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.
- Keep an eye on the time.
- 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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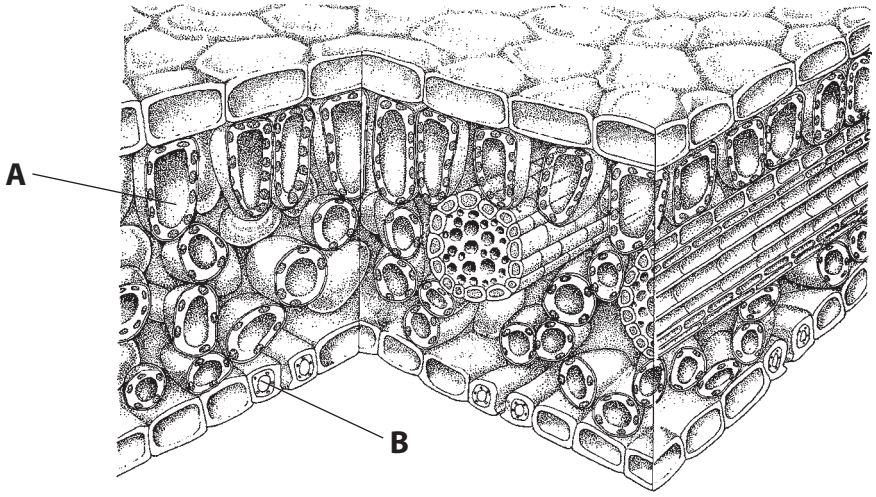
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Answer ALL questions.

1 (a) The diagram shows a section through a leaf.



(i) Name the structures labelled **A** and **B**.

(2)

A .....

B .....

(ii) Give the function of the waxy cuticle.

(1)

.....

.....

(iii) Some of the leaf cells carry out photosynthesis. Write a word equation for this process.

(2)

.....

(iv) Plants, like all living organisms, need to excrete waste products.
Explain how the excretory product of photosynthesis is removed from the leaf.

(2)

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.....

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(b) Some plants lose their leaves in cooler months. This can be described as an excretory mechanism. Suggest **two** other reasons why some plants lose their leaves in cooler months.

(2)

1 .....

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2 .....

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(c) Name **one** excretory organ in humans and name the substance it excretes.

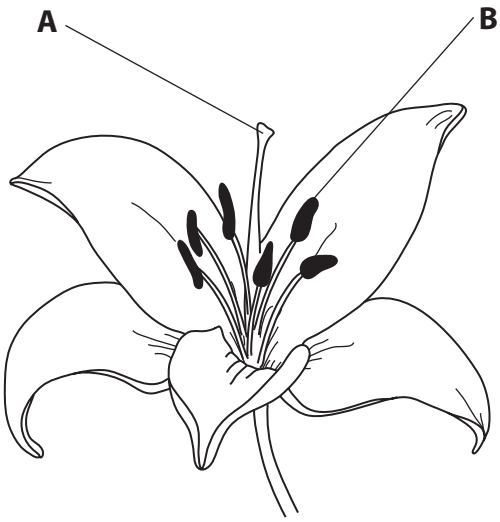
(2)

organ .....

substance .....

(Total for Question 1 = 11 marks)

2 The diagram shows part of a lily. A lily is an insect-pollinated flower.



(a) Name the structures labelled **A** and **B**.

(2)

A .....

B .....

(b) Describe what is meant by the term **insect-pollination**.

(2)

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(c) Give **two** ways in which the structure of a wind-pollinated flower would differ from the lily flower shown in the diagram.

(2)

1 .....

.....

2 .....

.....

(d) Describe the events that follow pollination and how they lead to seed formation.

(6)

(Total for Question 2 = 12 marks)

3 Doctors sometimes give antibiotics to very ill patients.

The passage below describes the treatment.

Complete the sentences in the passage by writing a suitable word or words on each dotted line.

Antibiotic solution is given to the patient through a tube. The tube is connected to a vein in the arm of the patient, using a needle. It is connected to a vein rather than an artery because veins have a lower ..... than arteries. The antibiotic travels to the heart in the largest vein in the body called the ..... .

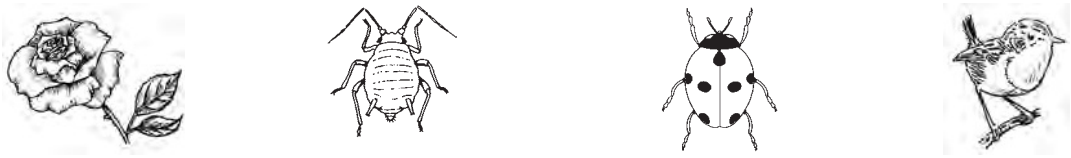
It enters a chamber called the right atrium, and passes to the right ..... before being pumped to the lungs in the ..... artery.

The antibiotic returns to the heart and eventually leaves the heart in the aorta, the largest ..... in the body. The antibiotic is then carried to the tissues where it leaves the smallest blood vessels called ..... .

The antibiotic then kills pathogens called ..... that were responsible for the patient being very ill.

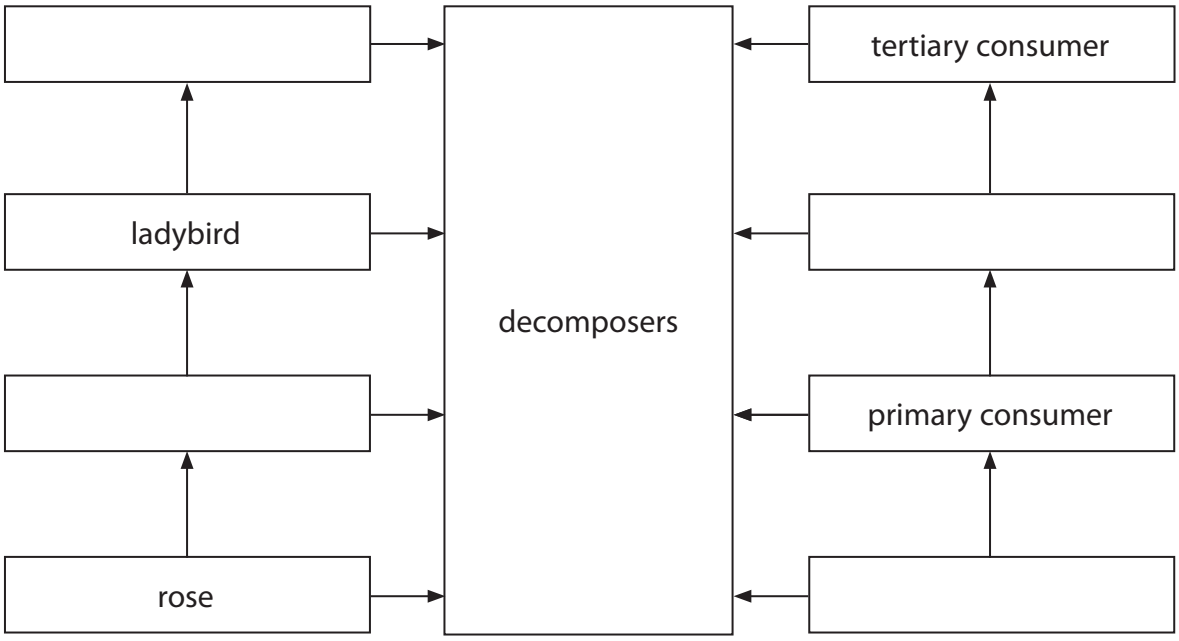
(Total for Question 3 = 7 marks)

4 Here is a food chain.



(a) (i) Use the information in this food chain to complete the diagram.

(3)



(ii) Name **one** type of organism that is a decomposer.

(1)

.....

(b) Decomposition is a stage in the carbon cycle. The other stages are respiration, photosynthesis and combustion.

How many of these four stages add carbon dioxide to the air?

(1)

.....

(Total for Question 4 = 5 marks)

5 The table shows the percentage of protein, fat and minerals found in the same mass of meat from different animals.

Meat	Protein (%)	Fat (%)	Minerals (%)
beef	19.0	17.0	0.9
chicken	21.0	2.5	1.1
lamb	17.5	20.0	1.0
pork	16.0	25.0	0.9
rabbit	21.0	3.5	1.5

(a) (i) Which meat contains the least protein?

.....

(1)

(ii) Calculate how many grams of protein are present in one kilogram of rabbit meat. Show your working.

(2)

Answer ..... g

(b) Which type of meat would provide the most energy?

(1)

.....

(c) Give **two** uses of fat in the human body.

(2)

1 .....

2 .....

(d) Name the mineral in meat that is needed to make haemoglobin.

(1)

.....

(Total for Question 5 = 7 marks)

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6 FH (familial hypercholesterolaemia) is an inherited condition. People with FH have high levels of blood cholesterol and an increased risk of heart disease.

A dominant allele (**D**) results in high levels of blood cholesterol. A recessive allele (**d**) results in low levels of blood cholesterol. This means that people who inherit the dominant allele are most at risk of FH.

(a) (i) What is meant by the term **recessive**?

(1)

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.....

(ii) What are the **two** different genotypes of people who are at risk of FH?

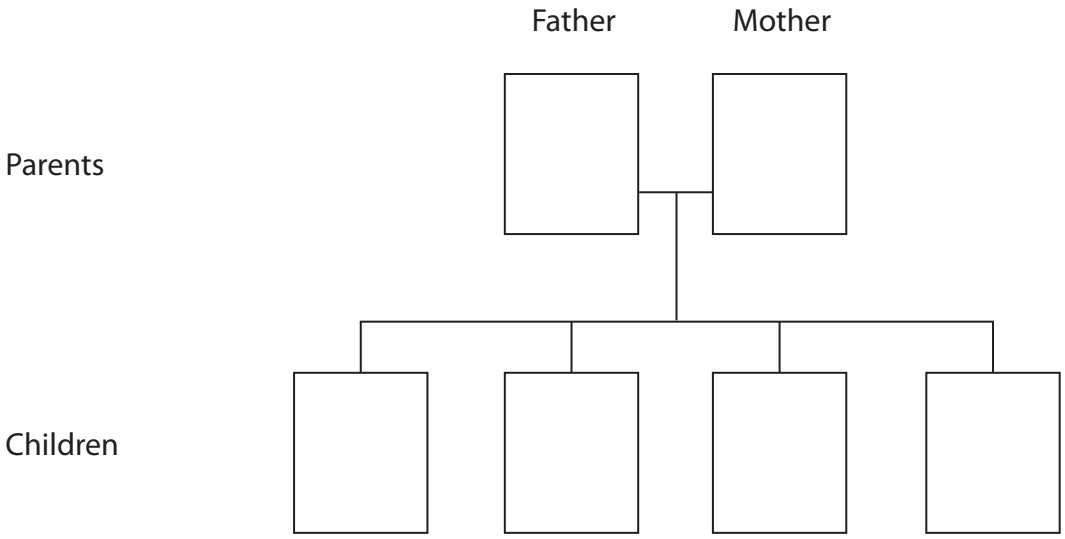
(2)

1 .....

2 .....

(b) (i) In the boxes below give the genotypes of the parents, and the genotypes of all the possible children, for a cross between a heterozygous father and a heterozygous mother. You should use the symbols **D** for the dominant allele and **d** for the recessive allele in your answer.

(2)



(ii) What is the probability of these parents producing a child with FH?

(1)

.....

(iii) What is the phenotype ratio of the children produced?

(1)

.....

(c) High levels of blood cholesterol can lead to narrowing of arteries. Suggest how this might affect the ability of the heart to function.

(5)

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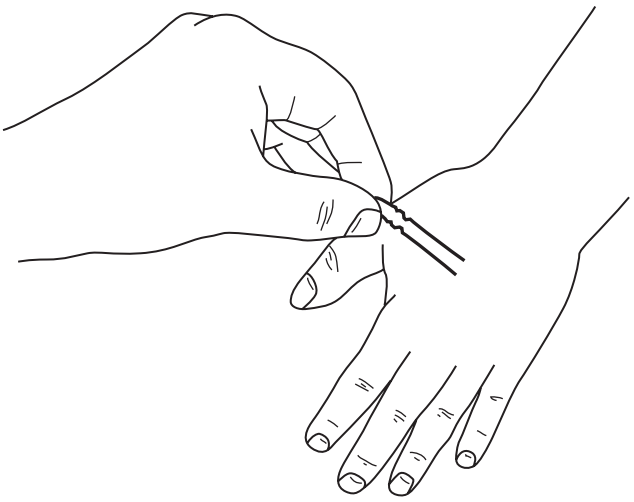
(Total for Question 6 = 12 marks)

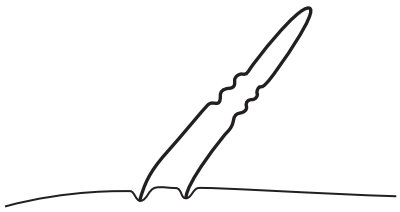
7 Students carried out a simple investigation to show how the sensitivity of the skin differs on the finger tips, the back of the hand and the wrist.

- Students worked in pairs.
- The two prongs of a hairpin were fixed 0.5 cm apart.
- This hairpin was then used by one student to touch the skin of another student, who was looking away.
- The first student used both prongs or one prong as a stimulus.
- The second student then indicated whether he thought both prongs or just one prong was used.
- His response was recorded as correct (✓) or incorrect (✗).
- This was repeated 10 times for each area of the skin.

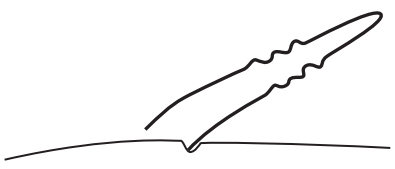
The procedure was then repeated using prongs 1 cm apart and 2 cm apart.

Students could then identify the most sensitive area of the skin.





stimulus with two prongs



stimulus with one prong

(a) Some of the percentages of correct responses at each distance have been recorded in the table. Complete the table by writing in the missing percentages.

(2)

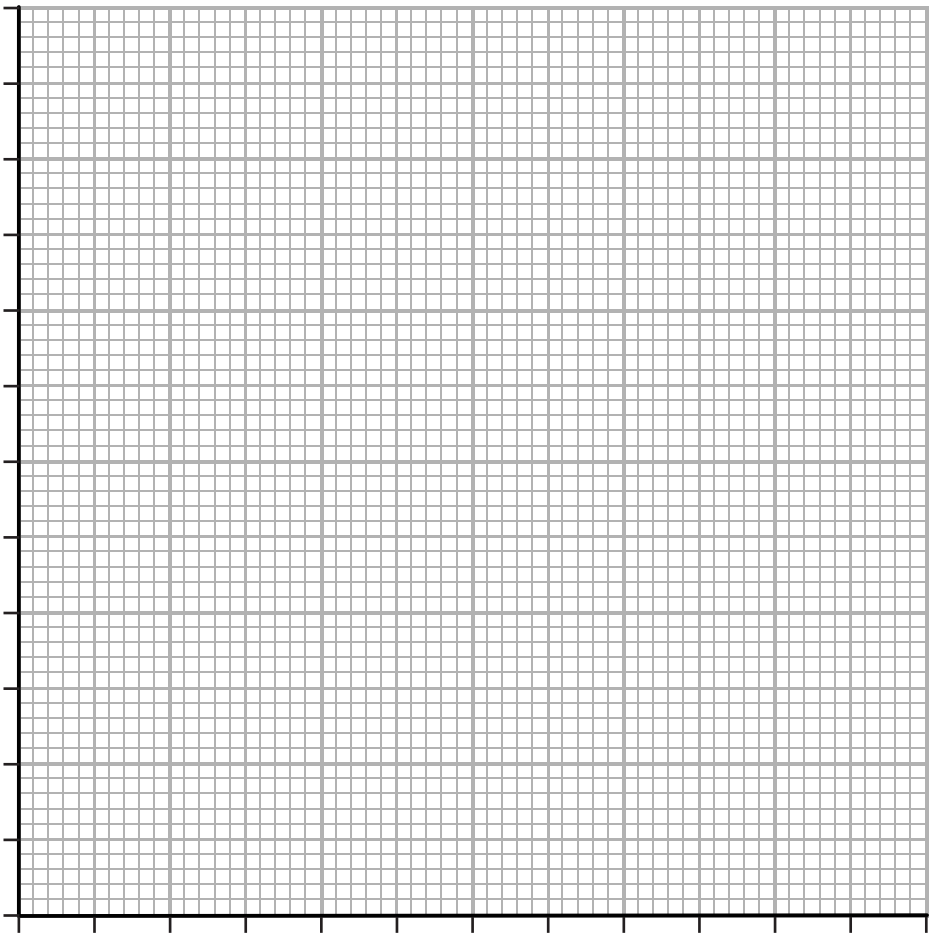
Record of response of second student			
Area of skin	Distance prongs apart in cm		
	0.5 cm	1.0 cm	2.0 cm
Finger tips	✓ ✓ ✓ ✓ ✗ ✓ ✓ ✓ ✗ ✗	✓ ✓ ✓ ✓ ✓ ✓ ✗ ✓ ✓ ✗	✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓
Percentage correct		80%	100%

Back of hand	✓ ✗ ✓ ✓ ✗ ✗ ✗ ✗ ✓ ✗	✓ ✓ ✗ ✓ ✗ ✓ ✗ ✓ ✓ ✗	✓ ✓ ✓ ✓ ✓ ✓ ✗ ✓ ✗ ✓
Percentage correct	40%		80%

Wrist	✗ ✗ ✗ ✓ ✗ ✗ ✗ ✗ ✗ ✗	✓ ✗ ✓ ✗ ✓ ✓ ✗ ✓ ✓ ✗	✗ ✓ ✗ ✓ ✓ ✗ ✓ ✓ ✓ ✓
Percentage correct		60%	

(b) On the grid provided, plot a bar graph to show how sensitivity changes with each area of the skin.

(5)



(c) Which area of the skin is the most sensitive? Explain your answer.

(3)

(d) Suggest a reason for the difference in sensitivity between the areas of the skin.

(2)

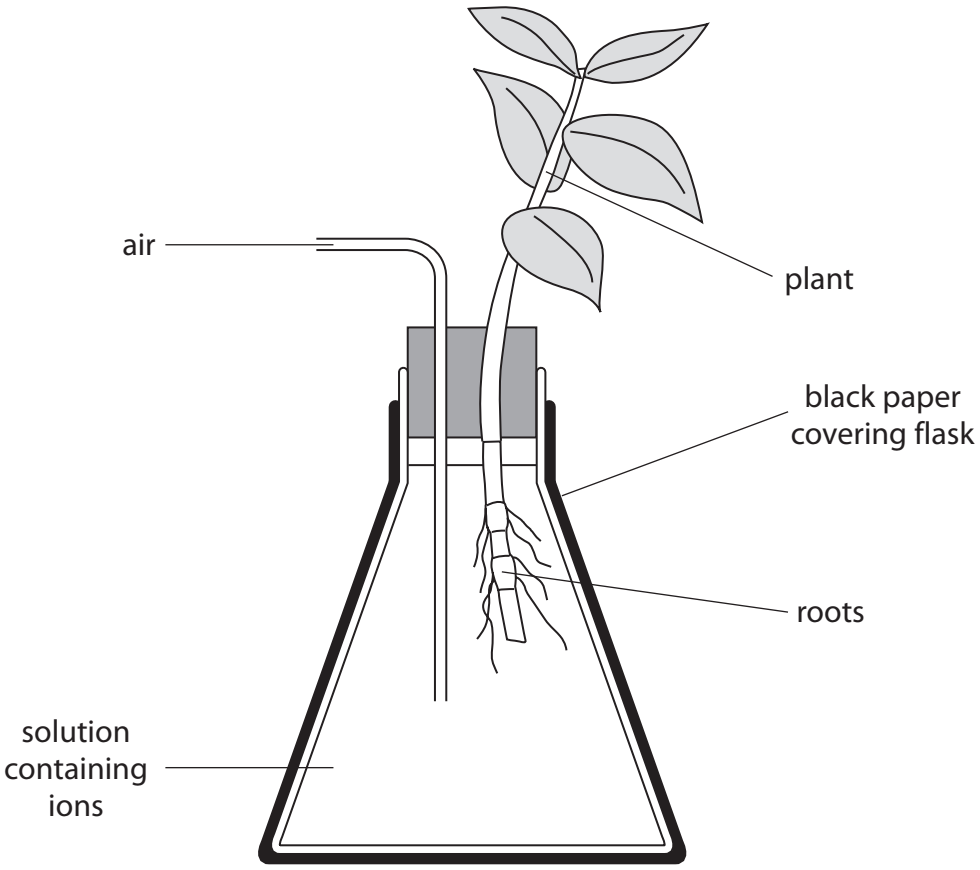
(e) The teacher told the students to touch the skin with the prongs using the same pressure each time. Suggest a reason for this.

(1)

(Total for Question 7 = 13 marks)

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8 A student used this apparatus to find out if nitrate ions helped plants to grow.



A young plant was grown in a solution that contained all the ions needed for growth.
A different young plant was grown in a solution that also contained all the ions needed for growth except nitrate.

(a) (i) Suggest why the solutions have air bubbled into them.

(2)

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(ii) Suggest why the apparatus was covered in black paper.

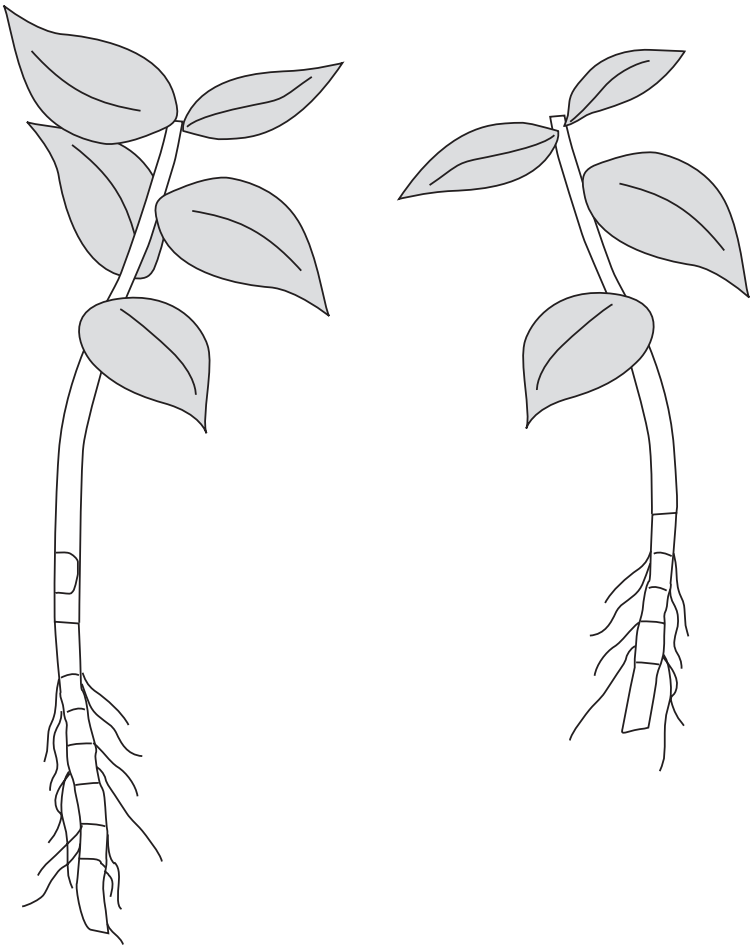
(2)

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(b) The diagram shows the young plants after 55 days of growth.



(i) Measure the length of the plants in mm and write your answers below.

(2)

plant grown in the solution containing all the ions ..... mm

plant grown in the solution without nitrate ions ..... mm

(ii) Suggest how the student could make the results of the investigation more reliable.

(1)

.....

.....

(iii) Suggest **two** factors, not seen in the diagram, that the student should keep the same for both plants while they are growing.

(2)

1 .....

2 .....

(c) Explain the consequences of fertiliser containing nitrates polluting a river.

(6)

(Total for Question 8 = 15 marks)

9 Cactus plants are adapted to survive in hot, dry conditions. They have shallow, widespread root systems, the ability to store water in their stems, spines for shade, a waxy coating and no leaves.



(a) Explain how having no leaves can help a cactus plant reduce water loss.

(2)

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(b) Suggest how a shallow, widespread root system would help a cactus to survive in desert environments.

(2)

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.....

(c) Other than shading, suggest **one** advantage to cactus plants of having spines.

(1)

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.....

(Total for Question 9 = 5 marks)

10 (a) Crop plants have been developed by a process called selective breeding.

(i) Describe the process of **selective breeding**.

(4)

(ii) Give **one** example of a desired characteristic developed by selective breeding in a **named** crop plant.

(2)

desired characteristic .....

crop plant .....

(b) Give **two** ways in which natural selection differs from selective breeding.

(2)

1 .....

.....

2 .....

.....

(Total for Question 10 = 8 marks)

11 Complex carbohydrates are broken down in the human digestive system.

(a) Name the elements present in a carbohydrate molecule.

(1)

.....

(b) Starch and glucose are carbohydrates found in living organisms.

Complete the table to show some of the properties of starch and glucose.
Insert a tick (✓) if the property applies or a cross (✗) if it does not.

(5)

Carbohydrate	Soluble in water	Found in animal cells	Broken down by amylase	Small molecule	Absorbed in the stomach
starch					
glucose					

(c) (i) Describe how you could test for the presence of glucose in a substance.

(3)

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.....

(ii) Give **two** safety precautions you would take when carrying out the test.

(2)

1 .....

.....

2 .....

.....

(Total for Question 11 = 11 marks)

12 All organisms share common basic characteristics. Some of these are given below with a simple description.

(a) Complete the table by adding the missing characteristics and the missing descriptions.

(4)

Characteristic	Description
nutrition	
	releasing energy in cells
	producing offspring
growth and development	

(b) Organisms can be classified into different groups depending on their structure.

State **two** ways in which

(i) a typical plant cell differs from a typical animal cell

(2)

1 .....

.....

2 .....

.....

(ii) a bacterium differs from a virus

(2)

1 .....

.....

2 .....

.....

(Total for Question 12 = 8 marks)

13 Describe an experiment you could do to find out the effect of pH on the growth of yeast.

(6)

(Total for Question 13 = 6 marks)

TOTAL FOR PAPER = 120 MARKS