Please write clearly in block capitals.

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Centre number ☐☐☐☐☐ Candidate number ☐☐☐☐

Surname _____

Forename(s) _____

Candidate signature _____

I declare this is my own work.

GCSE

COMBINED SCIENCE: TRILOGY

Higher Tier Biology Paper 2

Practice Paper Series – Set 2

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.
- Do not write outside the box around each page or on blank pages.
- 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 marks for questions are shown in brackets.
- The maximum mark for this paper is 70.
- You are expected to use a calculator where appropriate.
- You are reminded of the need for good English and clear presentation in your answers.
- When answering question 07.2 you need to make sure that your answer:
  - is clear, logical, sensibly structured
  - fully developed
  - shows how the points that you make are related or follow on from each other where appropriate.

For Examiner's Use

Question	Mark
1	
2	
3	
4	
5	
6	
7	
8	
TOTAL	

This is an original practice paper written for sciencegcse.co.uk to match the style and demand of AQA GCSE Combined Science: Trilogy (8464) Biology Paper 2 (Higher Tier). It is not an AQA examination paper and has not been produced or endorsed by AQA. It is not a prediction of a future examination.

0 1 Some students investigated how the percentage cover of plantain plants changed with distance from a footpath.

The students placed quadrats at 1 m intervals along a transect line from the edge of the path.

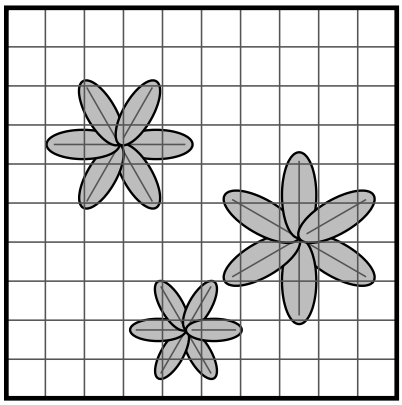
0 1 . 1 Give **one** reason why the students placed the quadrats along a transect rather than at random. [1 mark]

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Figure 1 shows one of the quadrats. The quadrat is divided into 100 squares.

Figure 1



0 1 . 2 Estimate the percentage cover of plantain in this quadrat. [1 mark]

Count a square only if more than half of it is covered.

Percentage cover = ... %

The students placed quadrats along three transects. **Table 1** shows the results.

Table 1

Distance from the path in m	Percentage cover of plantain			
	Transect 1	Transect 2	Transect 3	Mean
0	40	36	38	38
1	33	30	33	32
2	25	29	27	27
3	22	18	20	**X**
4	13	17	15	15
5	9	7	8	8

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0 1 . 3 Calculate mean **X**. [1 mark]

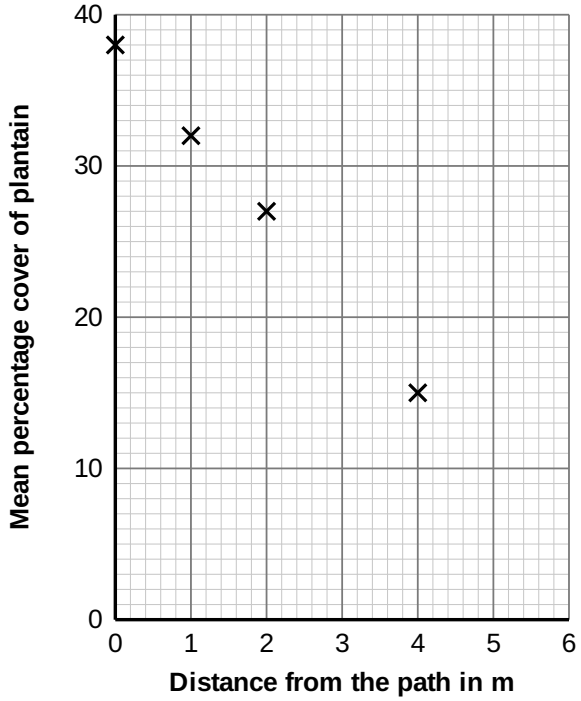
X = ... %

0 1 . 4 **Figure 2** shows some of the mean results. [2 marks]

Complete **Figure 2**:

- plot the mean results for 3 m and 5 m
- draw a line of best fit.

Figure 2



0 1 . 5 Describe the relationship between the distance from the path and the percentage cover of plantain. [1 mark]

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0 1 . 6 Plantain plants have leaves that grow flat on the ground. [1 mark]

Suggest why there was more plantain close to the path.

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Question 1 continues on the next page

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0 1 . 7 Suggest **one** abiotic factor the students could also measure along the transects. [1 mark]

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0 2 Medium ground finches live on one of the Galápagos Islands. They eat seeds.

- Finches with deeper beaks can crack open larger, harder seeds.
- In 1977 there was a drought on the island.
- Most of the plants that produce small, soft seeds died.

Table 2 shows data about the finches.

Table 2

Year	Number of medium ground finches	Mean beak depth in mm
1976	1200	9.4
1978	180	9.9

0 2 . 1 No new finches hatched between 1976 and 1978 [2 marks]

Calculate the percentage of the finches that survived from 1976 to 1978

Percentage = ... %

0 2 . 2 In 1977 most of the plants that produce small, soft seeds died. The mean beak depth of the finches increased from 9.4 mm to 9.9 mm [3 marks]

Explain why natural selection increased the mean beak depth of the surviving finches.

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Question 2 continues on the next page

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0 2 . 3 In the 1980s there were several very wet years. Plants that produce small, soft seeds became common again. [2 marks]

Predict how the mean beak depth of the finches changed.

Give a reason for your answer.

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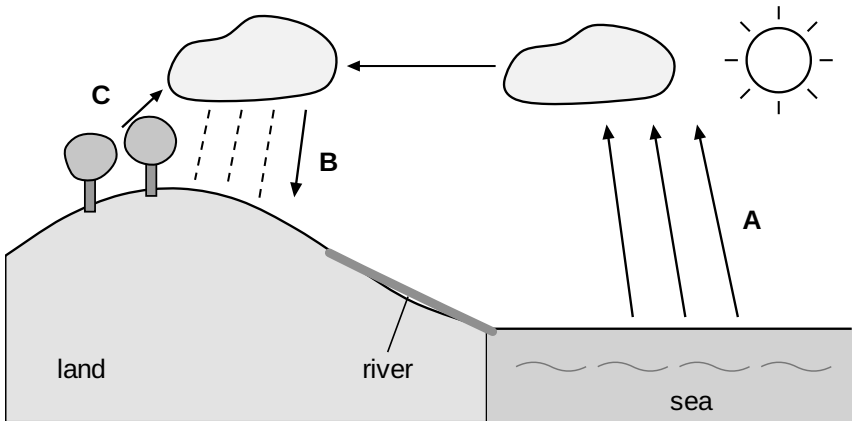
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0 3 **Figure 3** shows part of the water cycle.

Figure 3



0 3 . 1 Name processes **A**, **B** and **C**. [3 marks]

A .....

B .....

C .....

0 3 . 2 Explain why the water cycle is important for plants and animals that live on land. [2 marks]

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Question 3 continues on the next page

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0 3 . 3 A pond contained 420 m^3 of water in winter and 315 m^3 in summer. [2 marks]

Calculate the percentage decrease in the volume of water in the pond.

Percentage decrease = _____ %

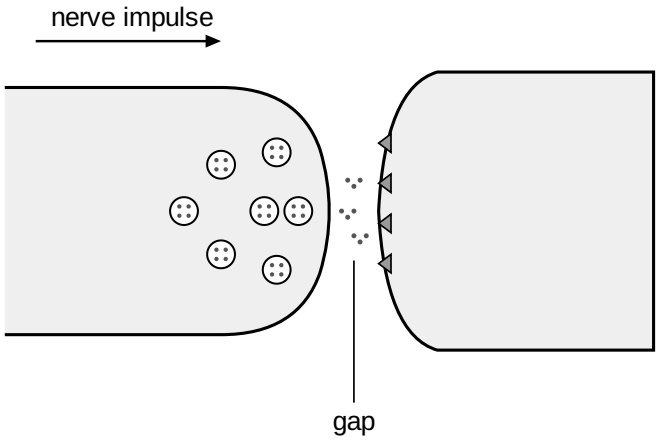
0 3 . 4 Suggest **one** reason why the volume of water in the pond decreased in summer. [1 mark]

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0 4 **Figure 4** shows a synapse between two neurones.

Figure 4



0 4 . 1 Describe how a nerve impulse passes across a synapse. [3 marks]

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Question 4 continues on the next page

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A student investigated the effect of background music on reaction time.

- Five volunteers each did a reaction-time test on a computer.
- Each volunteer did the test 10 times without music and then 10 times with music.

Table 3 shows the mean reaction time of each volunteer.

Table 3

Volunteer	Mean reaction time without music in s	Mean reaction time with music in s
A	0.24	0.27
B	0.22	0.25
C	0.26	0.25
D	0.23	0.28
E	0.25	0.27

0 4 . 2 The mean reaction time of the five volunteers without music was 0.240 s [3 marks]

Calculate the percentage increase in the mean reaction time of the five volunteers with music.

Percentage increase = ... %

0 4 . 3 The student concluded: [2 marks]

'Background music makes everyone's reaction time longer.'

Give **two** reasons why this conclusion is **not** justified.

Use **Table 3**.

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Question 4 continues on the next page

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0 4 . 4 Every volunteer did the test without music first. [2 marks]

Explain how this may have affected the results.

Suggest how the student could improve the method.

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0 5 Farmers can leave strips of wild flowers around the edges of their fields. These strips are called field margins.

0 5 . 1 Give **one** reason why it is important to maintain a high biodiversity. [1 mark]

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Scientists compared fields with and without field margins.

Table 4 shows the results.

Table 4

Field	Mean number of bumblebees counted per 100 m	Number of species of bird
No margin	3	8
6 m wild-flower margin	21	14

0 5 . 2 Calculate how many times as many bumblebees were counted in fields with a margin as in fields without a margin. [1 mark]

..... times

0 5 . 3 Explain why fields with margins have more species of bird. [2 marks]

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Question 5 continues on the next page

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0 5 . 4 The scientists counted the bumblebees in each field at the same time of day. [1 mark]

Suggest why.

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0 5 . 5 A farmer says: [2 marks]

'Field margins reduce the area I can use for crops, so I will make less money.'

Give **two** reasons why keeping field margins could benefit the farmer.

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0 5 . 6 Give **two** other ways that humans can help to maintain biodiversity. [2 marks]

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0 6 Hormones can be used as contraceptives.

0 6 . 1 Some oral contraceptives contain hormones that inhibit the production of FSH. [2 marks]

Explain how this prevents pregnancy.

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Question 6 continues on the next page

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0 6 . 2 Oestrogen and LH also control the menstrual cycle. [3 marks]

Describe the roles of oestrogen and LH in the menstrual cycle.

Table 5 shows the number of pregnancies in one year for every 100 women using three methods of contraception.

Table 5

Method of contraception	Number of pregnancies with typical use
Progesterone injection (every 3 months)	4
Diaphragm with spermicide	12
Female sterilisation	0.5

0 6 . 3 Calculate how many times as many pregnancies there are with the diaphragm as with the progesterone injection. [1 mark]

_____ times

0 6 . 4 Explain how a diaphragm with spermicide prevents pregnancy. [2 marks]

0 6 . 5 Give **one** reason why some women choose not to use hormonal methods of contraception. [1 mark]

Turn over for the next question

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0 7 Type 1 diabetes is treated with injections of insulin.

0 7 . 1 Explain why people with type 1 diabetes need insulin injections. [2 marks]

0 7 . 2 Human insulin is made by genetically engineered bacteria. [6 marks]

Describe how bacteria are genetically engineered to produce human insulin.

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0 7 . 3 A tank contains 50 000 dm^3 of a culture of these bacteria. [2 marks]

Each dm^3 of the culture contains 0.75 g of insulin.

Calculate the mass of insulin in the tank.

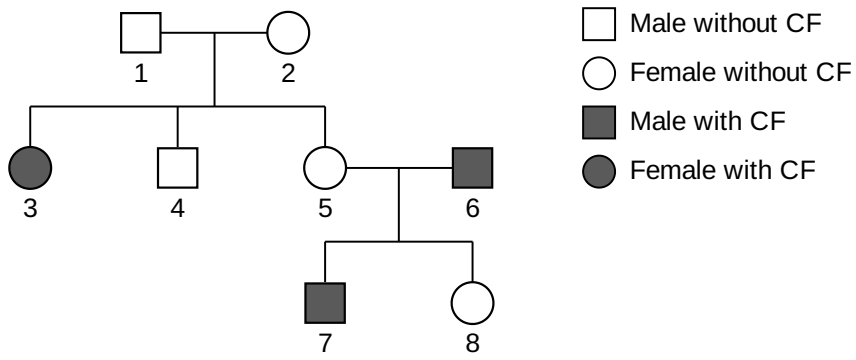
Give your answer in grams, in standard form.

Mass of insulin = ... g

0 8 Cystic fibrosis (CF) is an inherited disorder of cell membranes. CF is caused by a recessive allele.

Figure 5 shows the inheritance of CF in one family.

Figure 5



0 8 . 1 Use the symbols **F** for the dominant allele and **f** for the recessive allele. [1 mark]

What is the genotype of person 3?

Genotype = ...

0 8 . 2 Persons 1 and 2 do **not** have CF. [2 marks]

Explain how **Figure 5** shows that CF is caused by a recessive allele.

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Question 8 continues on the next page

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0 8 . 3 Persons 1 and 2 have another child. [3 marks]

Complete the Punnett square to show the possible genotypes of the child.

Give the probability that the child will have CF.

	Gametes from person 1		
Gametes from person 2			

Probability = ...

0 8 . 4 Person 8 does **not** have CF. [2 marks]

Explain why person 8 must be a carrier of CF.

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0 8 . 5 Gametes are produced by meiosis. [1 mark]

Give **one** way in which the cells produced by meiosis are different from the cells produced by mitosis.

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END OF QUESTIONS

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