AQA

Please write clearly in block capitals.

Centre number | | | | | | Candidate number | | | | |

Surname _____

Forename(s) _____

Candidate signature _____

I declare this is my own work.

GCSE
COMBINED SCIENCE: TRILOGY

H

Higher Tier
Biology Paper 2H

Friday 9 June 2023 Afternoon Time allowed: 1 hour 15 minutes

Materials

For this paper you must have:
- a ruler
- a scientific calculator.

Instructions
- Use black ink or black ball-point pen.
- Pencil should only be used for drawing.
- Fill in the boxes at the top of this page.
- Answer **all** questions in the spaces provided.
- If you need extra space for your answer(s), use the lined pages at the end of this book. Write the question number against your answer(s).
- Do all rough work in this book. Cross through any work you do not want to be marked.
- In all calculations, show clearly how you work out your answer.

For Examiner's Use	
Question	Mark
1	
2	
3	
4	
5	
6	
TOTAL	

Information
- The maximum mark for this paper is 70.
- The marks for questions are shown in brackets.
- You are expected to use a calculator where appropriate.
- You are reminded of the need for good English and clear presentation in your answers.

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ANSWER IN THE SPACES PROVIDED

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0 1 Sexual reproduction in humans involves the production of egg cells and sperm cells.

0 1 . 1 Name the type of cell division that produces egg cells and sperm cells.

[1 mark]

0 1 . 2 Sexual reproduction produces offspring that are genetically different from each other.

Give **two** reasons why sexual reproduction causes variation in the offspring.

[2 marks]

1 _____

_____

2 _____

_____

Question 1 continues on the next page

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Polydactyly is an inherited disorder.

The allele for polydactyly is dominant, **D**.

A person with two copies of the allele **d** will **not** have polydactyly.

0 1 . 3 A person with the genotype **DD** is homozygous.

What word describes the genotype **Dd**?

[1 mark]

_____

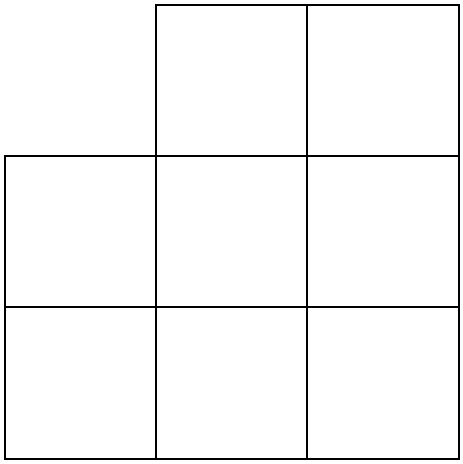
0 1 . 4 A person with the genotype **Dd** and a person with the genotype **dd** plan to have a child.

Determine the probability that the child will have polydactyly.

You should:

- complete the Punnett square diagram
- identify any offspring genotype that would have polydactyly.

[5 marks]



Probability that the child will have polydactyly = _____

Do not write outside the box

0 1 . 5 Embryos can be screened for the alleles that cause inherited disorders.

Give **two** advantages of embryo screening.

[2 marks]

1 _____

_____

2 _____

_____

11

Turn over for the next question

Do not write outside the box

0 2 It is estimated that 99.9% of all species that have ever existed are now extinct.

0 2 . 1 Why is the percentage of species that are extinct only an estimate?

[1 mark]

Tick (✓) **one** box.

All individuals of one species have the same genes. ☐

Extinction is always caused by humans. ☐

Humans have not found evidence of every species. ☐

0 2 . 2 What evidence is used to study species that have become extinct?

[1 mark]

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0 2 . 3 A bacterium called *Clostridioides difficile* (*C. difficile*) can infect the human digestive system.

C. difficile can multiply and produce toxins. The toxins cause diarrhoea.

Doctors are concerned that new strains of *C. difficile* may evolve.
Antibiotics may **not** be able to kill these new strains.

Explain how the evolution of antibiotic resistant *C. difficile* can be slowed down.

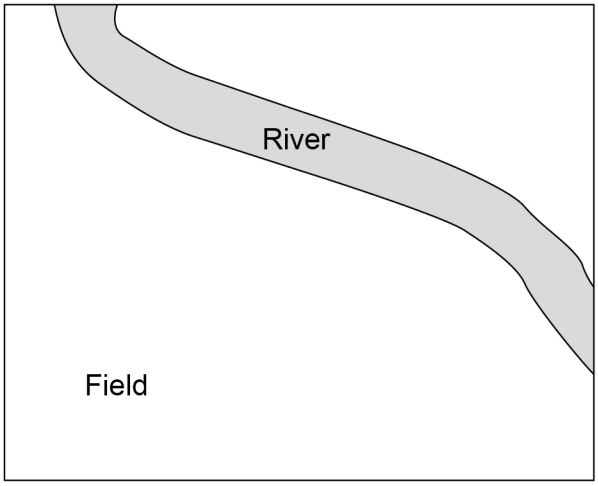
[6 marks]

8

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0 3 **Figure 1** shows a river next to a field.

Figure 1



0 3 . 1 Describe a method to investigate how the distance from the river affects the number of different plant species in the field.

You should explain how to use a transect in your method.

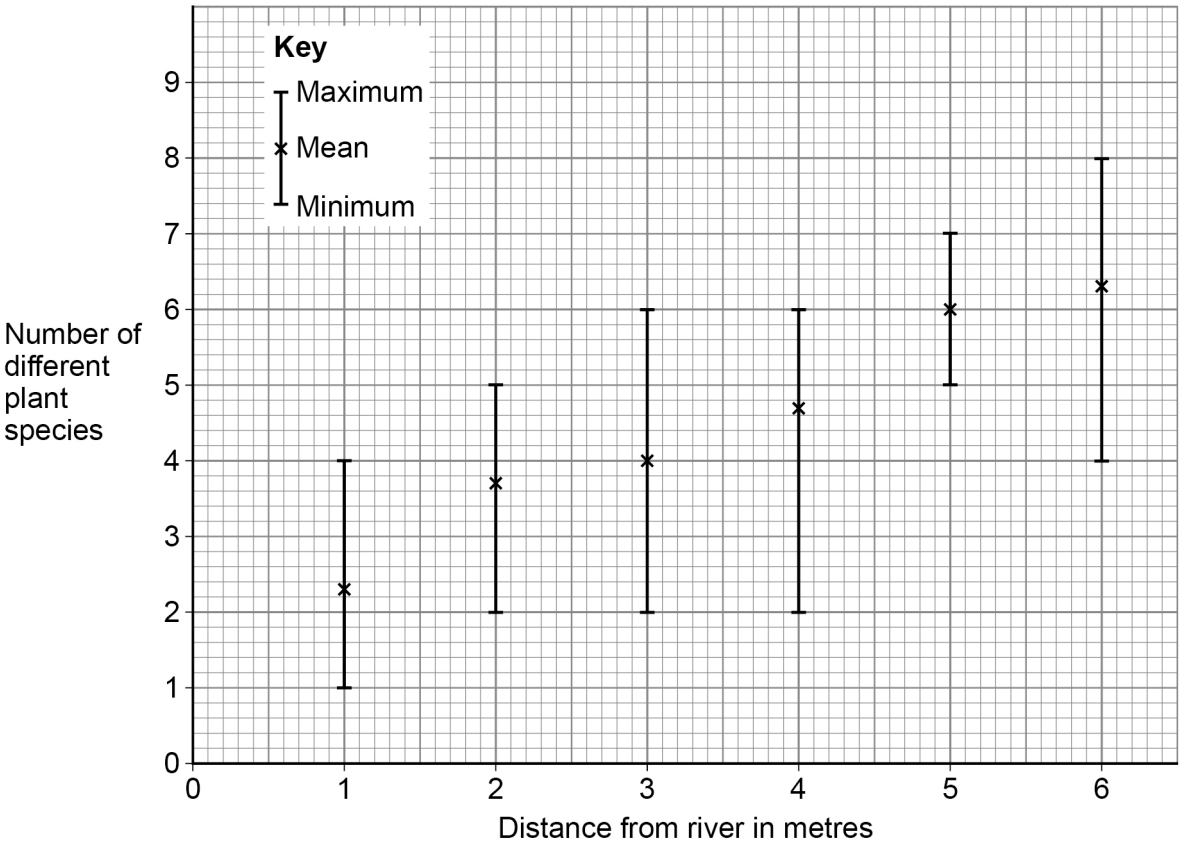
[4 marks]

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0 3 . 2 Students used a valid method to investigate how the distance from the river affects the number of different plant species in the field.

Figure 2 shows the results.

Figure 2



What is shown by the data in **Figure 2**?

[1 mark]

Tick (✓) **one** box.

Fewer different species are always recorded nearer to the river. ☐

The mean value students can be most certain about is 5 metres from the river. ☐

The number of species recorded 6 metres from the river is anomalous. ☐

Question 3 continues on the next page

Do not write outside the box

Cows walk on the ground near the river more than they walk on the ground further from the river.

0 3 . 3 Which is an **abiotic** factor that could affect the number of different plant species found near the river?

[1 mark]

Tick (✓) **one** box.

Microorganisms near the roots ☐

Moisture levels in the soil ☐

Oxygen concentration in the air ☐

Primary consumers in the field ☐

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0 3 . 4 Increasing numbers of cows are being farmed across the world.

Explain the environmental implications of increasing numbers of cows being farmed.

[6 marks]

12

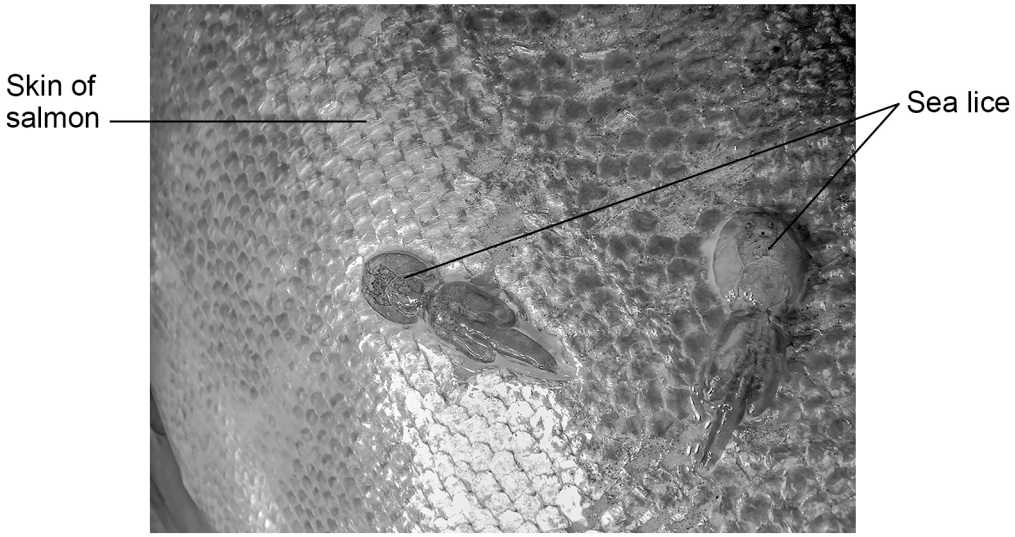
Turn over for the next question

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0 4 Sea lice are small animals that feed on the skin and blood of salmon fish.

Figure 3 shows sea lice attached to the skin of a salmon, *Oncorhynchus keta*.

Figure 3



0 4 . 1 What is the genus name of salmon?

[1 mark]

0 4 . 2 Which domain are sea lice classified in?

[1 mark]

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0 4 . 3 Some salmon have genes that result in fewer sea lice attaching to the skin.

Describe how fish farmers can selectively breed salmon that sea lice **cannot** attach to.

[3 marks]

0 4 . 4 Explain the advantages to salmon farmers of producing salmon that do **not** have sea lice attached to their skin.

[3 marks]

Question 4 continues on the next page

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0 4 . 5 Explain the **disadvantage** of selectively breeding salmon.

Do **not** refer to cost or to time in your answer.

[2 marks]

10

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0 5 In Vitro Fertilisation (IVF) can be used to treat infertility.

0 5 . 1 Which hormones are given to women having IVF treatment?

[1 mark]

Tick (✓) **one** box.

FSH and LH ☐

FSH and oestrogen ☐

LH and oestrogen ☐

0 5 . 2 Name the target organ of the hormones used for IVF.

[1 mark]

_____

0 5 . 3 Describe why microscopes are needed in the process of IVF.

[1 mark]

_____

_____

Question 5 continues on the next page

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0 5 . 4 Describe how the hormones given to women during IVF treatment **interact** with other hormones to prepare the body for pregnancy.

[3 marks]

Scientists studied women who had IVF treatment.

Table 1 shows the results.

Table 1

	Number of women
Received IVF treatment	450
Successful IVF treatment	135

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0 5 . 5 Calculate the **simplest** ratio of the number of women who had successful IVF to the number of women who had unsuccessful IVF.

Give the ratio in whole numbers.

[2 marks]

Ratio (whole numbers) = _____ : _____

0 5 . 6 Suggest **one** factor that can affect the probability of a woman having a child as a result of IVF treatment.

[1 mark]

0 5 . 7 Give **two** arguments against the use of IVF treatment.

Do **not** refer to cost or to religion in your answer.

[2 marks]

1 _____

2 _____

11

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0 6 The control of body temperature is an example of homeostasis.

0 6 . 1 Give **one** other internal condition controlled by homeostasis.

Do **not** refer to temperature in your answer.

[1 mark]

0 6 . 2 Explain why the control of body temperature is important.

[2 marks]

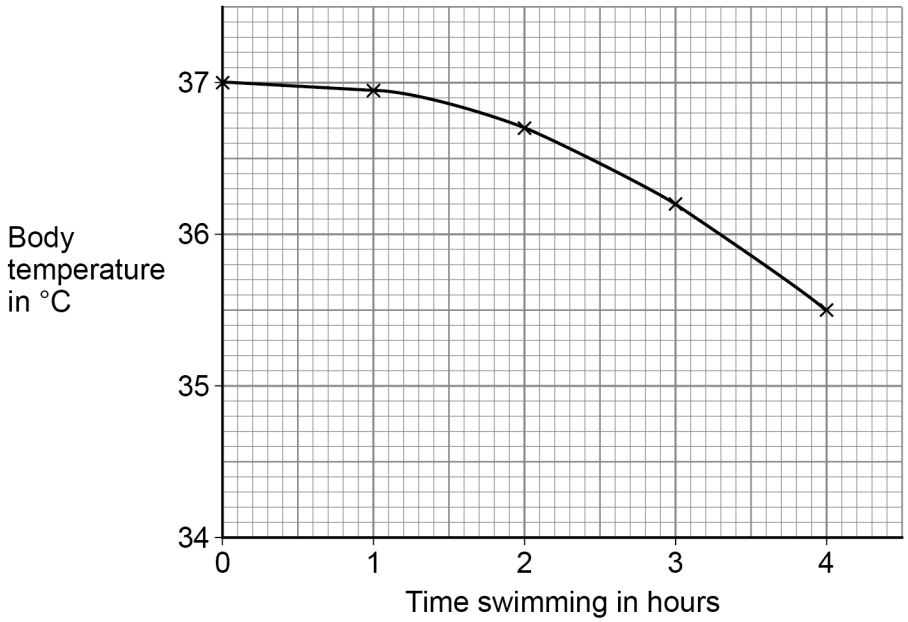
Question 6 continues on the next page

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The body temperature of long-distance swimmers can change as the length of time swimming in cold water increases.

Figure 4 shows how the body temperature of one swimmer changed in the first 4 hours of a long-distance swim.

Figure 4



0 6 . 3 Calculate the mean rate of body temperature decrease per hour in the first 4 hours of the swim.

[2 marks]

Rate = _____ °C per hour

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0 6 . 4 Hypothermia is a dangerously low body temperature.

For this swimmer, a 5.5% decrease in body temperature from the start of the swim will cause hypothermia.

Determine the body temperature at which this swimmer will start to have hypothermia.

Give your answer to 2 significant figures.

[4 marks]

Body temperature (2 significant figures) = _____ °C

Question 6 continues on the next page

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A decrease in body temperature causes the adrenal glands and the thyroid gland to be stimulated.

0 6 . 5 Which gland secretes hormones to stimulate the adrenal glands?

[1 mark]

0 6 . 6 Explain the role of the adrenal glands in responding to a decrease in body temperature.

[5 marks]

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0 6 . 7 Explain how the thyroid gland controls the response to a decrease in body temperature by negative feedback.

[3 marks]

END OF QUESTIONS

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