



Please write clearly in block capitals.

Centre number

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Candidate number

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Surname

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Forename(s)

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Candidate signature

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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.

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.

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



J U N 2 3 8 4 6 4 B 2 H 0 1

IB/M/Jun23/E7

8464/B/2H

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ANSWER IN THE SPACES PROVIDED**



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

0	1	.	1
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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

Turn over ►



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 = _____



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

Turn over ►



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]



[6 marks]

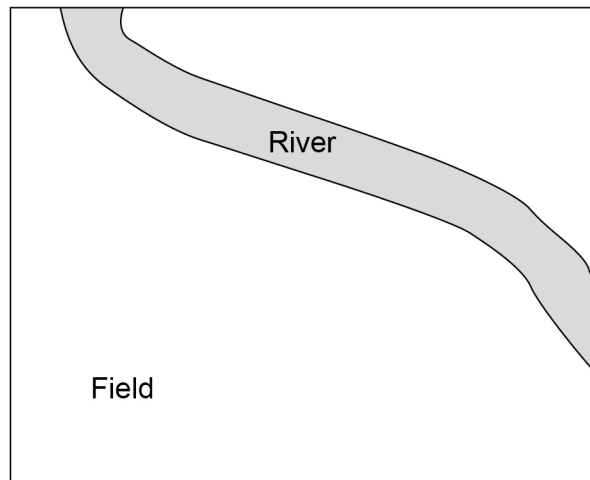
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8

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]

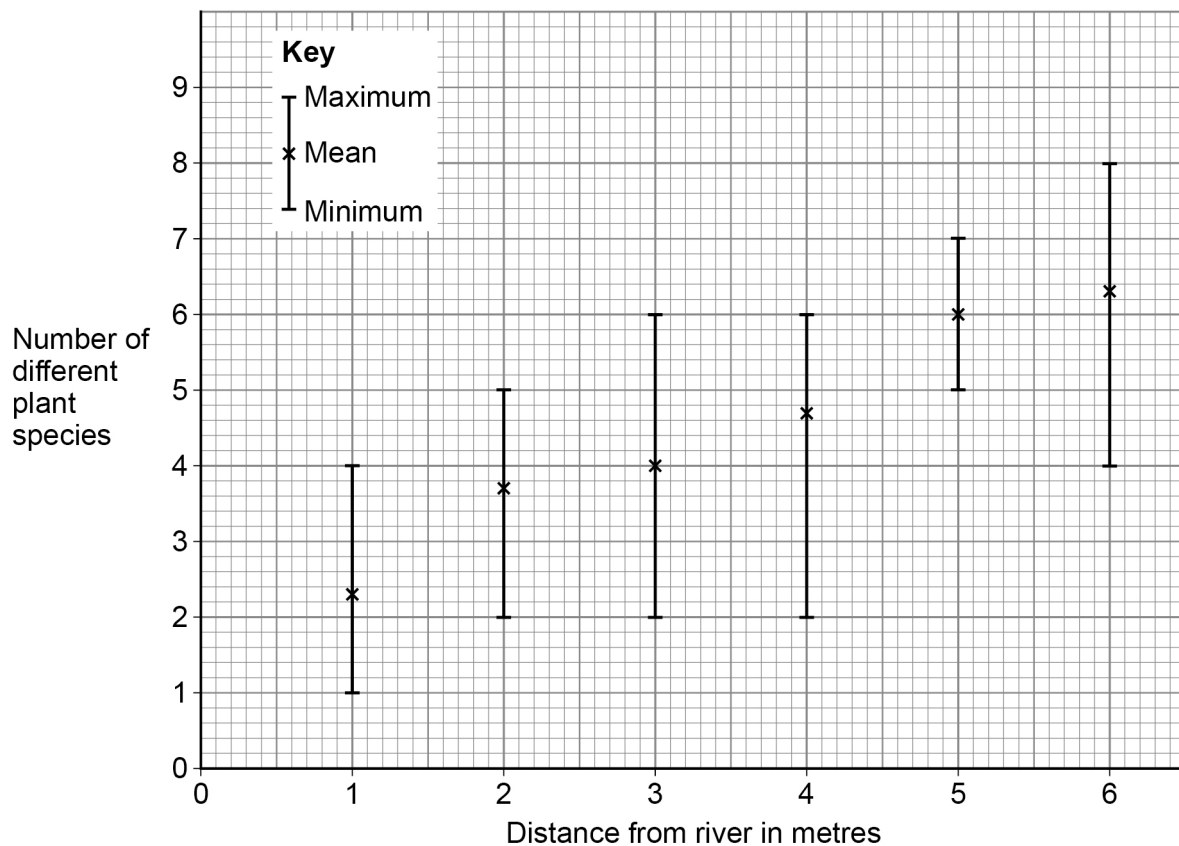


0 3 . 2

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

Turn over ►



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

☐

[6 marks]

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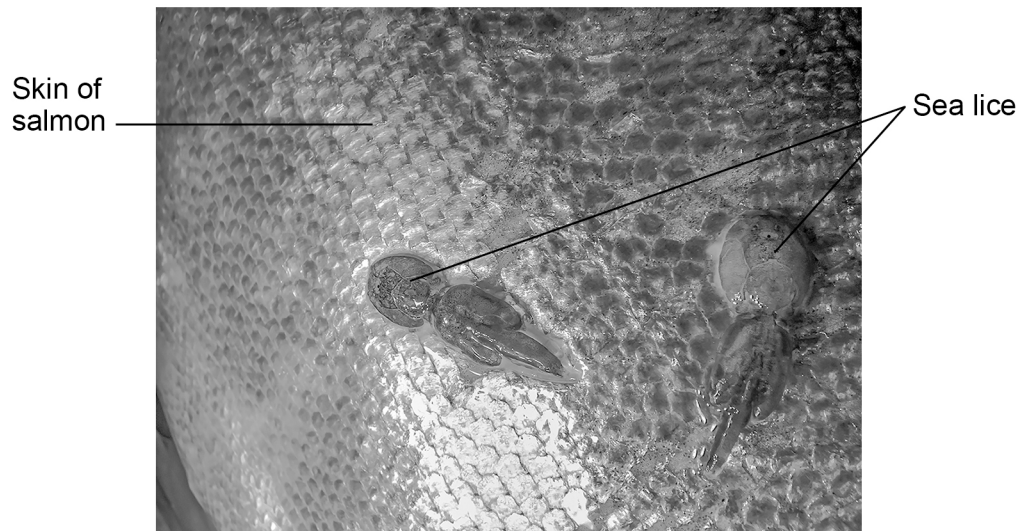
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0	4
---	---

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]



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

Turn over ►



0

4

5

Explain the **disadvantage** of selectively breeding salmon.

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

[2 marks]

10



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**Turn over ►**

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



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 _____



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

[2 marks]

Question 6 continues on the next page

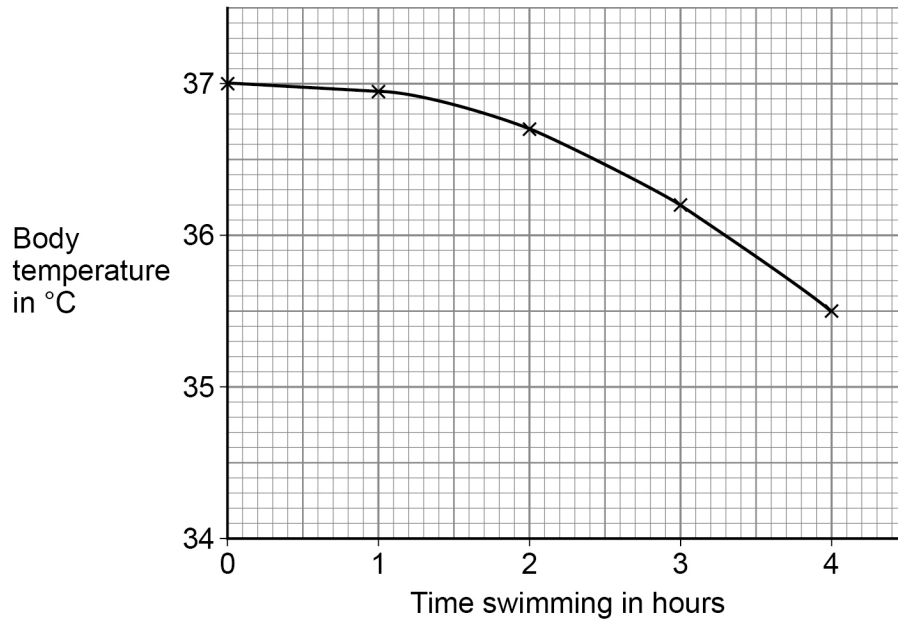
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The body temperature of long-distance swimmers can change as the length of time swimming in cold water increases.

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



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

Turn over ►



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]



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

[3 marks]

18

END OF QUESTIONS



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2 8



2 3 6 G 8 4 6 4 / B / 2 H

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