

Please write clearly in block capitals.

H

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 1

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 09.1 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	
9	
TOTAL	

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sciencegcse.co.uk | Practice Paper Series – Set 1 | SGC/S1/B/2H

0 1 Consider a hypothetical single-gene fur-colour trait in mice.

The allele for black fur, B, is dominant to the allele for white fur, b.

0 1 . 1 Which type of cell division produces gametes? [1 mark]

Tick (✓) **one** box.

- | | |
|-----------------|--------------------------|
| Meiosis | ☐ |
| Mitosis | ☐ |
| Fertilisation | ☐ |
| Differentiation | ☐ |

A male mouse with genotype Bb mates with a female mouse with genotype bb.

0 1 . 2 Complete the Punnett square to show the possible genotypes of the offspring. [2 marks]

The gametes of the male are shown along the top and those of the female down the side.

	B	b
b		
b		

0 1 . 3 What is the probability that an offspring has white fur? [1 mark]

Probability = ...

0 1 . 4 The male mouse is heterozygous for fur colour. [1 mark]

What is meant by heterozygous?

.....

0 1 . 5 The sex of a child is determined by the sex chromosomes. [2 marks]

Give the sex chromosomes of a male **and** the probability that a child is a boy.

Sex chromosomes of a male

Probability that a child is a boy

Question 1 continues on the next page

- 0 1 . 6** Cystic fibrosis is an inherited disorder caused by a recessive allele. [2 marks]
Explain how two parents who do **not** have cystic fibrosis can have a child with cystic fibrosis.

- 0 2** A student estimated the number of dandelion plants in a field.
The student placed a 1 m^2 quadrat at five random positions in the field and counted the dandelion plants in each quadrat.
Table 1 shows the results.

Table 1

Quadrat	1	2	3	4	5
Number of dandelion plants	3	5	4	2	6

- 0 2 . 1** Why did the student place the quadrats at random positions? [1 mark]

- 0 2 . 2** Calculate the mean number of dandelion plants per quadrat. [2 marks]

Mean number per quadrat = ...

- 0 2 . 3** The area of the field is 200 m^2 . [2 marks]
Estimate the total number of dandelion plants in the field.
Use your answer to **02.2**.

Estimated number of dandelion plants = ...

Question 2 continues on the next page

0 2 . 4 Give **one** abiotic factor that could affect where dandelion plants grow in the field. [1 mark]

0 2 . 5 Give **one** biotic factor that could affect the number of dandelion plants in the field. [1 mark]

Figure 1 shows a food chain in the field.

Figure 1



0 2 . 6 Name the producer in this food chain **and** state what the arrows in a food chain show. [2 marks]

Producer

The arrows show

0 3 The body is controlled by the nervous system and by the endocrine system.
Table 2 compares the two systems.

Table 2

	Nervous system	Endocrine system
How the message is carried	electrical impulses along neurones	
Speed of the response		slower
How long the response lasts	short time	longer time

0 3 . 1 Complete **Table 2**. [2 marks]

Question 3 continues on the next page

03.2

Thyroxine is produced by the thyroid gland.

[1 mark]

Give **one** function of thyroxine.

03.3

The concentration of thyroxine in the blood is controlled by negative feedback. [3 marks]

Explain how the concentration of thyroxine is kept at a constant level.

03.4

Adrenaline is released by the adrenal glands in times of fear or stress. [1 mark]

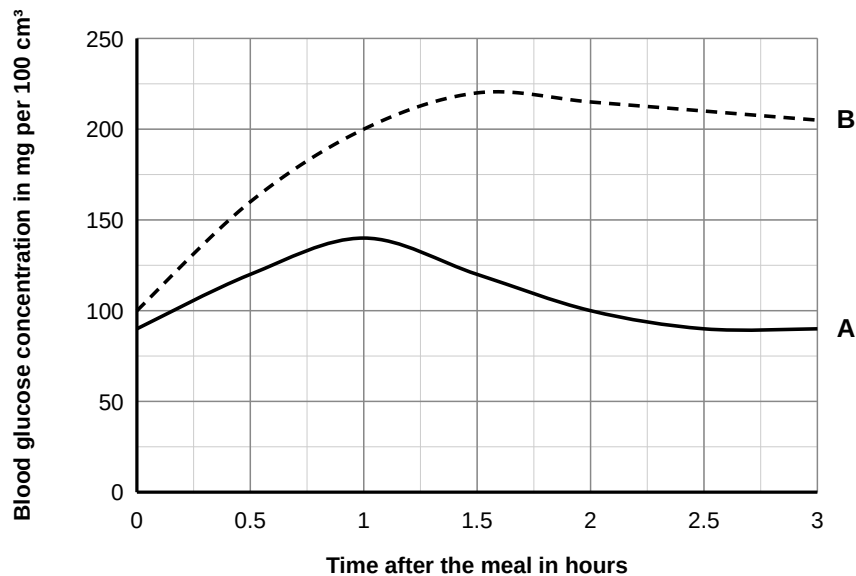
Give **one** effect of adrenaline on the body.

Turn over for the next question

0 4 Two people, **A** and **B**, ate the same meal. Person **B** has Type 1 diabetes.

Figure 2 shows how the blood glucose concentration of each person changed after the meal.

Figure 2



0 4 . 1 Describe **two** differences between the results for person **A** and person **B**. [2 marks]

Use data from **Figure 2**.

- 1
.....
.....
- 2
.....
.....

0 4 . 2 Explain how the blood glucose concentration of person **A** was returned to the normal level. [3 marks]

-
.....
.....
.....
.....
.....

0 4 . 3

Later in the day person **A** exercised and the blood glucose concentration fell below the normal level.

[2 marks]

Explain how the body responds to a low blood glucose concentration.

0 4 . 4

Person A's blood glucose concentration rose from 90 to 140 mg per 100 cm³. Calculate the percentage increase.

[1 mark]

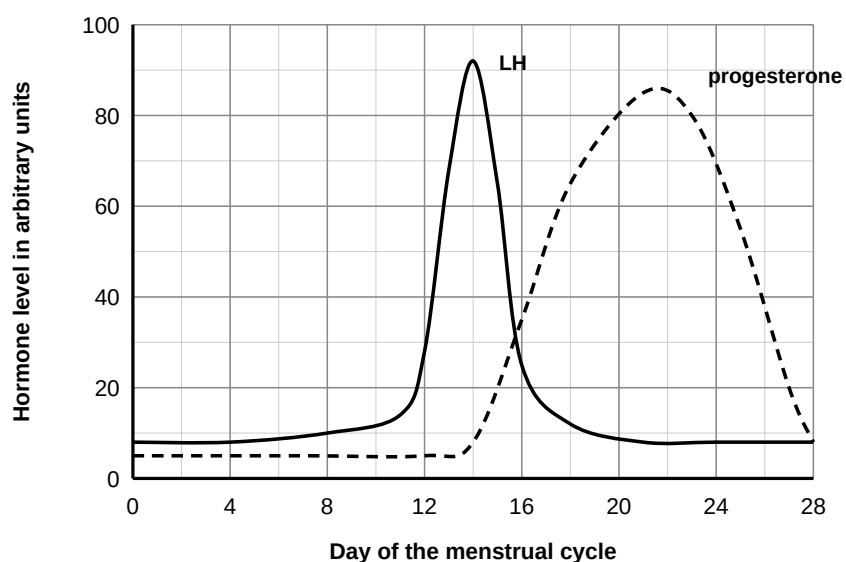
Percentage increase = _____ %

0 5

Several hormones control the menstrual cycle.

Figure 3 shows how the levels of two of these hormones change during one cycle.

Figure 3



0 5 . 1

An egg is released from an ovary on day 14 of the cycle.

[1 mark]

Which hormone stimulates the release of the egg?

Use **Figure 3**.

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0 5 . 2 Describe **two** roles of follicle stimulating hormone (FSH) in the menstrual cycle. [2 marks]

1

2

0 5 . 3 Oestrogen and progesterone interact with FSH. [2 marks]
Describe how oestrogen **and** progesterone affect the release of FSH.

0 5 . 4 In vitro fertilisation (IVF) can be used to treat infertility. [3 marks]
Describe how IVF is carried out **and** give **one** disadvantage of IVF treatment.

0 6 Some crop plants have been genetically engineered to be resistant to attack by insects.

0 6 . 1 Describe the main steps in genetically engineering a crop plant. [3 marks]

0 6 . 2 Give **one** other benefit of genetically modified (GM) crops. [1 mark]

0 6 . 3 Some people are concerned about growing GM crops. [2 marks]

Give **two** concerns about GM crops.

1

2

0 6 . 4 Selective breeding can also be used to produce crops with useful characteristics. [1 mark]

Give **one** disadvantage of selective breeding.

Turn over for the next question

- 07** Rock pocket mice live in deserts. Some areas of the desert have pale sand and some areas have dark rock.

The mice are eaten by owls, which hunt by sight.

Table 3 shows the percentage of mice with dark fur in the two areas.

Table 3

Area	Percentage of mice with dark fur
Pale sand	7
Dark rock	86

- 07.1** Explain how natural selection has led to most of the mice living on the dark rock having dark fur. [4 marks]

- 07.2** Fossils provide evidence for evolution. [2 marks]
Explain why scientists cannot be certain about how life on Earth began.

Question 7 continues on the next page

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0 7 . 3 Carl Woese developed the three-domain system of classification. [2 marks]

Name the three domains.

1

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2

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3

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0 8 A student investigated the number of daisy plants at different distances from a large tree in a field. The student also measured the light intensity at each distance.

Table 4 shows the results.

Table 4

Distance from the tree in m	Light intensity in arbitrary units	Mean number of daisy plants per m ²
0	20	1
2	45	3
4	70	8
6	90	14
8	95	15

0 8 . 1 Describe the relationship between the distance from the tree, the light intensity and the number of daisy plants. [2 marks]

.....

.....

.....

.....

0 8 . 2 Explain the relationship shown in **Table 4**. [2 marks]

.....

.....

.....

.....

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- 08.3** Dead leaves from the tree fall onto the ground and are broken down by microorganisms. [2 marks]

Describe the role of microorganisms in the carbon cycle.

- 08.4** Peat bogs are sometimes destroyed to produce compost for gardens. [2 marks]

Explain why the destruction of peat bogs increases the amount of carbon dioxide in the atmosphere.

- 09** A stream runs along one edge of a field. A student noticed that many buttercup plants grew close to the stream, but very few grew further away from it.

The student has a tape measure, a 0.25 m^2 quadrat and a soil moisture meter.

- 09.1** Plan an investigation, using a transect, to find out how the number of buttercup plants changes with distance from the stream, and to find out whether soil moisture could explain the pattern. [6 marks]

[illegible]

END OF QUESTIONS

Additional page, if required.

Write the question numbers in the left-hand margin.

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Additional page, if required.

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