

CHERRY HILL TUITION AQA BIOLOGY AS PAPER 11

1)

(a) (i) An arteriole is described as an organ. Explain why.

.....
(1 mark)

(a) (ii) An arteriole contains muscle fibres. Explain how these muscle fibres reduce blood flow to capillaries.

.....
(2 marks)

(b) (i) A capillary has a thin wall. This leads to rapid exchange of substances between the blood and tissue fluid. Explain why.

.....
(1 mark)

(b) (ii) Blood flow in capillaries is slow. Give the advantage of this.

.....
(1 mark)

(c) Kwashiorkor is a disease caused by a lack of protein in the blood. This leads to a swollen abdomen due to a build up of tissue fluid.

Explain why a lack of protein in the blood causes a build up of tissue fluid.

.....
(3 marks)

(Extra space)

2)

(a) The scientific name of the leopard is *Panthera pardus*. Complete the table to show the classification of the leopard.

Kingdom	Animalia
Phylum	Chordata
	Mammalia
	Carnivora
Family	Felidae
Genus	
Species	

(2 marks)

(b) Leopards, cheetahs and pumas are all members of the family Felidae.

Biologists used DNA hybridisation to investigate the evolutionary relationships between leopards, cheetahs and pumas. They found that hybrid DNA from a leopard and a cheetah separated into single strands at a higher temperature than hybrid DNA from a leopard and a puma.

These results suggest that leopards are more closely related to cheetahs than to pumas. Explain why.

.....
(2 marks)

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(c) All modern cheetahs are thought to have descended from a single female. This female was part of a small population that survived an ice age a long time ago that killed almost all cheetahs. After the ice age, the number of cheetahs increased.

(c) (i) Use this information to explain what is meant by a genetic bottleneck.

.....
(2 marks)

(c) (ii) The fertility of cheetahs is low. The proportion of abnormal sperm cells produced is higher in cheetahs than in other members of the family Felidae. Suggest an explanation for this.

.....
(2 marks)

3)

(a) What is *intraspecific* variation?

.....
.....
(1 mark)

(b) Schizophrenia is a mental illness. Doctors investigated the relative effects of genetic and environmental factors on the development of schizophrenia. They used sets of identical twins and non-identical twins in their investigation. At least one twin in each set had developed schizophrenia.

- Identical twins are genetically identical.
- Non-identical twins are not genetically identical.
- The members of each twin pair were raised together.

The table shows the percentage of cases where both twins had developed schizophrenia.

Type of twin	Percentage of cases where both twins had developed schizophrenia
Identical	50
Non-identical	15

(b) (i) Explain why both types of twin were used in this investigation.

.....
(2 marks)

(b) (ii) What do these data suggest about the relative effects of genetic and environmental factors on the development of schizophrenia?

.....
(1 mark)

(b) (iii) Suggest **two** factors that the scientists should have taken into account when selecting the twins to be used in this study.

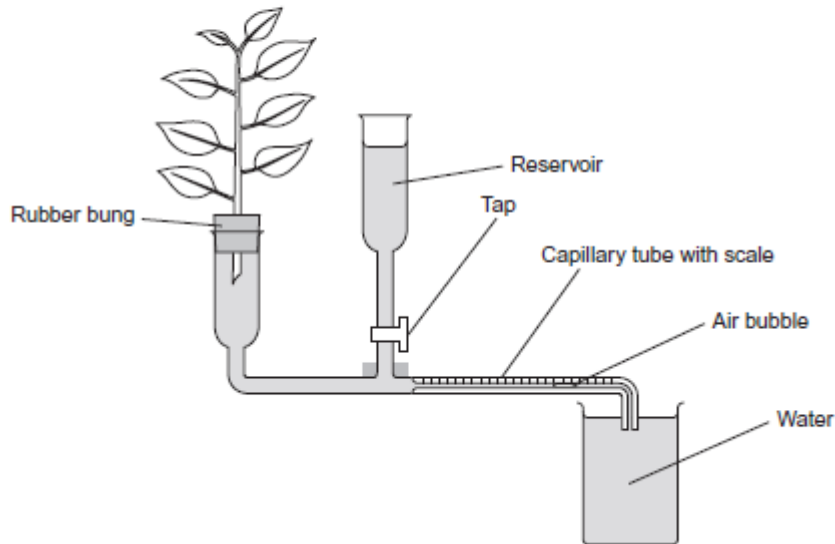
1

2

(2 marks)

4)

Students investigated the effect of removing leaves from a plant shoot on the rate of water uptake. Each student set up a potometer with a shoot that had eight leaves. All the shoots came from the same plant. The potometer they used is shown in the diagram.



(a) Describe how the students would have returned the air bubble to the start of the capillary tube in this investigation.

(1 mark)

(b) Give **two** precautions the students should have taken when setting up the potometer to obtain reliable measurements of water uptake by the plant shoot.

1

2

(2 marks)

(c) A potometer measures the rate of water uptake rather than the rate of transpiration. Give **two** reasons why the potometer does **not** truly measure the rate of transpiration.

1

2

(2 marks)

(d) The students' results are shown in the table.

Number of leaves removed from the plant shoot	Mean rate of water uptake / cm ³ per minute
0	0.10
2	0.08
4	0.04
6	0.02
8	0.01

Explain the relationship between the number of leaves removed from the plant shoot and the mean rate of water uptake.

(3 marks)

5)

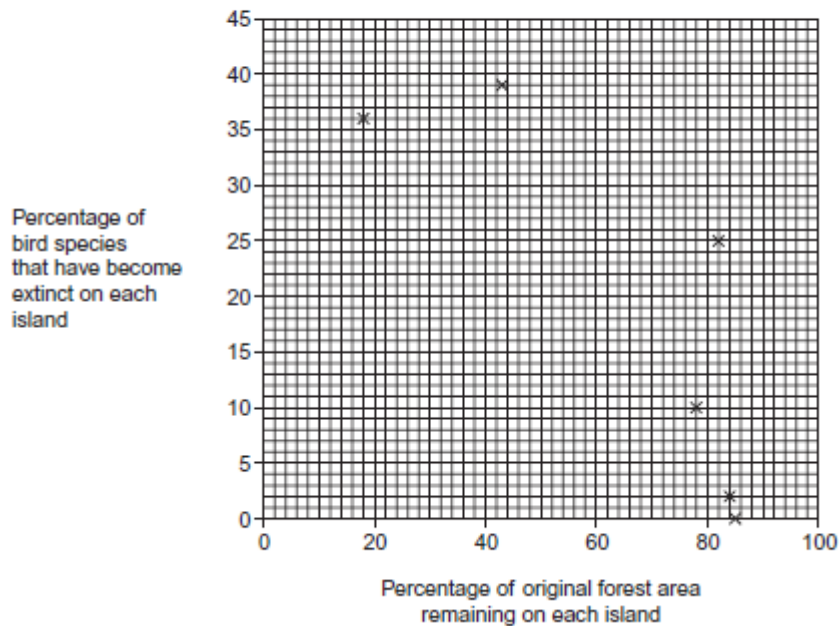
- (c) A mutation in the gene coding for enzyme **B** could lead to the production of a non-functional enzyme. Explain how. (3 marks)

- (d) Using isoniazid to treat diseases caused by other species of bacteria could increase the chance of the bacterium that causes tuberculosis becoming resistant to isoniazid.
- Use your knowledge of gene transmission to explain how.
- (3 marks)

6)

- (a) There are ethical and economic arguments for maintaining biodiversity.
- (a) (i) Suggest **one** ethical argument for maintaining biodiversity.
- (1 mark)
- (a) (ii) Suggest **one** economic argument for maintaining biodiversity.
- (1 mark)

Ecologists calculated the percentage of bird species that have become extinct on six islands in the last one hundred years. They also calculated the percentage of original forest area remaining on each island after the same time period. The graph shows their results.



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- (b) Explain the relationship between the percentage of original forest area remaining and the percentage of bird species that have become extinct.

.....
(2 marks)

- (c) What **two** measurements would the ecologists have needed to obtain to calculate the index of diversity of birds on each island?

1

2

(2 marks)

- (d) The ecologists noted that the species of birds surviving on the coldest islands had a larger body size than those surviving on warmer islands.

Explain how a larger body size is an adaptation to a colder climate.

.....
(2 marks)

7)

The 'placebo effect' describes the improvement in patients' symptoms due to psychological effects. Scientists investigated the placebo effect in patients with asthma. They divided a large number of asthma patients into three groups, **1**, **2** and **3**.

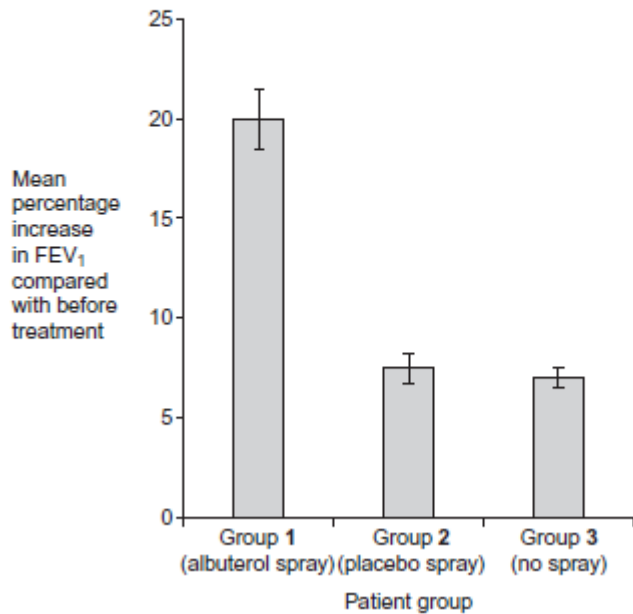
- Group **1** inhaled a spray containing albuterol every day. Albuterol is a drug used to treat asthma.
- Group **2** inhaled a placebo spray every day. This was identical to the spray given to group **1** but it did not contain albuterol.
- Group **3** did not receive any spray treatment.

- a) Describe **one** way the scientists could have allocated the patients to each group.

.....
(2 marks)
..

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The scientists measured the forced expiratory volume (FEV_1) of each patient at regular intervals. The forced expiratory volume (FEV_1) is the volume of air forced out of the lungs in the first second when breathing out. The scientists recorded each patient's FEV_1 before treatment started and after 60 days of treatment. They then calculated the mean increase in FEV_1 for each group. Their results are shown in the graph. The bars show the standard deviation.



8

- (b) What do the standard deviation bars suggest about the difference in the mean increase in FEV_1 between Group 1 and the other groups? Explain your answer.

.....
(2 marks)

- (c) What do the data suggest about the 'placebo effect' in this investigation? Explain your answer.

.....
(2 marks)

- (d) On each occasion that a patient's FEV_1 was measured, a doctor repeated the measurement several times. Explain why.

.....
(2 marks)

8)

The table shows pressure changes in the left side of the heart during one cardiac cycle.

Time / s	Blood pressure / kPa	
	Left atrium	Left ventricle
0.0	0.7	0.3
0.1	1.0	2.0
0.2	0.1	12.5
0.3	0.2	15.3
0.4	1.0	4.5
0.5	0.5	1.0
0.6	0.6	0.3
0.7	0.7	0.3

- (a) Between which times is the valve between the atrium and the ventricle closed?
Explain your answer.

Times s and s

Explanation

(2 marks)

- (b) The maximum pressure in the ventricle is much higher than that in the atrium.
Explain what causes this.

(2 marks)

- (c) Use the information in the table to calculate the heart rate in beats per minute.

Answer beats per minute
(1 mark)