

Write your name here	
Surname	Other names
Pearson Edexcel	Centre Number
International GCSE	Candidate Number
Biology Unit: 4BI0 Science (Double Award) 4SC0 Paper: 1BR	
Monday 19 May 2014 – Afternoon	Paper Reference
Time: 2 hours	4BI0/1BR 4SC0/1BR
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.
- 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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PEARSON

Answer ALL questions.

1 Plants need water to survive.

(a) Name the two parts of a plant cell where most water is found.

(2)

1

2

(b) Plants absorb water from the soil through their roots.

(i) In the space draw a labelled diagram of a root hair cell.

(4)

(ii) Explain how the structure of the root hair cell is adapted to absorb water from the soil.

(2)

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(c) Plants also absorb mineral ions from the soil.

(i) What are magnesium ions used for in plants?

(1)

(ii) What are nitrate ions used for in plants?

(2)

(Total for Question 1 = 11 marks)



2 Fish farming provides protein for humans to eat.

(a) A freshwater fish farmer noticed the following problems.

Suggest the cause of each problem and a solution for the farmer.

(i) An increase in the number of bird predators in the area.

(2)

cause.....

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solution.....

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(ii) An increase in the growth of algae on the surface of the fish ponds.

(4)

cause.....

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solution.....

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(iii) An increase in the number of fish with a disease.

(2)

cause.....

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solution.....

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(b) Suggest two advantages of fish farming compared to catching fish in the wild.

(2)

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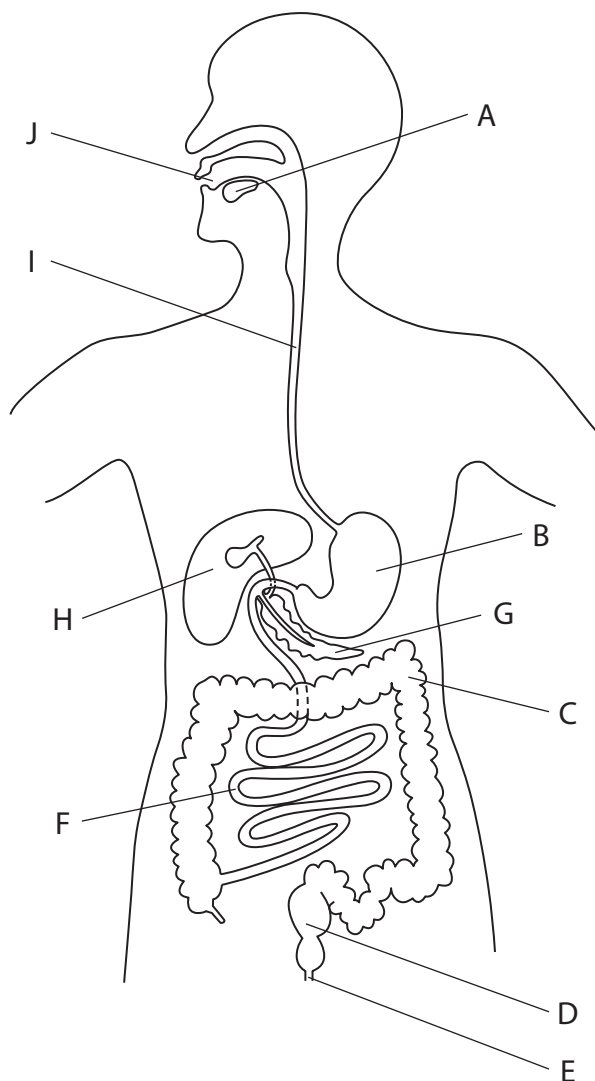
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(Total for Question 2 = 10 marks)



3 The diagram shows the human digestive system.



(a) Use letters from the diagram to answer these questions.

Each answer may be one letter or more than one letter.

(3)

(i) Where is amylase made?

(ii) Where are faeces stored?

(iii) Where is protein digested?

(b) Describe and explain how the structure of the small intestine is adapted for absorbing digested food.

(5)

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(c) A balanced diet is important to maintain good health.

(i) Suggest the consequences of having a diet that lacks fresh fruit and fibre.

(2)

(ii) Suggest the consequences of having a diet that contains too much fat.

(3)

(Total for Question 3 = 13 marks)

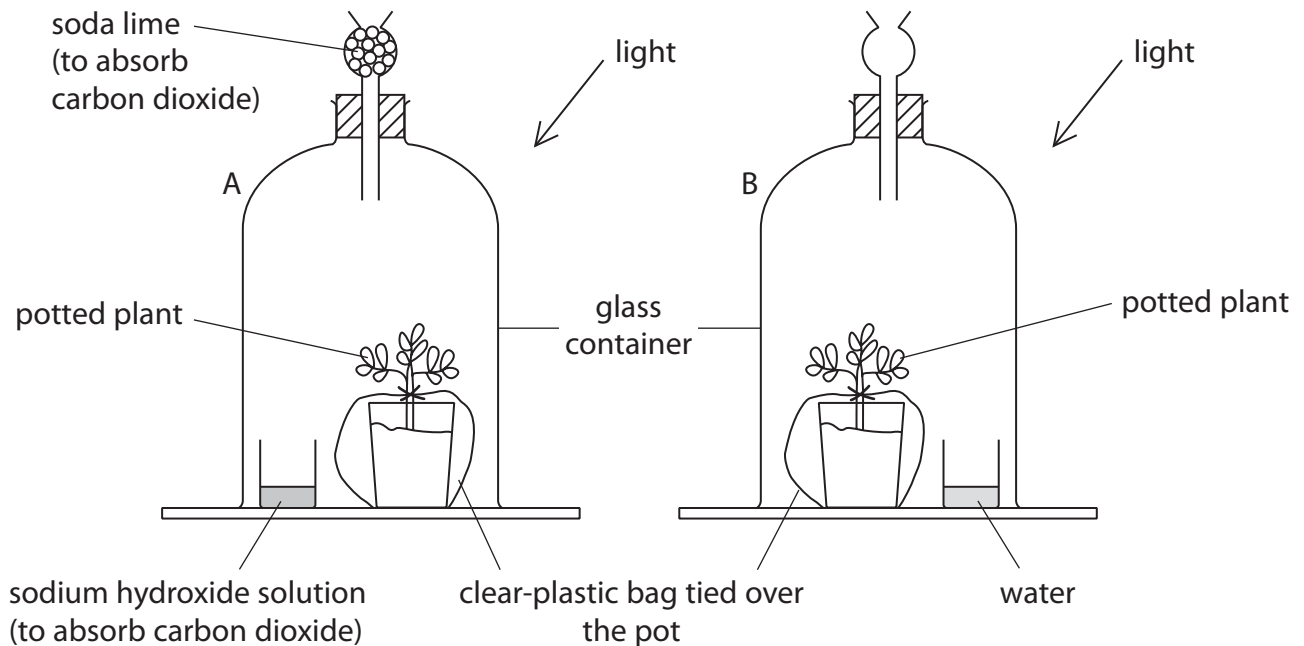


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- 4 An experiment is set up to find out if carbon dioxide is needed by plants for photosynthesis. Two plants were destarched and then put in glass containers A and B as shown in the diagram.

After two days in the containers the plant leaves are tested for starch.



- (a) (i) Suggest why the pots were covered with clear-plastic bags.

(2)

- (ii) What is the purpose of container B?

(1)

- (iii) The plant species and the time were kept the same in the experiment.

Suggest two other variables that should be kept the same for the experiment to be valid.

(2)

1

2



(b) The table describes the stages used to test the leaves for starch. It also gives the reason for each stage.

(i) Complete the table by describing stage 2 and giving the reason for stage 4. (2)

Stage	Reason
1. boil leaf in water	make cell membranes permeable and prevent any starch digestion
2.	remove chlorophyll
3. dip leaf in water	hydrate leaf for iodine diffusion
4. add iodine solution to leaf	

(ii) Explain how stage 1 will prevent any starch digestion. (1)

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(iii) What is meant by the term **diffusion** mentioned in stage 3? (1)

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(iv) Describe the colour of the leaves you would expect after a starch test on (2)

a leaf from container A.....

a leaf from container B.....

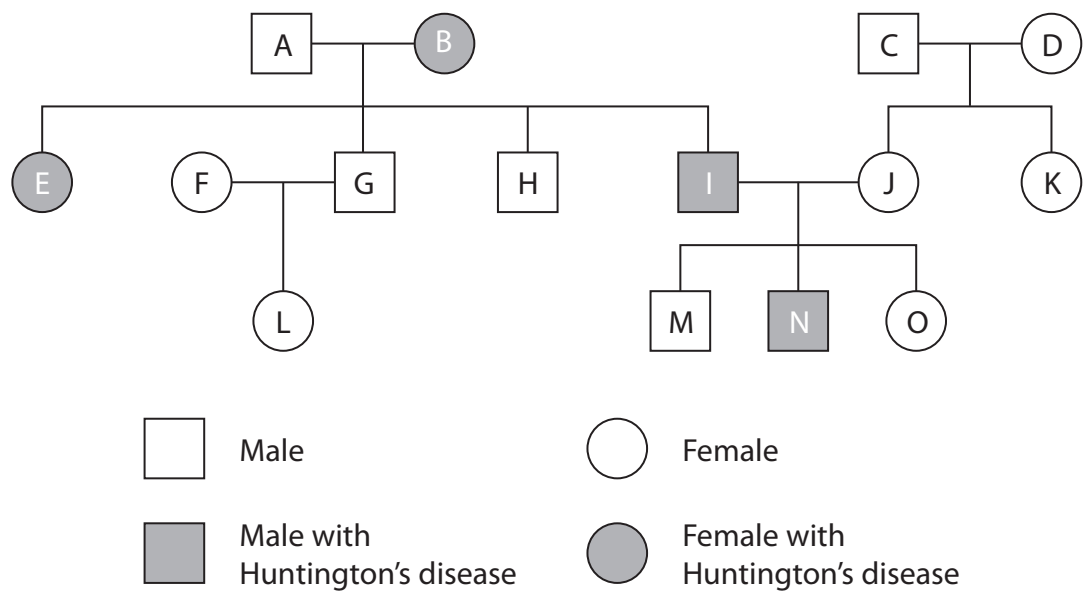
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(Total for Question 4 = 11 marks)



5 Huntington’s disease causes damage to the nervous system. It is an inherited condition caused by a dominant allele (H). Only individuals who are homozygous for the recessive allele (h) are protected from the disease.

The diagram shows the inheritance of Huntington’s disease in a family.



(a) Complete the table to show how many people in the diagram fit each description. The first one has been done for you.

(4)

Description	Number of people who fit the description
male	7
female with Huntington’s disease	
homozygous recessive	
heterozygous	
homozygous dominant	

(b) Individuals A and B have both male and female children.

Draw a genetic diagram to show how they can produce both male and female children.

(3)

(Total for Question 5 = 7 marks)



6 Farmers have used selective breeding to produce cows that give high milk yields.

(a) Describe how selective breeding can be used to produce cattle that give high milk yields.

(3)

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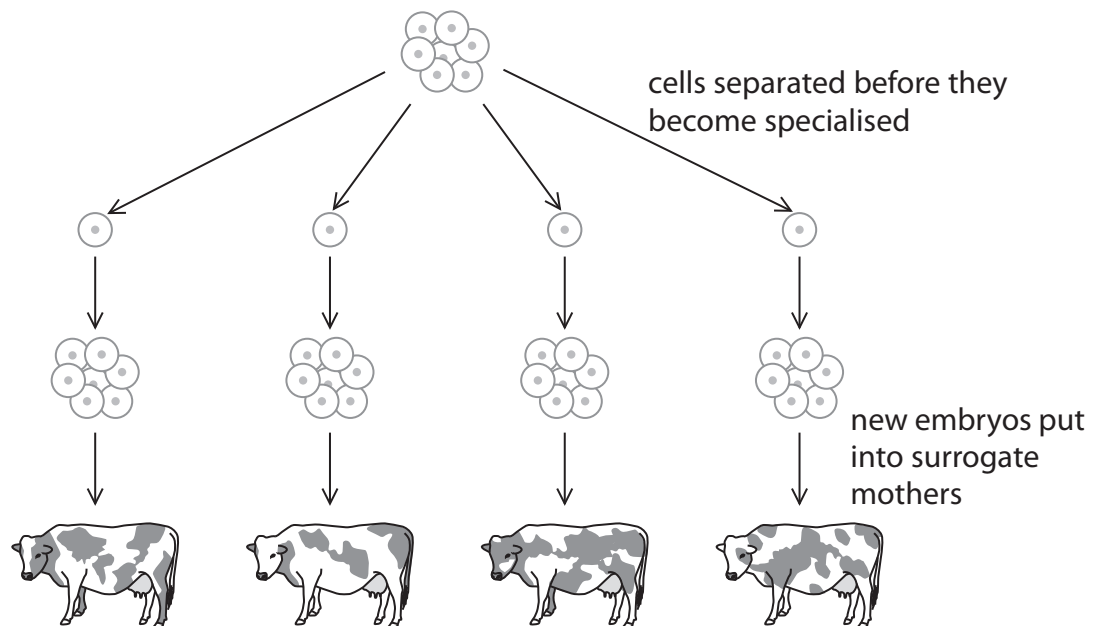
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(b) The diagram shows a different way to obtain cows that produce high milk yields. The process is called embryo cloning.

In this process individual cells from an embryo known to have the potential to become a high milk yielding cow are separated before they become specialised. Each separated cell is then allowed to develop into a new embryo. These new embryos are then put into surrogate mothers.



(i) Where in the body of the surrogate mothers do the new embryos develop?

(1)

(ii) Suggest three advantages of producing cows with desirable characteristics using embryo cloning rather than using selective breeding.

(3)

1

2

3

(c) Explain what is meant by the term **clone**.

(2)

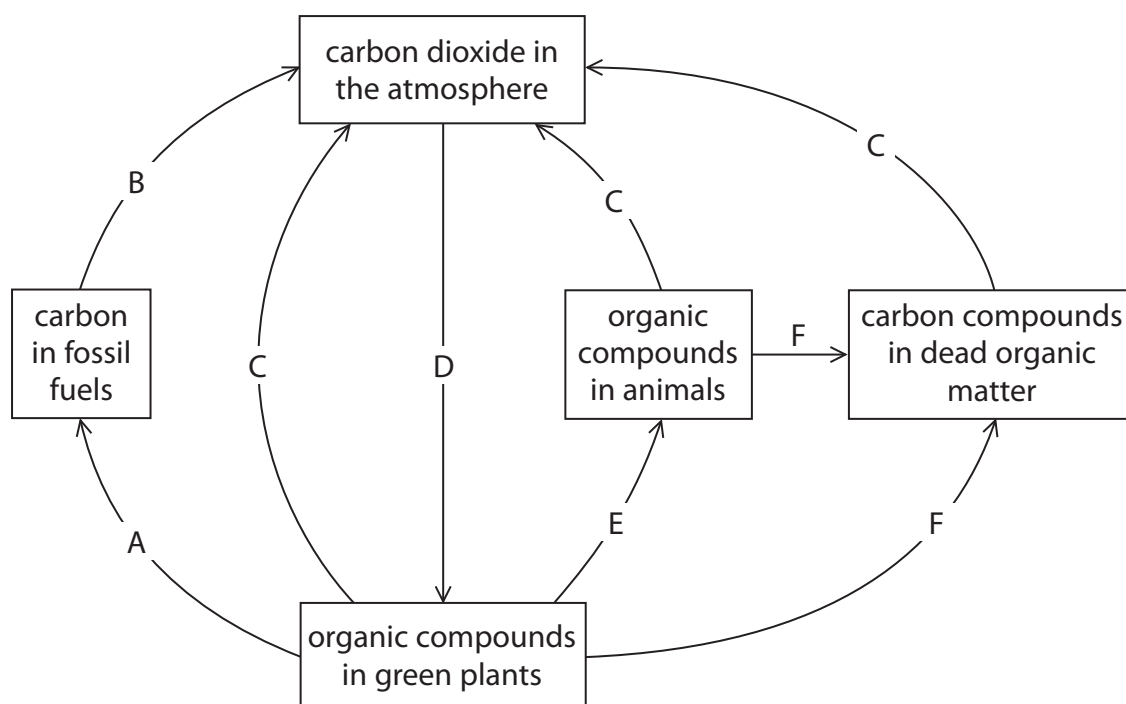
(d) Name the type of cell division that produces an embryo from an individual cell.

(1)

(Total for Question 6 = 10 marks)



- 7 The diagram shows the carbon cycle. The letters A to F represent different processes in the carbon cycle.



- (a) Complete the table by naming the process represented by each letter. The first one has been done for you.

(5)

Letter	Name of process
A	fossilisation
B	
C	
D	
E	
F	

(b) (i) Some of the carbon in plants is found in the form of carbohydrates.

Name two carbohydrates found in plants.

(2)

1

2

(ii) The molecule that genes are made from contains carbon.

Name this molecule.

(1)

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(c) Describe how increasing levels of carbon dioxide in the air may cause global warming and explain the possible consequences of global warming.

(5)

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(Total for Question 7 = 13 marks)

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- 8 (a) The table shows some of the levels of organisation within an organism.

Complete the table by inserting a tick (✓) to show the level of organisation of each example. The first one has been done for you.

(4)

Example	Level of organisation		
	Organelle	Organ	System
nucleus	✓		
circulation			
chloroplast			
leaf			
bulb			

- (b) Place the following human structures in order of size from the smallest to the largest.

liver	red blood cell	eye	white blood cell	kidney
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(2)

Order	Structure
smallest	
↓	
largest	

(Total for Question 8 = 6 marks)

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9 A student wants to investigate osmosis using potato tissue.

(a) What is meant by the term **osmosis**?

(3)

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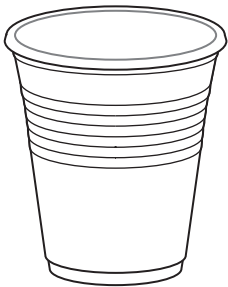
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(b) The student puts 90 cm³ of glucose solution of different concentrations into six different plastic cups. He then puts one raw potato chip into each cup. The diagram shows one of the plastic cups.

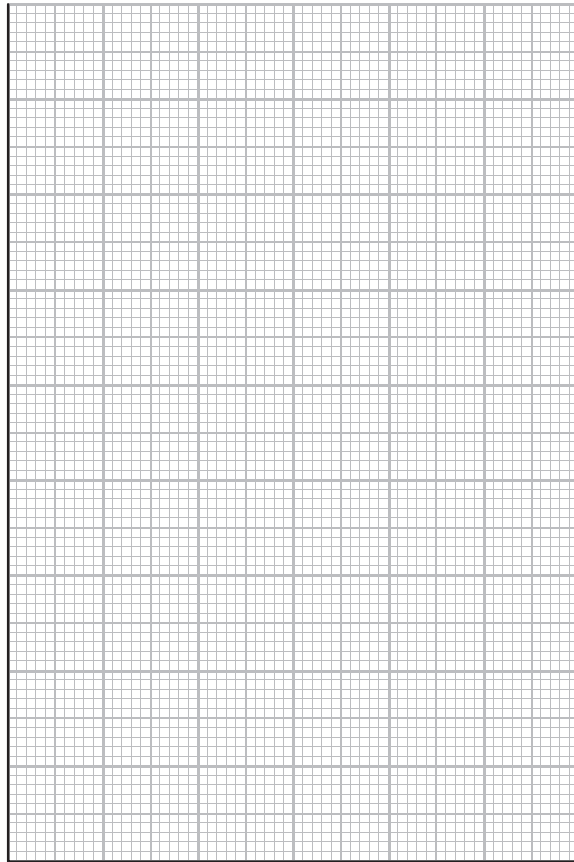


The potato chips were all the same mass and shape at the start of the investigation. After 12 hours the chips are removed and the volume of solution in the plastic cups is measured. The table shows the results.

Cup	Concentration of glucose solution in plastic cup in mol/dm ³	Volume of solution at start in cm ³	Volume of solution in cup after 12 hours in cm ³
1	0.0	90	84
2	0.2	90	88
3	0.4	90	93
4	0.6	90	95
5	0.8	90	95
6	1.0	90	95

- (i) Use the information in the table to plot a graph on the grid to show the volume of solution remaining in the cup after 12 hours in each concentration of glucose. Use a ruler to join your points with straight lines.

(5)



- (ii) Use your graph to estimate the concentration of the cytoplasm in the potato cells.

(1)

concentration mol/dm³

- (iii) Complete the table by ticking the boxes to show the cups in which the potato chips lost water.

(1)

Cup	1	2	3	4	5	6
Tick						



(c) (i) Name the independent variable in this investigation.

(1)

(ii) Name a controlled variable in this investigation.

(1)

(iii) Suggest two reasons why the volume of solution measured by the student may not be accurate.

(2)

1

2

(iv) Suggest a piece of apparatus that could be used to give a precise measurement of the volume of the solution left in each cup.

(1)

(Total for Question 9 = 15 marks)



10 Flowers are reproductive organs. They help flowering plants with sexual reproduction.

- (a) Suggest how sexual reproduction makes it more likely that a species can adapt to a changing environment.

(2)

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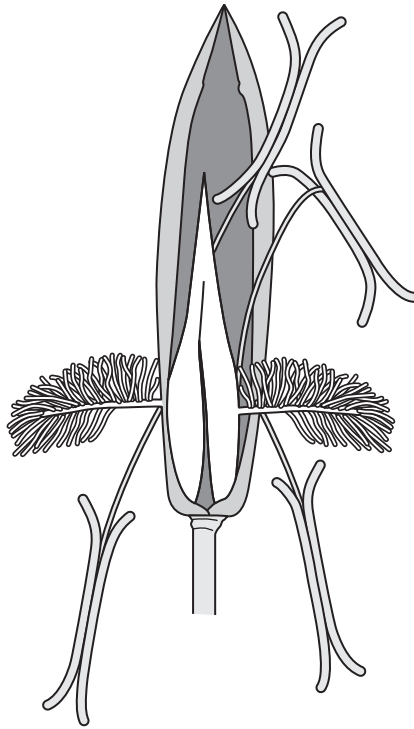
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- (b) Some flowering plants transfer their male gametes (pollen) by using insects and others use wind. The diagram shows a plant that is wind-pollinated.



- (i) Give two ways you can tell from the diagram that this plant is wind-pollinated.

(2)

1

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2

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- (ii) Suggest why insects rarely visit wind-pollinated flowers.

(2)

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(c) Some people have an allergy to pollen produced by flowering plants. This is known as hay fever.

- (i) Suggest why hay fever tends to be caused by wind-pollinated plants rather than insect pollinated plants.

(1)

- (ii) Suggest why people only show symptoms of hay fever at certain times of the year.

(1)

- (iii) Allergies are caused by the body cells reacting to the proteins on the surface of the pollen grains.

Explain how the body usually responds to foreign proteins.

(3)

(Total for Question 10 = 11 marks)



11 This food chain is from a rainforest ecosystem.

trees → deer → genet → python

(a) (i) Name the primary consumer in the food chain.

(1)

(ii) Name the tertiary consumer in the food chain.

(1)

(b) The photograph shows a genet, which is a cat-like carnivore that lives in rainforests in Africa and Asia.



Photographer: Guerin Nicolas

Suggest how the following features help the genet to survive.

(i) large ears

(1)

(ii) spotted coat

(1)

(iii) ability to stand on hind legs

(1)

(c) The rainforests in many countries are under threat from deforestation.

Explain the consequences of removing the rainforest on the balance of atmospheric gases.

(2)

(Total for Question 11 = 7 marks)

QUESTION 12 STARTS ON PAGE 28



12 Cholesterol is a fatty substance found in the blood that can increase the risk of heart disease.

Statins are drugs thought to lower blood cholesterol levels.

Design an investigation to find out the effect of statins on blood cholesterol levels.

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

(6)

(Total for Question 12 = 6 marks)

TOTAL FOR PAPER = 120 MARKS

