Write your name here

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International GCSE

Centre Number | | | | | |

Candidate Number | | | | |

Biology

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

Monday 19 May 2014 – 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.
- Some questions must be answered with a cross in a box ☒. If you change your mind about an answer, put a line through the box ☒ and then mark your new answer with a cross ☒.

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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P 4 2 8 6 2 A 0 1 3 2

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Answer ALL questions.

1 (a) The table contains names and descriptions of processes involved in the digestive system.

Complete the table by filling in the missing names and descriptions.

(5)

Name of process	Description of process
	food enters the mouth
digestion	
	small food molecules move from the small intestine into the blood
	small food molecules are used to build large molecules
egestion	

(b) Describe the process of digestion in the mouth.

(3)

(c) A student carried out some food tests on two samples of food, A and B. The table shows the results.

Sample	Reagent used in food test	Colour seen after adding the reagent
A	iodine solution	blue black
B	Benedict's	brick red

The student concluded that both samples of food contained carbohydrates.

Do you agree with this conclusion?

Give reasons for your answer.

(2)

(Total for Question 1 = 10 marks)

2 The table shows the number of deaths in the United Kingdom in 2010 caused by cancer, lung diseases and circulatory diseases. The table also shows the number of these deaths caused by smoking.

Cause of death	Total number of deaths	Number of these deaths caused by smoking
cancer	66 000	38 000
lung diseases	46 000	22 000
circulatory diseases	138 000	20 000

(a) (i) What is the total number of deaths caused by all three diseases?

(1)

.....

(ii) Calculate the percentage of the total number of deaths that are caused by smoking.

Show your working.

(2)

percentage ..... %

(b) Chemicals in cigarette smoke cause mutations in cells which can lead to cancer.

What is meant by the term **mutation**?

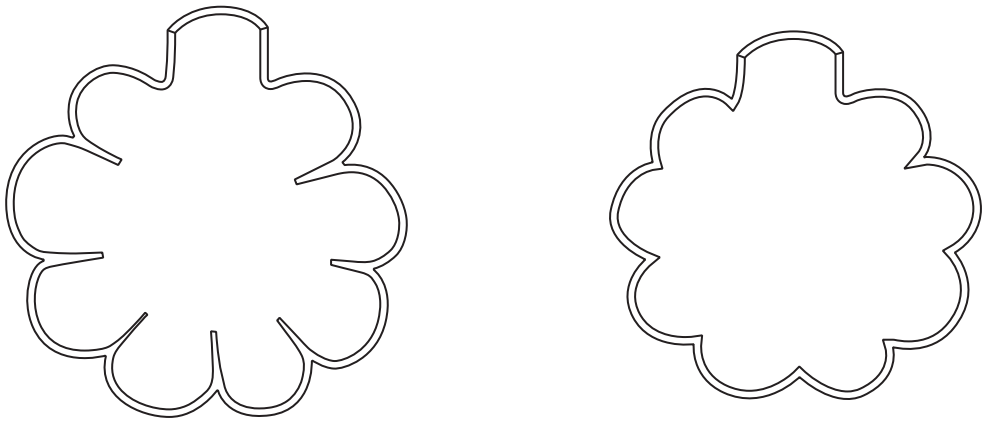
(2)

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(c) Emphysema is a lung disease that is usually caused by smoking. The diagram shows a cross section through two alveoli X and Y. Alveolus X is from a non-smoker and alveolus Y is from a smoker suffering from emphysema.



X Y

Use the diagram to suggest and explain the effect of emphysema on gas exchange.

(2)

(d) Smoking can increase the risk of developing coronary heart disease.

Explain how coronary heart disease can cause death.

(5)

(Total for Question 2 = 12 marks)

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3 The table shows the area of land used, in hectares, to grow tea plants at different altitudes (height above sea level) in Sri Lanka between the years 1990–2000.

	Area of land used in hectares			
Year	**High altitude**	**Medium altitude**	**Low altitude**	**Total**
1990	73 138	83 223	65 397	221 758
1992	74 141	85 510	62 185	221 836
1994	51 443	56 155	79 711	187 309
1996	52 272	56 863	79 836	188 971
1998	51 444	58 155	79 711	189 310
2000	52 272	56 863	79 836	188 971

(a) Describe the changes that have taken place in the area of land used to grow tea plants between 1990 and 2000.

(3)

(b) (i) An area of land at high altitude is cooler than an area of land at low altitude.

Suggest and explain how this difference in temperature might affect the growth of tea plants.

(2)

(ii) Give two factors, other than temperature, that could affect the growth of tea plants.

(2)

1 .....

2 .....

(c) Describe how the tea grower could use a quadrat to estimate the total mass of tea plants growing in a large area of land.

(3)

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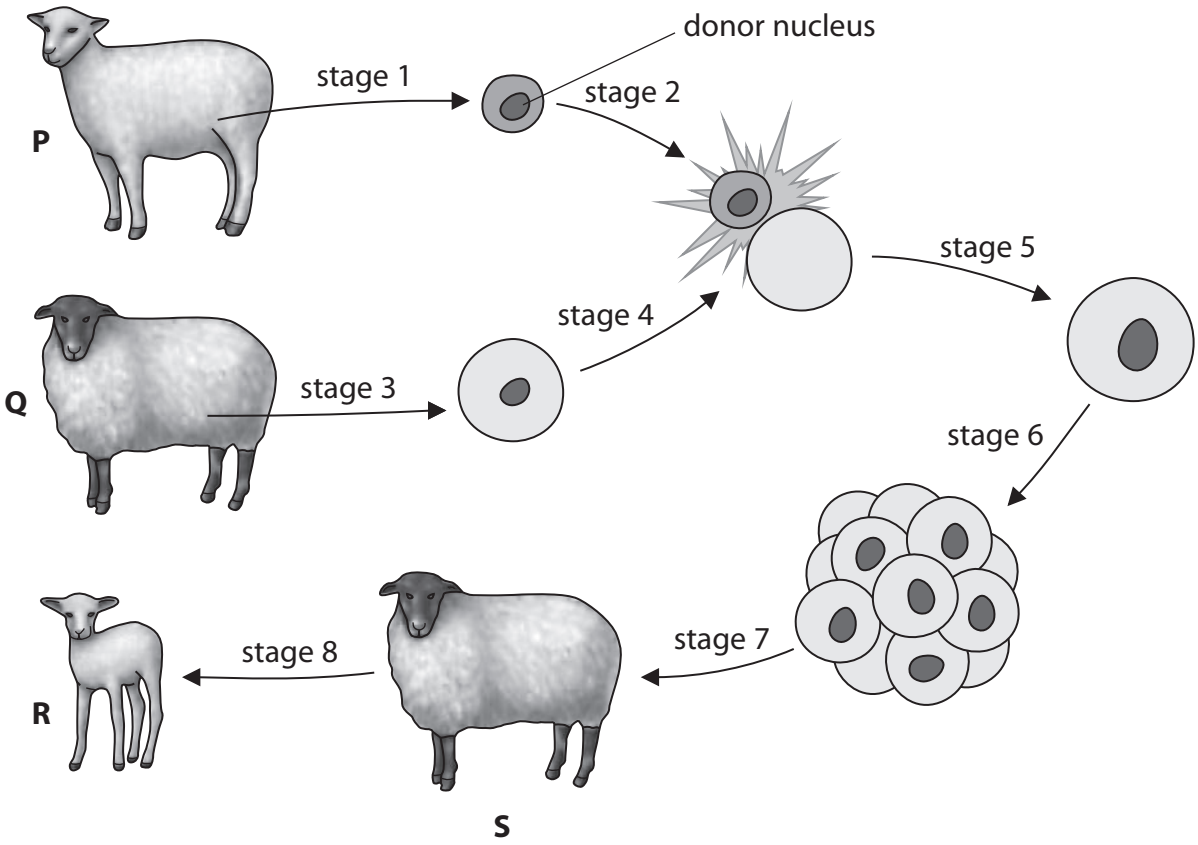
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(Total for Question 3 = 10 marks)

4 The diagram shows stages in the cloning process that produced Dolly the sheep.



(a) The table lists three events that take place in the cloning process that produced Dolly the sheep.

Complete the table by giving the number of the stage when each event takes place.

(3)

Event	Stage number
cell division produces an embryo	
an embryo is put into a surrogate mother	
an egg cell is collected from a female sheep	

(b) Which sheep in the diagram is Dolly?

(1)

- ☒ **A** P
- ☒ **B** Q
- ☒ **C** R
- ☒ **D** S

(c) Which sheep are genetically identical?

(1)

- ☒ **A** P, Q, R and S
- ☒ **B** P and Q
- ☒ **C** P and S
- ☒ **D** P and R

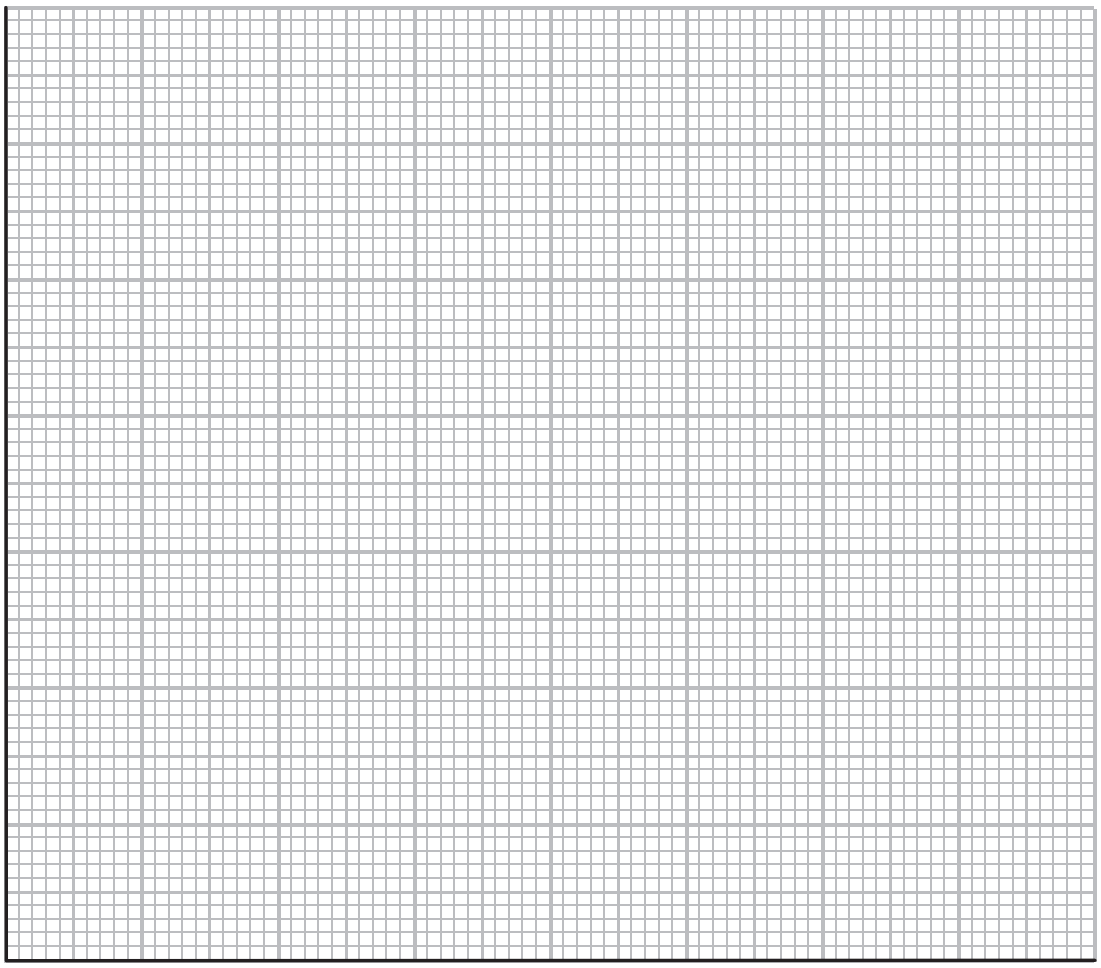
(Total for Question 4 = 5 marks)

5 Scientists investigated the effect of altitude (height above sea level) on the mass of haemoglobin found in human blood. Blood samples were taken from humans living at different altitudes. The results are shown in the table.

Altitude in metres	Average mass of haemoglobin in grams per litre
0	121
500	121
1000	121
1500	125
2000	128
2500	133
3000	140

(a) (i) Plot a graph on the grid to show how the average mass of haemoglobin changes with altitude. Use a ruler to join the points with straight lines.

(5)



(ii) Use the graph to describe how altitude affects the mass of haemoglobin in human blood.

(2)

(iii) Suggest why a long distance athlete who trains at high altitude may have a better chance of winning than a long distance athlete who trains at sea level.

(3)

(b) Scientists obtain blood samples from an athlete's vein. To do this they use a sterile needle attached to a syringe.

(i) Suggest two reasons why scientists obtain blood samples from a vein rather than from an artery.

(2)

1 .....

2 .....

(ii) Suggest one reason why the scientists could **not** obtain a blood sample from a capillary.

(1)

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(iii) Suggest why the needle used to obtain a blood sample needs to be sterile.

(2)

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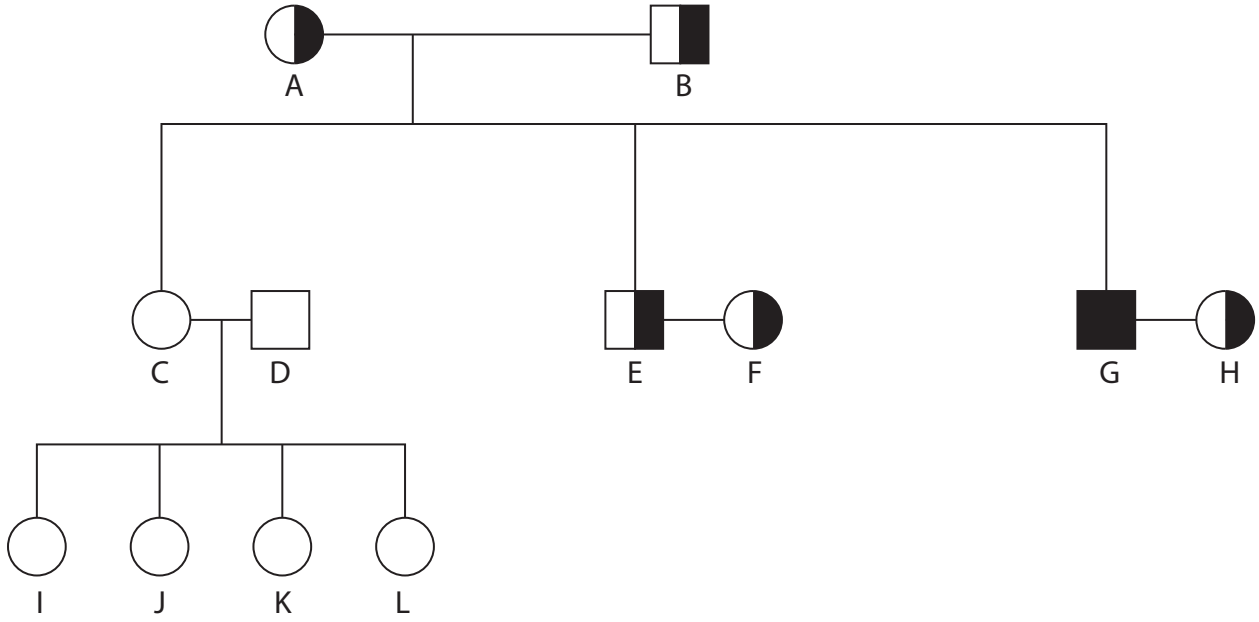
(Total for Question 5 = 15 marks)

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6 Cystic fibrosis is an inherited condition. It is caused by a recessive allele (d).

The non-cystic fibrosis allele is dominant (D).

The diagram shows how cystic fibrosis was inherited in a family.



key

○	homozygous dominant female
◑	heterozygous female
●	homozygous recessive female
□	homozygous dominant male
◧	heterozygous male
■	homozygous recessive male

(a) Use letters D and d to give the genotype of person A and person L in the table.

(2)

Person	Genotype
A	
L	

(b) How many people in this family do **not** have cystic fibrosis?

(1)

.....

(c) (i) Complete the table to show the probability of each set of people having a child with cystic fibrosis. One has been done for you.

(2)

People	Probability as a %
C and D	
E and F	25
G and H	

(ii) Parents E and F have four children. None of them have cystic fibrosis although the probability shown in the table is 25%.

Suggest why they did not have a child with cystic fibrosis.

(1)

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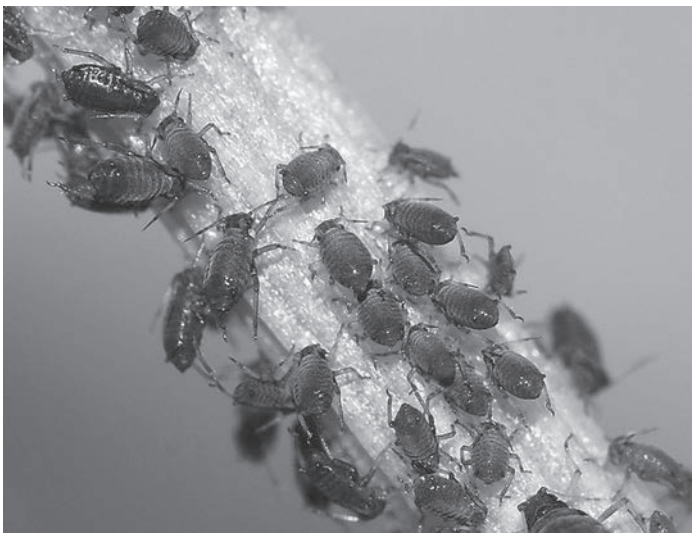
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(Total for Question 6 = 6 marks)

7 Aphids are insect pests. They feed on broad bean plants.

The aphids can be controlled by lacewing larvae.



Photographer: Joaquim Alves Gaspar, May 2010

(a) Use this information to draw a food chain in the space below.

(2)

(b) A student wanted to compare the ability of two different species of predator, lacewings and hoverflies, to control aphids. Lacewings were released, on day 0, into one field of broad beans (field X), and hoverflies were released into a different field of broad beans (field Y).

The table shows his results.

Field X			Field Y		
Time in days	Number of individuals per m^2		Time in days	Number of individuals per m^2	
	aphids	lacewings		aphids	hoverflies
0	762	22	0	752	22
3	770	112	3	740	112
6	768	180	6	470	240
9	770	260	9	90	230
12	520	260	12	2	120
15	30	255	15	40	0
18	0	255	18	240	0

Use information in the table to answer the following questions.

(i) Suggest two reasons why lacewings might be better predators to use to control aphids than hoverflies.

(2)

1 .....

2 .....

(ii) Suggest one reason why hoverflies might be better predators to use to control aphids than lacewings.

(1)

.....

.....

.....

(c) (i) Other than predation, name two biotic (living) factors that may affect aphid numbers.

(2)

1 .....

.....

2 .....

.....

(ii) Name two abiotic (non-living) factors that may affect aphid numbers.

(2)

1 .....

.....

2 .....

.....

(Total for Question 7 = 9 marks)

8 The passage describes cell division and reproduction in humans.

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

Fully grown adults can produce sex cells or ..... called sperm and eggs.

The ..... cells are much smaller than the ..... cells

and have a powerful ..... to enable them to swim.

The cell division used to make sex cells is called ..... and in males this

takes place in the ..... .

The sperm cells pass out of the male along a tube called the ..... and

into the female's body, then through the cervix and into the ..... in

which fertilisation takes place.

(Total for Question 8 = 8 marks)

9 (a) Antibiotics are chemicals used to kill pathogens that cause infections.

(i) Name the type of organism that make antibiotics.

(1)

.....

(ii) Name the type of pathogen that is killed by antibiotics.

(1)

.....

(b) Some antibiotics are no longer effective in killing pathogens. Use your knowledge of natural selection to explain why.

(5)

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(Total for Question 9 = 7 marks)

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10 A pyramid of numbers can be used to show the number of organisms at each trophic level in an ecosystem.

(a) Explain what is meant by the term **trophic level**.

(1)

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(b) A scientist collected data from a local ecosystem.

Number of nettle plants = 300

Number of robins that feed on the caterpillars = 20

Number of caterpillars that feed on the nettles = 200

Number of hawks that feed on robins = 2

Draw and label a pyramid of numbers for this data.

(3)

(c) The scientist collected this data during the summer months.

Suggest why the number of the caterpillars might be different during the winter.

(2)

(d) The total mass of the organisms at each level in the pyramid decreases as you move up the pyramid.

Explain why.

(4)

(Total for Question 10 = 10 marks)

11 (a) The human kidney acts as an organ of excretion and an organ of osmoregulation.

(i) What is meant by the term **osmoregulation**?

(1)

.....

.....

(ii) Name one other organ in the human body that is an organ of excretion.

(1)

.....

(b) The table shows the concentration of two substances in blood plasma and in urine.

Substance	Concentration of each substance in grams per 100 cm^3	
	Blood plasma	Urine
proteins	8.0	0.0
glucose	0.1	0.0

(i) Name one substance that is found in urine.

(1)

.....

(ii) Explain how the kidney ensures that there is no protein in urine.

(3)

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(iii) Explain why the body does **not** excrete glucose and how this is achieved by the kidney.

(3)

(Total for Question 11 = 9 marks)

12 (a) Explain how plants absorb water from the soil and transport the water to their leaves.

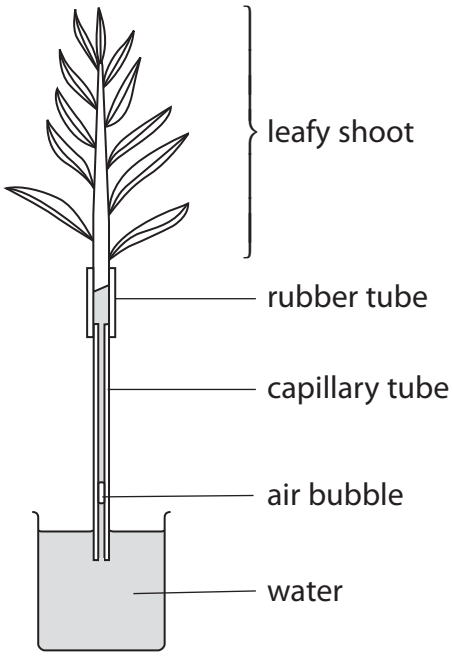
(4)

(b) Some useful substances are dissolved in the water that is taken up by plants.

Name one of these substances.

(1)

(c) This apparatus can be used to investigate the rate of water uptake by a leafy shoot.



(i) Describe one precaution you would take when setting up this apparatus.

(1)

(ii) Give two environmental conditions you could vary in the laboratory when investigating the rate of water uptake by a leafy shoot.

For each condition describe how you could obtain a range of different values.

(4)

Condition .....

How I could obtain a range of different values .....

Condition .....

How I could obtain a range of different values .....

(Total for Question 12 = 10 marks)

13 Human insulin can be made by genetically modified bacteria.

(a) (i) Name the small circle of DNA that is genetically modified in bacteria.

(1)

.....

(ii) Name two enzymes that are used to genetically modify the DNA of the bacteria.

(2)

1 .....

2 .....

(b) To produce large amounts of human insulin the genetically modified bacteria are grown in a fermenter.

Describe an investigation to find out if temperature affects the amount of insulin made by genetically modified bacteria.

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

(6)

(Total for Question 13 = 9 marks)

TOTAL FOR PAPER = 120 MARKS

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