



General Certificate of Secondary Education
2014

Centre Number

71

Candidate Number

Double Award Science: Biology

Unit B2

Higher Tier

[GSD42]

ML

FRIDAY 6 JUNE 2014, AFTERNOON

TIME

1 hour 15 minutes, plus your additional time allowance.

INSTRUCTIONS TO CANDIDATES

Write your Centre Number and Candidate Number in the spaces provided at the top of this page.

Write your answers in the spaces provided in this question paper.
Answer **all ten** 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.

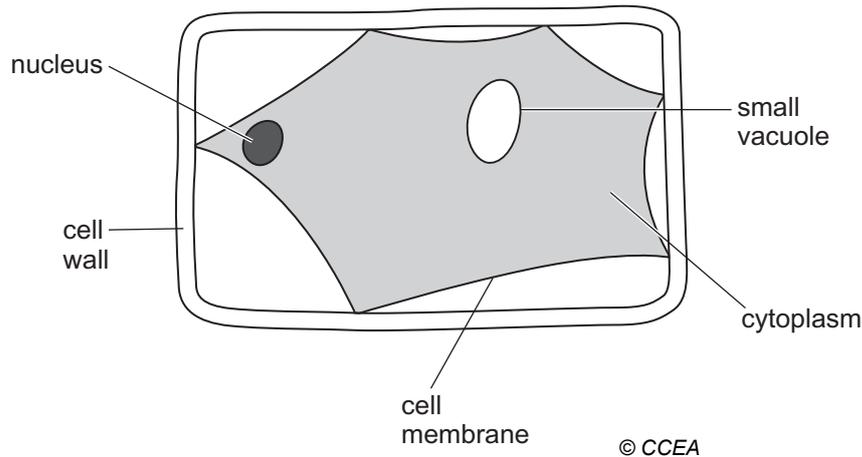
Quality of written communication will be assessed in **questions 5(b) and 7(b)**.

For Examiner's use only	
Question Number	Marks
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	

Total Marks	
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- 1 Look at the diagram below. It shows a plant cell as it would look under a microscope. The cell had been left in strong sugar solution for 30 minutes.



- (a) What term describes the cell as it looks in the diagram?

[1]

- (b) Redraw the cell, **to the same scale**, as it would look after being left in water for 30 minutes.
Label the **cell wall**, **cell membrane** and **vacuole** on your drawing.

[4]

Examiner Only	
Marks	Remark

- 2 (a) Look at the photograph below. It shows the type of mosquito that can carry the virus that causes the disease yellow fever. When a person is bitten by this type of mosquito, the virus can be passed to that person. Approximately 7% of people who catch yellow fever die from it within three weeks.



© Sinclair Stammers/ Science Photo Library

Paul is planning to visit Africa and has been advised to be vaccinated against yellow fever before he travels.

Write down two reasons why Paul should be vaccinated before he travels.

1. _____

2. _____ [2]

Examiner Only

Marks

Remark

- (b) The MMR vaccine gives immunity against measles, mumps and rubella.

The table below shows the percentage of the population who got the MMR vaccine in 2011, in the different regions of the United Kingdom.

Region of United Kingdom	Percentage of the population who got the MMR vaccine
England	89.1
Wales	91.5
Scotland	93.2
Northern Ireland	92.9

- (i) Work out the difference in the percentage of the population who got the MMR vaccine in Northern Ireland compared to England.

_____ % [1]

In 2011, there were fewer cases of measles in Northern Ireland than in England.

- (ii) Write down **one** reason why there were fewer cases of measles in Northern Ireland than in England, in 2011.

 _____ [1]

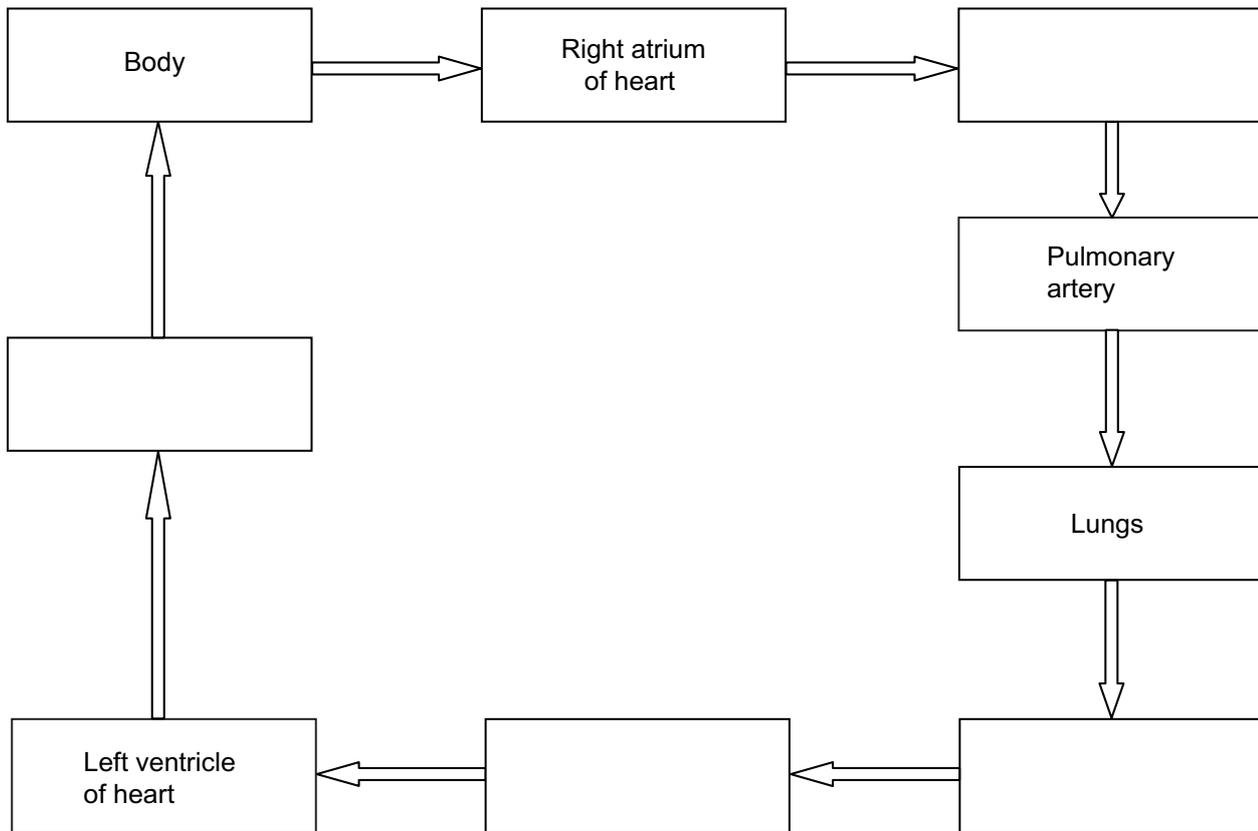
- (iii) Write down the name of the scientist who developed the first vaccine.

_____ [1]

Examiner Only

Marks Remark

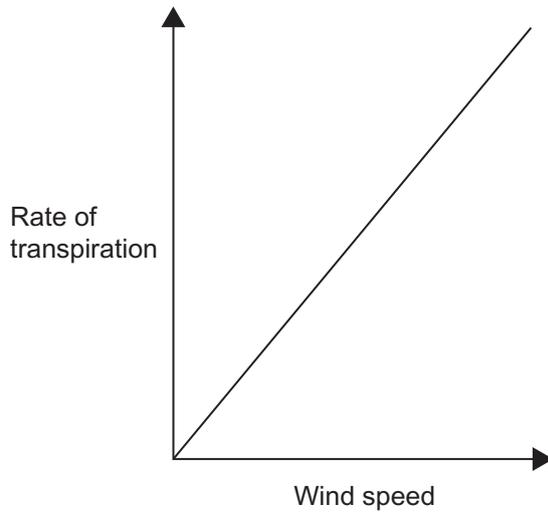
(c) In the diagram below, fill in the empty boxes to show the passage of blood through the heart and around the body. The empty boxes show heart chambers or blood vessels.



[4]

Examiner Only	
Marks	Remark

- 4 (a) Look at the graph below. It shows the effect of increasing wind speed on the rate of transpiration in plants.

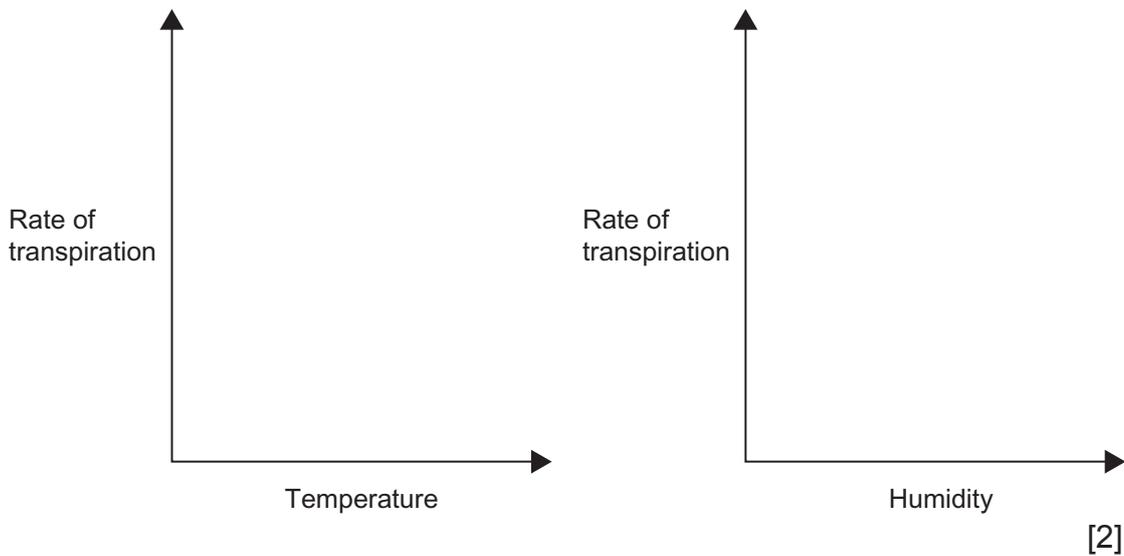


- (i) Write about and describe the trend shown.

[1]

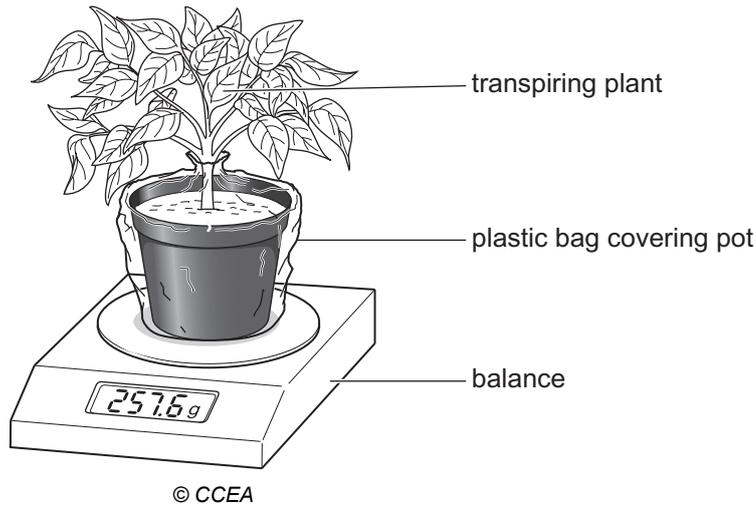
Two other factors that affect the rate of transpiration in plants are temperature and humidity.

- (ii) Draw a line to show the effect of increasing temperature on the rate of transpiration on the first axis below.
 Draw a line to show the effect of increasing humidity on the rate of transpiration on the second axis below.



Examiner Only	
Marks	Remark

- (b) Look at the diagram below. It shows apparatus used to investigate the effect of surface area of leaves on the rate of transpiration in a plant.



- (i) Why was the pot covered with a plastic bag?

_____ [1]

The plant was weighed and left for **24 hours**. It was then reweighed.

The **rate** of transpiration was worked out as 3.8g per hour.

Some leaves were removed from the plant and the experiment was repeated.

The table below shows the result for the second experiment.

Mass of plant at start /g	Mass of plant after 24 hours /g
257.6	185.6

- (ii) Work out the rate of transpiration (in g per hour) in the second experiment. Use the data in the table above to do this.

Show your working out.

_____ g per hour [2]

Examiner Only

Marks Remark

(iii) Write about and explain why the rate of transpiration is lower when some leaves were removed.

_____ [2]

(iv) Plants use water in transpiration.

Write down two **other** ways that plants use water.

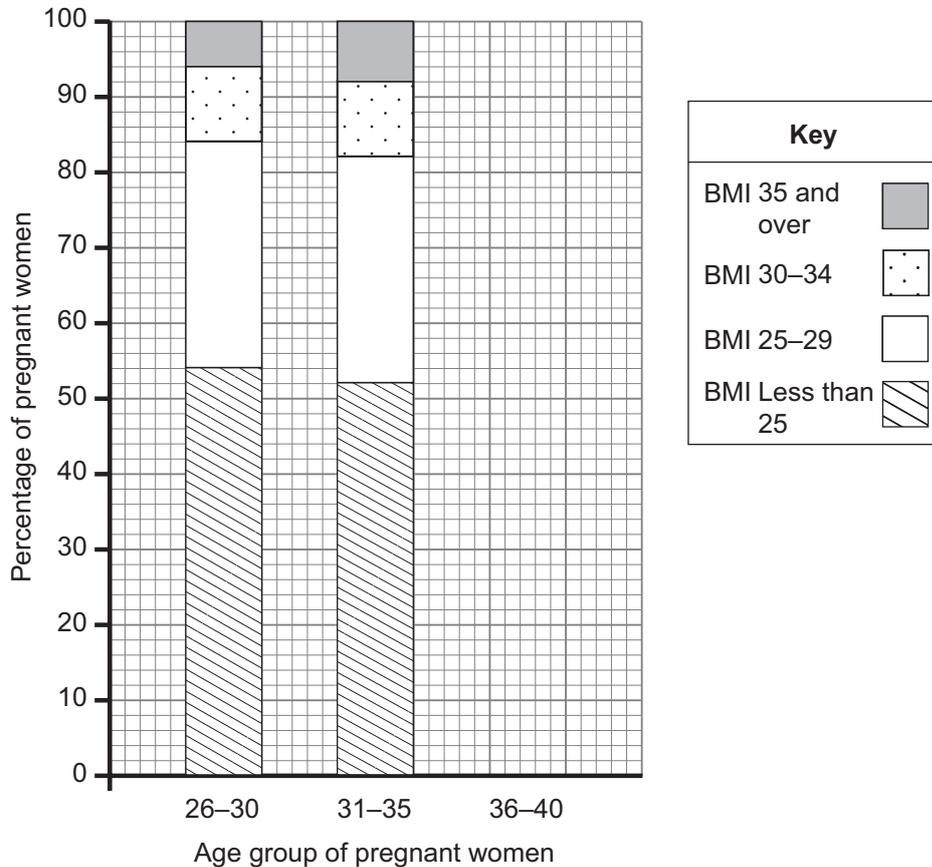
1. _____
2. _____ [2]

Examiner Only	
Marks	Remark

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- 5 (a) Obesity in pregnant women can increase the risk of health problems in the developing baby.

Look at the graph below. It shows the BMI (body mass index) of pregnant women, in different age groups, in Northern Ireland in 2010–2011.



Women are obese if they have a BMI of 30 and over.

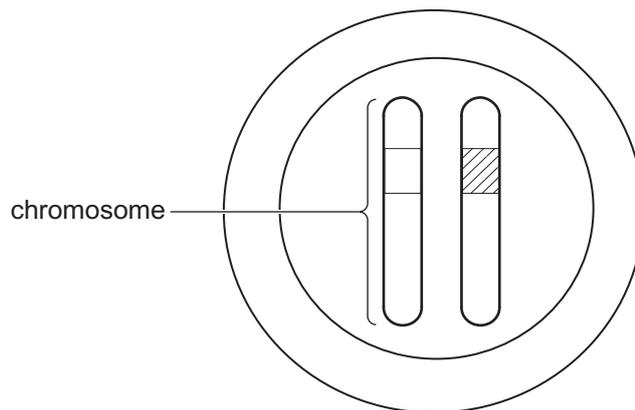
- (i) What percentage of pregnant women aged 31–35 were obese?

Show your working out.

_____ % [2]

Examiner Only	
Marks	Remark

- 6 (a) Look at the diagram below. It shows a cell that has a nucleus with two chromosomes.



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- (i) Write down the name of the molecule that makes up chromosomes.

[1]

- (ii) Draw the cells and chromosomes that would be produced when this cell divides by **mitosis**. Do this in the space below.

[3]

Examiner Only	
Marks	Remark

(b) Genes control characteristics in organisms.

Peas can be smooth or wrinkled.

This characteristic is shown in the photograph below.



© Walter Eberhart, Visuals Unlimited/ Science Photo Library

Let H represent the allele for smooth peas.

Let h represent the allele for wrinkled peas.

(i) Using a Punnett square, show the possible offspring produced when a heterozygous, smooth pea plant is crossed with a wrinkled pea plant.

[4]

(ii) Using your Punnett square, write down the ratio of smooth pea plants to wrinkled pea plants.

[1]

Examiner Only	
Marks	Remark

(c) Write about and explain how a test (back) cross could be used to work out the possible genotypes of a smooth pea plant.

[3]

Examiner Only	
Marks	Remark

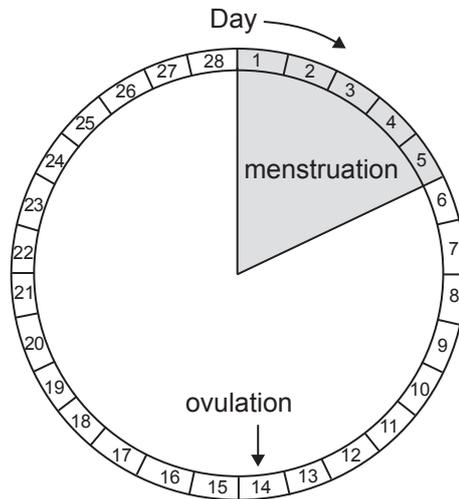
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7 Sex hormones are involved in the menstrual cycle.

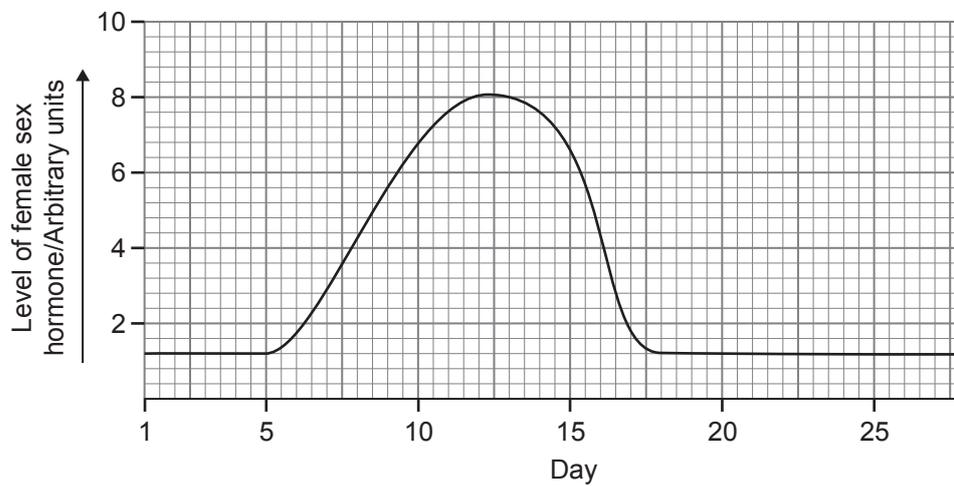
(a) How are hormones transported around the body?

[1]

(b) The diagram below shows a 28 day menstrual cycle.



The graph below shows how levels of a female sex hormone change during the menstrual cycle.



Examiner Only	
Marks	Remark

(c) In vitro fertilisation (IVF) may be used to treat couples who have fertility problems.

(i) How are zygotes produced in the laboratory during IVF?

_____ [2]

(ii) Write down **one** reason why zygotes produced during IVF are left to grow to the eight cell stage (embryo) before being transferred into the uterus.

_____ [1]

(iii) Write down two ethical issues to do with IVF.

1. _____
2. _____ [2]

Examiner Only

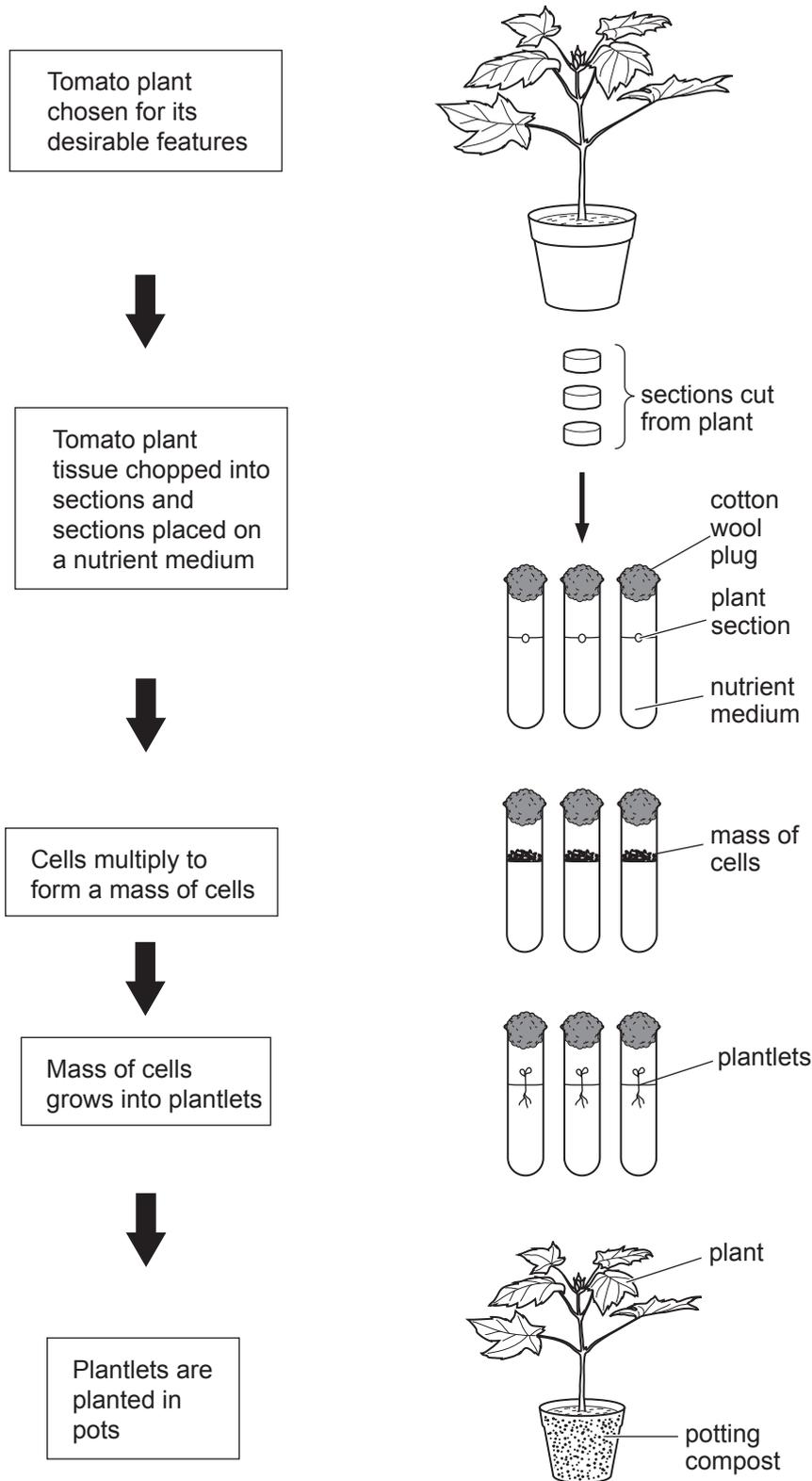
Marks Remark

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8 (a) Write about and explain why cloning in plants can be described as asexual reproduction.

[1]

(b) Look at the diagram below. It shows one method of asexual reproduction so that plants can be cloned.



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Examiner Only	
Marks	Remark

- (i) What is the name of this method of asexual reproduction (cloning) in plants?

[1]

- (ii) It is important for a grower to choose a suitable plant for asexual reproduction (cloning). Suggest two good features that a suitable plant would have.

1. _____

2. _____ [2]

- (iii) Write about **one** disadvantage of cloning.

[1]

Examiner Only

Marks

Remark

- 9 In a grassland there were equal numbers of brown and white rabbits. A farmer changed the use of this land from grassland to woodland.

Several years after the change in land use he did a survey on the number of rabbits there were. The results showed that there was the same number of rabbits. However, the number of brown rabbits had increased while the number of white rabbits had decreased.

Foxes hunt and eat rabbits. The number of foxes in the area had not changed.

- (a) Write about and describe how natural selection can explain the **increase** in the number of brown rabbits overall because of the change in land use.

[4]

- (b) Write about two changes that could cause the number of **white** rabbits to increase in the future.

1. _____

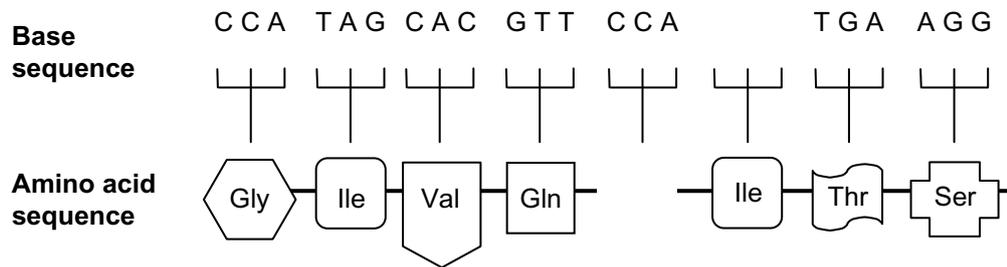
2. _____ [2]

Examiner Only

Marks

Remark

- 10 (a) Look at the diagram below. It shows part of the base sequence of DNA which is used to code for specific amino acids. The amino acids join to make a protein molecule such as insulin.



- (i) Complete the diagram by:

- adding the missing three bases in the base sequence.
- drawing the missing amino acid in the amino acid sequence.

[2]

- (ii) Insulin is a protein made up of 51 amino acids.

How many bases are needed to code for this protein?

_____ [1]

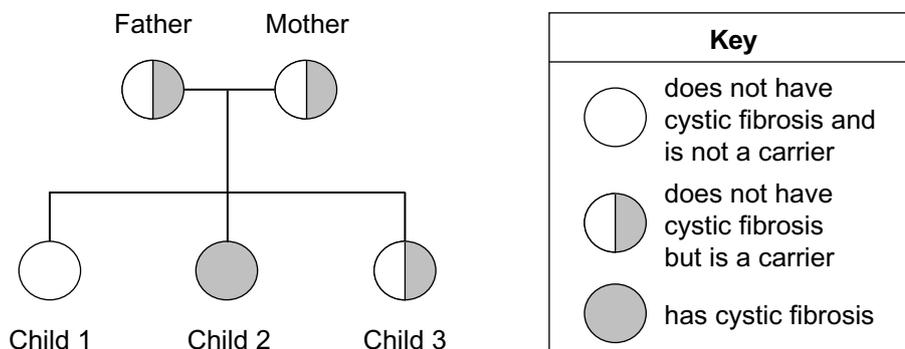
- (iii) Write about and explain what would happen if the first base (C), in the base sequence above, was removed.

_____ [2]

Examiner Only	
Marks	Remark

- (c) Cystic fibrosis is an inherited condition. Look at the diagram below. It shows how two parents who are carriers can have a child with cystic fibrosis.

A carrier is a person who has an allele for a condition but does not have the condition.



- (i) Write about and explain how two parents who are carriers can have a child with cystic fibrosis. Use the diagram and your knowledge in your answer.

_____ [2]

- (ii) Anne and Niall have a child with cystic fibrosis.

Anne is pregnant with a second baby and has asked her doctor for information on genetic screening.

Write about two ethical issues to do with genetic screening during pregnancy.

1. _____
2. _____ [2]

- (iii) Cystic fibrosis is caused by a change in the genes.

Write the name of one genetic condition that is caused by a change in the **number of chromosomes**.

_____ [1]

THIS IS THE END OF THE QUESTION PAPER

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