Rewarding Learning

Centre Number

Candidate Number

General Certificate of Secondary Education
2015

Double Award Science: Biology

Unit B2

Foundation Tier

[GSD41]

GSD41

FRIDAY 5 JUNE, AFTERNOON

TIME

1 hour 15 minutes.

INSTRUCTIONS TO CANDIDATES

Write your Centre Number and Candidate Number in the spaces provided at the top of this page.
You must answer the questions in the spaces provided.
Do not write outside the boxed area on each page or on blank pages.
Complete in blue or black ink only. **Do not write with a gel pen.**
Answer **all twelve** questions.

INFORMATION FOR CANDIDATES

The total mark for this paper is **90**.
Figures in brackets printed down the right-hand side of pages indicate the marks awarded to each question or part question.
Quality of written communication will be assessed in Question **8**.

9582

1 The photograph shows a National Health Service (NHS) poster. It gives the symptoms of a stroke and tells people to act quickly if someone has a stroke.

(a) Choose **two** words from the list to complete the sentence.

blood	**nerve**	**brain**	**lungs**

A stroke may occur when there is a blockage in the _____

vessels of the _____. [2]

(b) Suggest why it is important to act quickly when someone has a stroke.

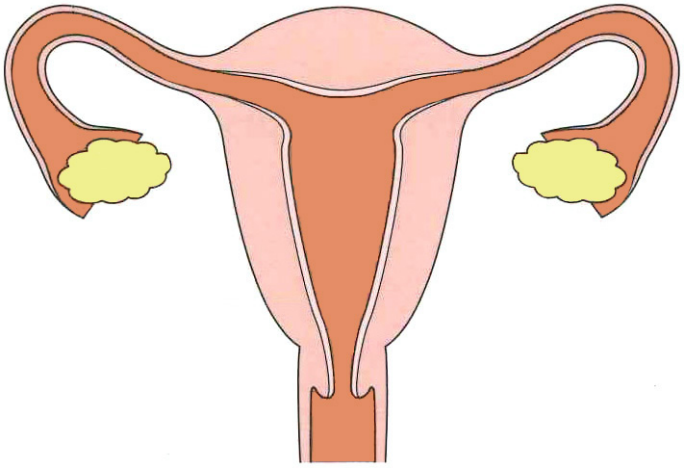
_____

_____

_____ [1]

[Turn over

2 **(a)** The diagram shows part of the female reproductive system.



(i) Define the term fertilisation.

_____

_____ [1]

(ii) Write the letter A on the diagram to show where fertilisation takes place. [1]

(iii) Fertilisation results in a zygote being formed.

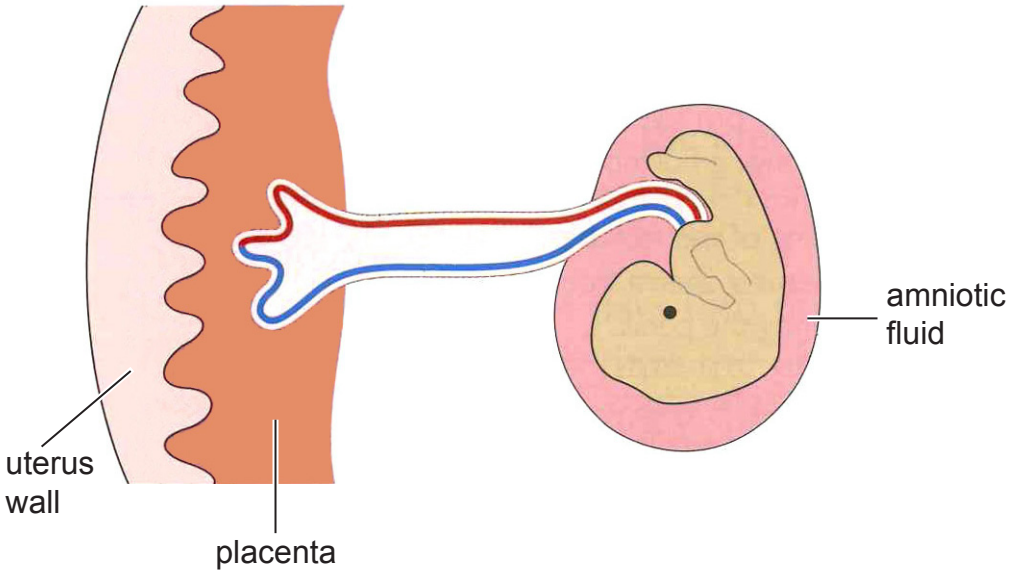
What happens to the zygote before implantation?

_____

_____ [1]

(iv) Write the letter B on the diagram above to show where implantation occurs. [1]

(b) The diagram shows a developing foetus in the uterus.



(i) What is the function of the amniotic fluid?

_____ [1]

(ii) How is the placenta adapted for diffusion?

_____

_____ [1]

(iii) Underline **two** useful substances from the list that pass across the placenta from the mother to the baby.

carbon dioxide **oxygen** **urea** **glucose**

[2]

(c) Name **one** way that fertilisation can be prevented.

_____ [1]

[Turn over

3 The photograph shows a field of sunflowers.

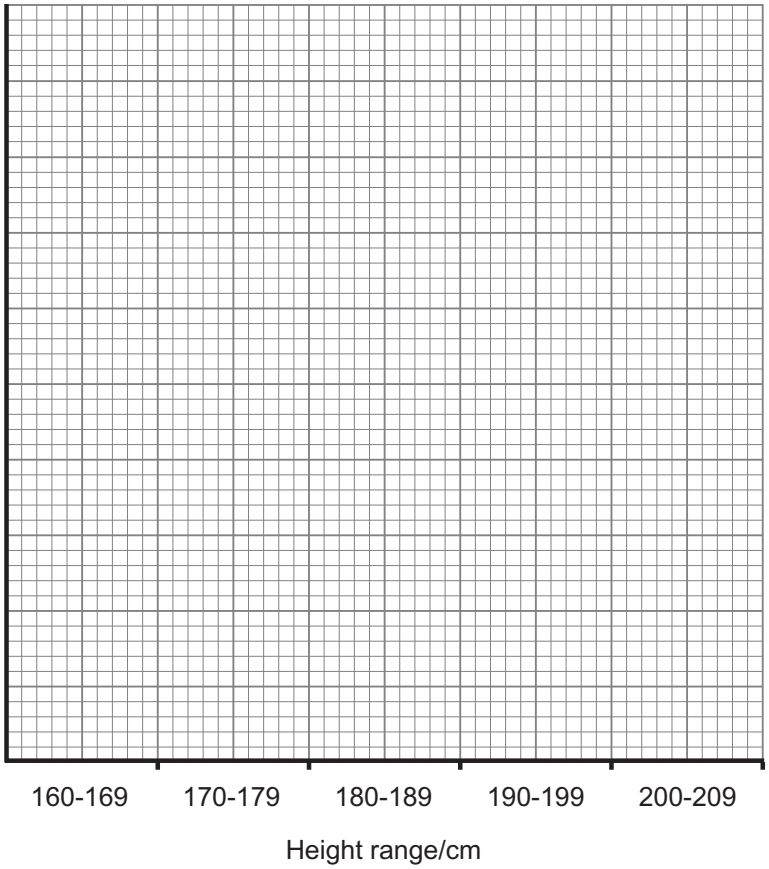
© Dr Nei Overy / Science Photo Library

(a) A group of students measured the heights of the sunflowers.
The table shows the number of sunflowers in each height range.

Height range/cm	Number of sunflowers
160–169	100
170–179	120
180–189	200
190–199	120
200–209	80

Use the information in the table opposite to plot a histogram on the grid.

Label the y axis. Add a suitable scale to the y axis.



[4]

(b) What type of variation is shown by the heights of the sunflowers?

_____ [1]

[Turn over

4 Smoking cigarettes is harmful to health.
Many smokers find it difficult to give up smoking cigarettes. Some try different methods to help them stop. These methods include nicotine gum, nicotine patches and support groups.

(a) Why is it difficult for many smokers to give up smoking cigarettes?

_____ [1]

(b) Suggest why chewing nicotine gum is less harmful to health than smoking cigarettes.

_____ [1]

(c) A packet of 10 cigarettes cost £4.00.
An 18-year-old girl smokes five cigarettes a day.
How much does she spend on buying cigarettes in two weeks?

Show your working

£ _____ [2]

(d) Smokers are more likely to suffer from bronchitis and lung cancer than non-smokers.

(i) What is bronchitis? _____

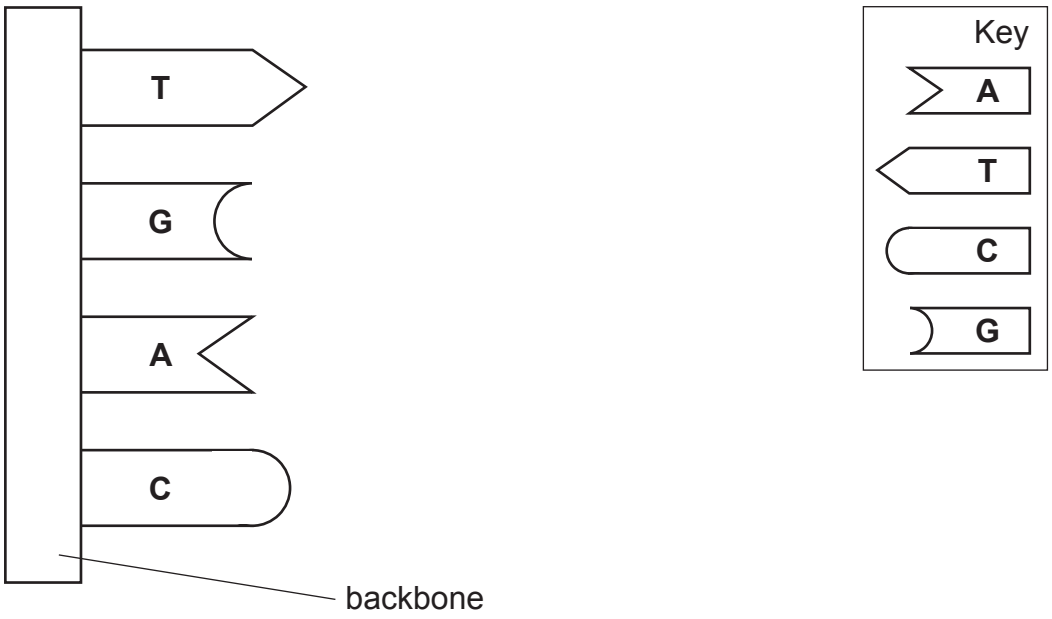
_____ [1]

(ii) What is lung cancer? _____

_____ [1]

5 The diagram shows part of a DNA molecule.

(a) Add the correct bases and a backbone to the diagram to complete the molecule of DNA.



[3]

(b) Name the **two** substances that make up the backbone of the DNA molecule.

_____ and _____ [2]

(c) What term is used to describe the shape of a DNA molecule?

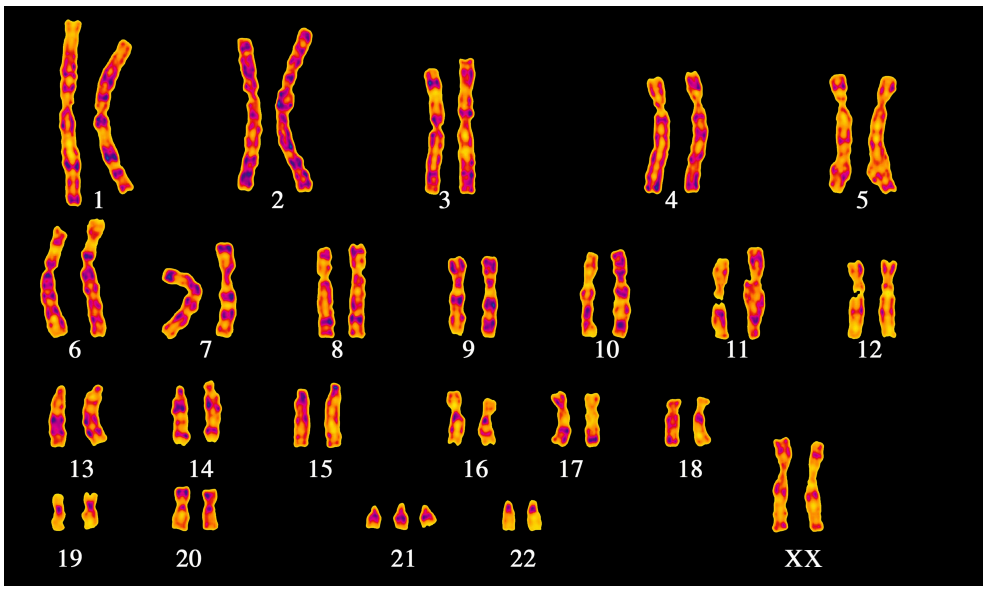
_____ [1]

(d) Where would you find DNA in a cell?

_____ [1]

[Turn over

6 **(a)** The diagram shows the chromosomes from a child who has Down Syndrome.



(i) What evidence in the diagram shows that the child is a girl?

_____ [1]

(ii) What evidence in the diagram shows that the child has Down Syndrome?

_____ [1]

(b) The table shows how a mother's age affects the chance of having a baby with Down Syndrome.

Mother's age	Chance of having a baby with Down Syndrome
20	1 in 2000
22	1 in 1500
24	1 in 1300
26	1 in 1100
28	1 in 1000
30	1 in 900
32	1 in 720
34	1 in 450
36	1 in 300
38	1 in 200
40	1 in 100

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(i) Describe the trend shown in the table.

_____

_____

_____ [1]

(ii) How many times more likely is it for a 38-year-old mother to have a child with Down Syndrome compared to a mother aged 28?

Show your working

_____ [2]

[Turn over

(iii) A 38-year-old woman is offered genetic screening during pregnancy.
Give **two** ethical issues raised by genetic screening.

_____

_____

_____ [2]

(c) A couple had a baby boy.

(i) Use a Punnett square to show how the sex of a baby is inherited.

[4]

(ii) What is the expected ratio of boys to girls in this Punnett square?

_____ to _____ [1]

7 Blood samples from three patients were analysed.
Table 1 gives the results for each patient.

Table 1

Blood samples were analysed for	Blood results for		
	Patient A	Patient B	Patient C
Blood alcohol level	high	not present	low
Level of cholesterol	high	normal	low
Carbon monoxide	normal	high	normal
Hormones:			
• Testosterone	present	absent	absent
• Oestrogen	absent	present	present
• Fertility hormones	absent	absent	present

Use the information in Table 1 and your knowledge to complete Table 2.
The first row has been completed for you.

Table 2

	Patient	Evidence
Most likely to have a heart attack	A	high cholesterol level
Is a male		
Most likely to be a smoker		
Most likely to be receiving IVF Treatment		
Most likely to be a binge drinker		

[8]

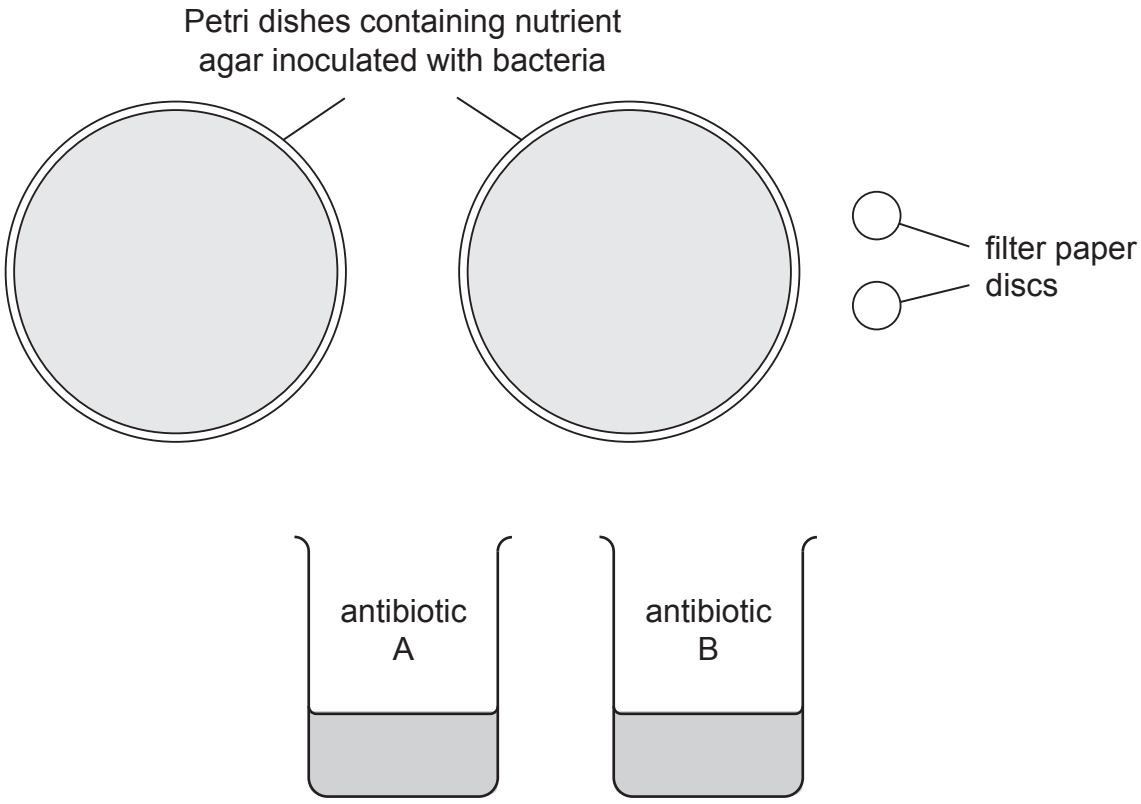
[Turn over

8 A student wanted to investigate how effective two antibiotics were against a particular type of bacteria.

The student was given the following apparatus:

- two Petri dishes containing nutrient agar inoculated with the bacteria;
- two filter paper discs;
- two different antibiotic solutions.

The diagram shows the apparatus the student was given.



Describe how the student carried out this investigation.

- Give **two** safety precautions.
- Describe and explain the results the student would obtain if antibiotic A was more effective than antibiotic B.

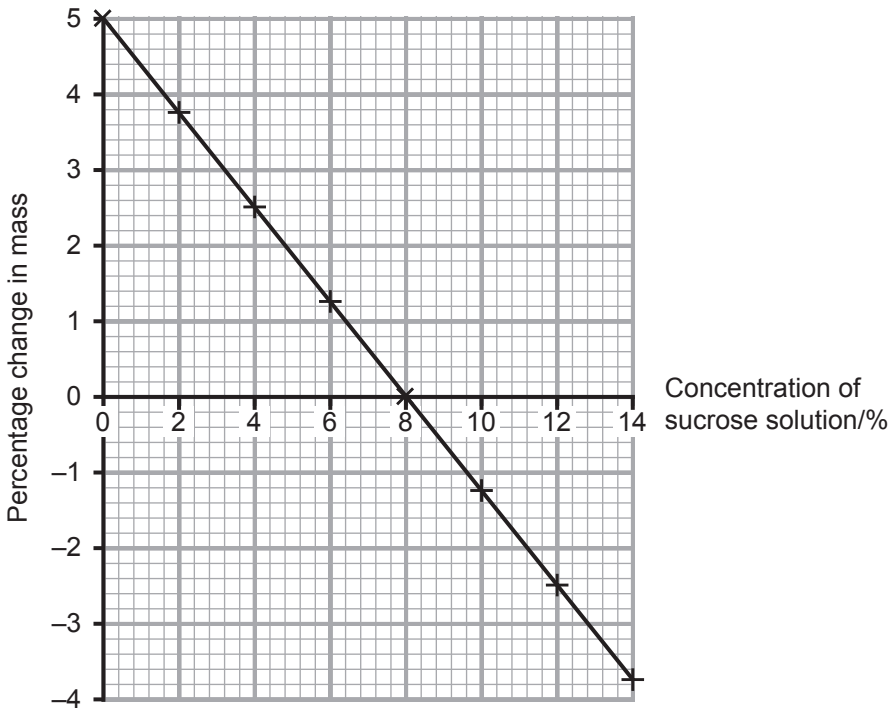
In this question you will be assessed on your written communication skills including the use of specialist scientific terms.

[6]

[Turn over

9 A student weighed and recorded the mass of eight potato cylinders.
She placed one cylinder in each of eight concentrations of sucrose solution and left them for two hours.
She then reweighed the cylinders and calculated the percentage change in mass.

The graph shows her results.



(a) (i) Use the graph to find the percentage concentration of sucrose solution which gives zero percentage change in the mass of the potato cylinder.

_____ % [1]

(ii) Explain your answer.

_____

_____

_____

_____ [1]

(b) Draw a plant cell in each box as it would appear after it had been left for 2 hours in

(i) water (0% sucrose solution).

(ii) 12% sucrose solution.
Label the cell wall and cell membrane.

(i) cell in water	**(ii)** cell in 12% sucrose solution **(Label the cell membrane and cell wall.)**

[4]

(c) What is the function of the plant cell wall in osmosis?

_____

_____ [1]

[Turn over

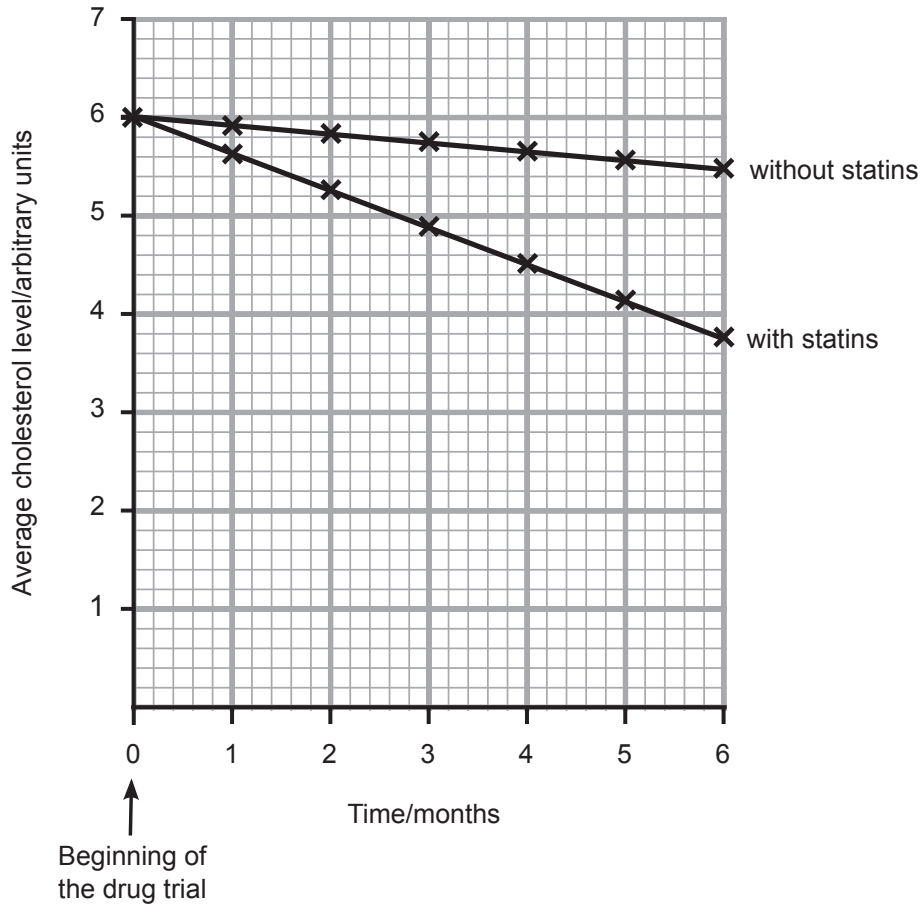
10 A high cholesterol level in the blood increases the risk of a heart attack.

(a) Explain how a high cholesterol level in the blood can lead to a heart attack.

[4]

(b) A six month drug trial involved 14 000 patients with high cholesterol levels.
It is claimed that drugs called statins reduce cholesterol levels.
Half of the patients were given statins and half were not.
All patients were told to eat a balanced diet over the period of the trial.

The graph shows the average cholesterol levels over the six months of the trial.



(i) What conclusions can be drawn from this drug trial?
Use **data** from the graph to support your answer.

[3]

(ii) Why was the group of patients who were **not** given statins included as part of the trial?

[1]

Of the 14 000 patients who took part in the drug trial six out of seven were men. This is because men make up a greater proportion of heart disease patients.

(iii) How many **women** took part in the drug trial?

Show your working

women [2]

[Turn over

(iv) Some of these women found that statins did not reduce their cholesterol level. This meant that they were still at risk of having a heart attack.

Other than a balanced diet suggest **two** lifestyle changes that these women could make which would help to reduce their risk of having a heart attack.

1. _____

2. _____ [2]

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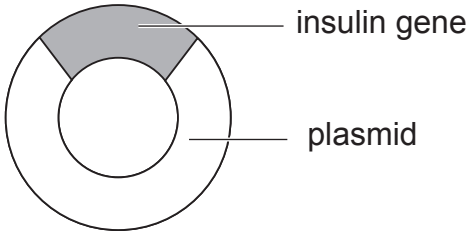
(Questions continue overleaf)

11 Insulin is a hormone which can be made using genetic engineering.
Bacteria are used in this process.
The diagram shows a stage in the production of human insulin by genetic engineering.



(a) Describe **three** stages required to produce the plasmid shown in the diagram.

[3]

(b) The plasmid containing the insulin gene is placed back into a bacterium.
Explain how this genetically engineered bacterium can be used to produce large quantities of insulin in a short period of time.

[1]

(c) State **two other** advantages of producing human insulin by this method.

_____

_____

_____

_____ [2]

(d) Name the condition that insulin is used to treat.

_____ [1]

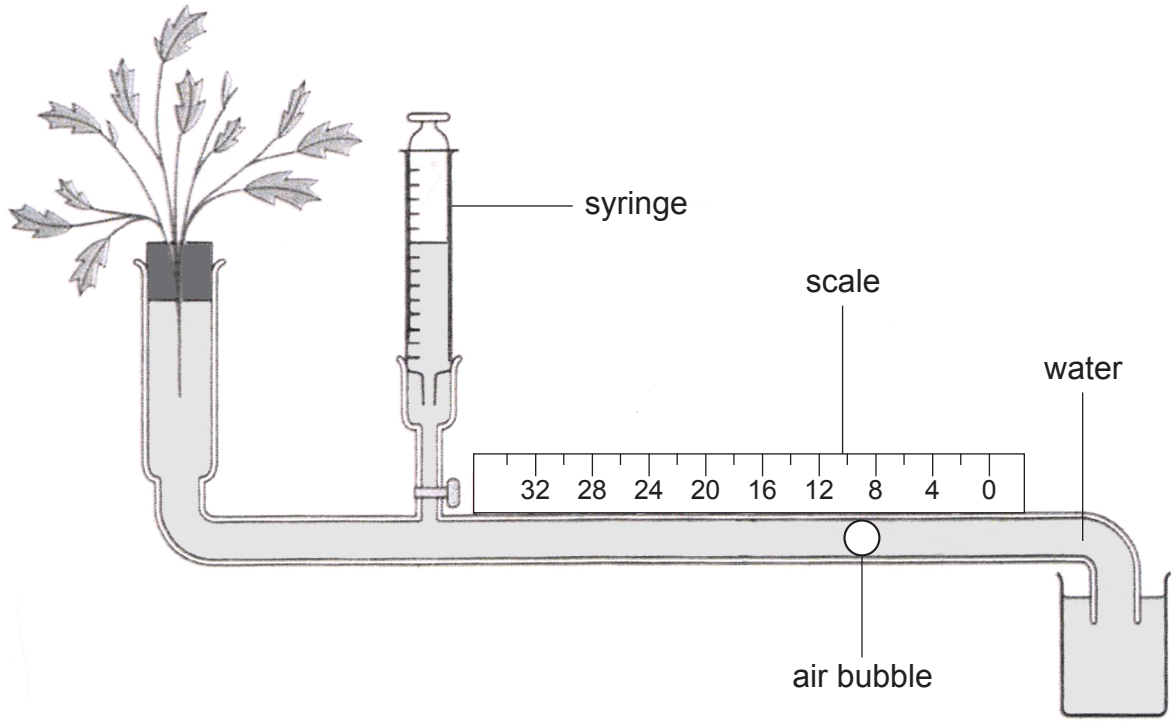
[Turn over

12 **(a)** Complete the sentence to define transpiration.

Transpiration is the evaporation of water from the leaf cells followed by

diffusion through the _____. [1]

(b) The diagram shows apparatus used to investigate the rate of transpiration in a plant shoot in different environmental conditions.



(i) Name the apparatus.

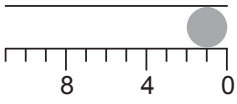
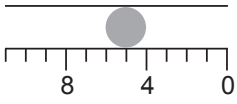
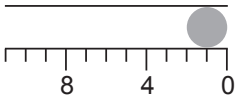
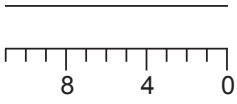
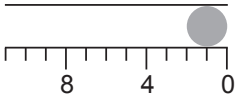
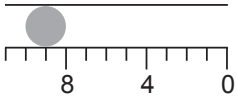
_____ [1]

(ii) How is the bubble reset to zero between experiments?

_____

_____ [1]

(c) The table shows the distance moved by the air bubble under different environmental conditions over **30 minutes**.

Experiment	Environmental condition			Position of bubble at the start	Position of bubble at the end	Distance moved by bubble/mm
	Fan speed on/off	Temperature /°C	Humidity low/high			
1	off	20	low			4
2	on	20	low			6
3	off	30	low			

Complete the table by

(i) drawing in the position of the air bubble at the end of Experiment 2. [1]

(ii) calculating the distance moved by the air bubble in Experiment 3. [1]

(d) What is the rate of transpiration in Experiment 1 in mm **per hour?**

_____ mm per hour [1]

(e) **(i)** The distance moved by the air bubble in Experiment 1 was 4 mm.
The distance moved by the air bubble in Experiment 2 was 6 mm.

Give the environmental condition that caused this increase.

_____ [1]

(ii) Experiment 1 was repeated with high humidity. What would you expect to happen to the distance moved by the bubble?

_____ [1]

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Question Number	Marks
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