



Please write clearly in block capitals.

Centre number

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Candidate number

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Surname

Forename(s)

Candidate signature

I declare this is my own work.

GCSE COMBINED SCIENCE: TRILOGY

F

Foundation Tier
Biology Paper 2F

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 2 8 4 6 4 B 2 F 0 1

IB/M/Jun22/E11

8464/B/2F

0 1

This question is about genetics.

0 1 . 1

Crop plants are genetically modified (GM) for useful characteristics.

Which useful characteristic are crops genetically modified for?

[1 mark]Tick (✓) **one** box.

Fewer roots

☐

Larger yields

☐

Smaller fruits

☐**0 1 . 2**What is **one** concern about GM crops?**[1 mark]**Tick (✓) **one** box.

GM crops will add to global warming.

☐

GM crops will cause air pollution.

☐

GM crops will harm wildlife.

☐

GM crops will produce too much food.

☐

Some inherited disorders are caused by a faulty piece of DNA.

0 1 . 3

What is the name of a piece of DNA that codes for a characteristic?

[1 mark]



0 1 . 4 DNA contains a code for making substances in the cell.

What type of substance is made using the DNA code?

[1 mark]

Tick (✓) **one** box.

Fat ☐

Protein ☐

Starch ☐

Sugar ☐

Cystic fibrosis (CF) is an inherited disorder.

The allele for having CF is recessive (**h**).

The allele for **not** having CF is dominant (**H**).

0 1 . 5 What is a recessive allele?

[1 mark]

Tick (✓) **one** box.

An allele that is always expressed.

☐

An allele that is expressed if only one copy is present.

☐

An allele that is only expressed if two copies are present.

☐

Question 1 continues on the next page

Turn over ►



A man and a woman do **not** have CF. The man has the alleles **Hh**.

0 1 . 6 What word describes the alleles of the man?

[1 mark]

Tick (✓) **one** box.

Heterozygous

☐

Homozygous

☐

Phenotype

☐

0 1 . 7 The man and the woman want to have a child.

Complete **Figure 1** to show the possible genotypes of the child.

Draw a ring around the genotype of a child who will have CF.

[3 marks]

Figure 1

		Woman	
		H	h
Man	H		
	h		hh



0 1 . 8

What is the chance that a child of the man and the woman will have CF?

[1 mark]

Tick (✓) **one** box.

25%

☐

50%

☐

75%

☐

100%

☐

0 1 . 9

The woman is pregnant.

The woman can have embryo screening to find out if the child will have CF.

Suggest **one** reason why the woman might **not** want to have embryo screening.

[1 mark]

11

Turn over for the next question

Turn over ►



[illegible]

0 2 . 2 What type of factor is water in the soil?

[1 mark]

Tick (✓) **one** box.

A biotic factor

☐

A control factor

☐

An abiotic factor

☐

0 2 . 3 Give **two** factors which might affect the number of buttercups growing on the school field.

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

[2 marks]

1 _____

2 _____

0 2 . 4 Complete the sentence.

Choose the answer from the box.

[1 mark]

a control

the dependent

the independent

In this investigation the number of buttercups in each quadrat was

_____ variable.

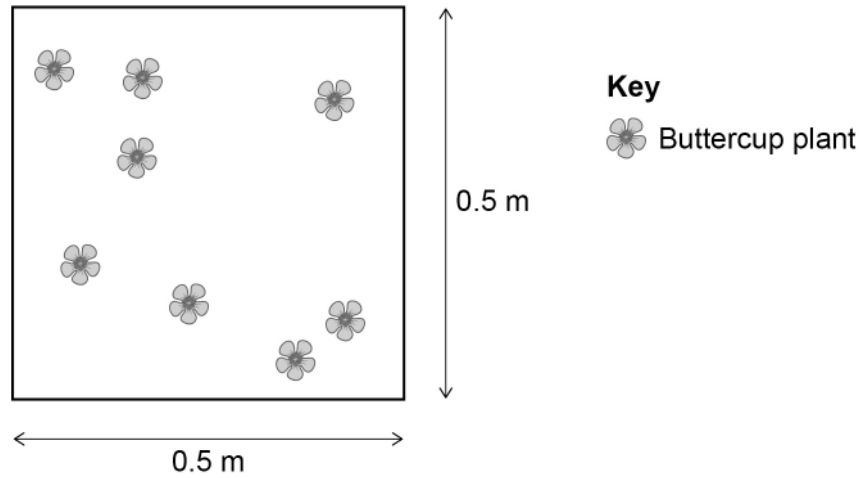
Question 2 continues on the next page

Turn over ►



Figure 2 shows a quadrat on an area of the school field.

Figure 2



0 2 . 5

Calculate the area of the quadrat.

[1 mark]

Area of the quadrat = _____ m²

0 2 . 6

The mean number of buttercups in one quadrat was 8

Calculate the number of buttercups per m²

Use your answer from Question **02.5**

[2 marks]

Number of buttercups = _____ per m²



Question 2 continues on the next page

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ANSWER IN THE SPACES PROVIDED**

Turn over ►



In a laboratory another group of students investigated the effect of soil acidity on the growth of beans.

This is the method used.

1. Put soil with a neutral pH in two large boxes.
2. Add acid to the soil in one box.
3. Plant some bean seeds in each box.
4. Water the seeds over 3 weeks.
5. After 3 weeks, measure the height of the bean plants in each box.
6. Calculate the mean height of bean plants in each box.

0 2 . 7

Give **two** improvements the students could make to the method to give more valid results.

[2 marks]

1 _____

2 _____



The students then carried out a valid investigation.

Table 1 shows the students' results.

Table 1

Bean plant	Height of bean plants in cm	
	Acid soil	Neutral soil
1	8	11
2	6	12
3	4	11
4	10	17
5	7	19
Mean	7	X

0 2 . 8 Calculate mean value **X** in **Table 1**.

[2 marks]

X = _____ cm

0 2 . 9 What conclusion can the students make about the effect of acid soil on the growth of bean plants?

[1 mark]

16

Turn over ►



0 3

The theory of evolution by natural selection was suggested by Charles Darwin in 1859.

Evidence from fossils supports Darwin's theory.

0 3**1**

What evidence supports the theory of evolution by natural selection?

[1 mark]

Tick (✓) **one** box.

Knowledge of how DNA controls inheritance

☐

Knowledge of how the dinosaurs became extinct

☐

Knowledge of how the Earth was formed

☐

Knowledge of what causes global warming

☐

0 3 . 2 **Figure 3** shows a fossil fly preserved in amber.

The fossil formed when the amber solidified with the fly trapped inside.

Figure 3



Why has the fly been preserved?

[1 mark]

Tick (✓) **one** box.

The amber has been kept at a constant temperature.

☐

The fly was soft-bodied.

☐

There was no oxygen in the amber.

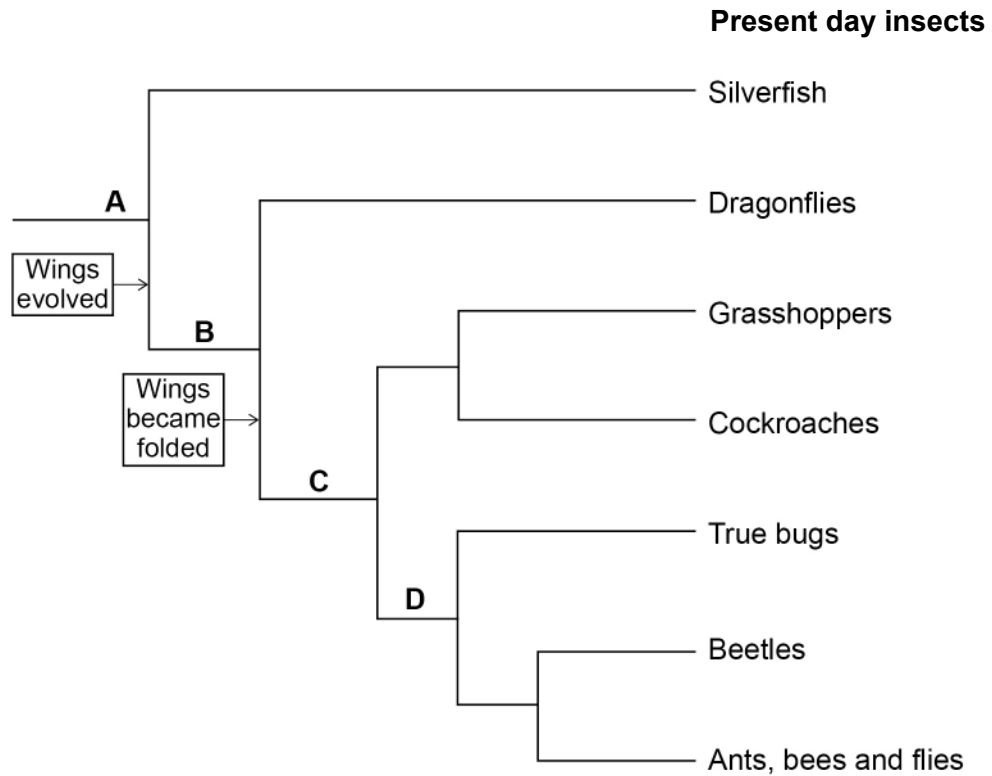
☐

Turn over ►



Figure 4 shows a simplified evolutionary tree for the insect group of animals.

Figure 4



0 3 . 3 Which present day insect evolved first?

[1 mark]

0 3 . 4 Animals **A**, **B**, **C** and **D** were ancestors of present day insects.

Which animal is the most recent ancestor of both grasshoppers and beetles?

[1 mark]

Tick (✓) **one** box.

A ☐ **B** ☐ **C** ☐ **D** ☐

0 3 . 5 Name the group of present day insects which have wings which do **not** fold.

[1 mark]



0 3 . 6 The house fly has the binomial name *Musca domestica*.

Table 2 shows part of the classification for the house fly.

Table 2

Classification group	Name
Kingdom	
Phylum	arthropoda
Class	
Order	diptera
Family	muscidae
Genus	
Species	

Complete **Table 2**.

Choose answers from the box.

[3 marks]

animalia	domestica	Musca	insecta
----------	-----------	-------	---------

Question 3 continues on the next page

Turn over ►



03.7

Carl Woese proposed the 'three-domain system' of classification.

Which domain are insects in?

[1 mark]

Tick (✓) **one** box.

Archaea

☐

Eukaryota

☐

Prokaryota

☐

9

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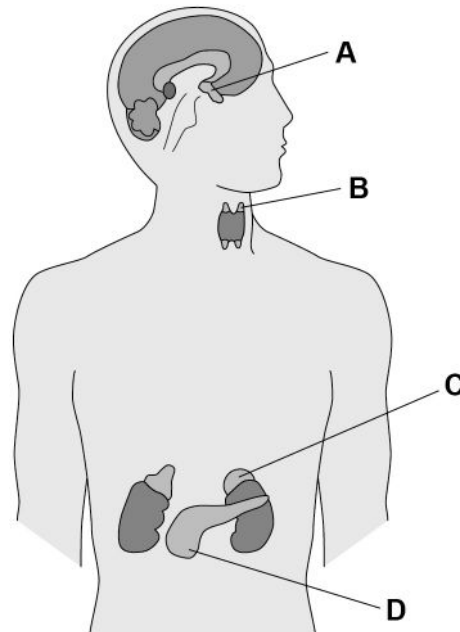


0 4

The endocrine system is made up of glands which secrete hormones.

Figure 5 shows the position of endocrine glands in the human body.

Figure 5



0 4 . 1

Which letter shows the pancreas?

[1 mark]

Tick (✓) **one** box.

A	☐	B	☐	C	☐	D	☐
---	--------------------------	---	--------------------------	---	--------------------------	---	--------------------------

0 4 . 2

Which letter shows the thyroid gland?

[1 mark]

Tick (✓) **one** box.

A	☐	B	☐	C	☐	D	☐
---	--------------------------	---	--------------------------	---	--------------------------	---	--------------------------



0 4 . 3

Hormones travel from the gland where they are made to the target organ where they have an effect.

How do hormones travel from the gland to the target organ?

[1 mark]

When blood glucose concentration becomes too high, hormone **X** from the pancreas causes a decrease in the glucose concentration.

0 4 . 4

Name hormone **X**.

[1 mark]

0 4 . 5

In what **two** ways does hormone **X** cause a decrease in blood glucose concentration?

[2 marks]

Tick (✓) **two** boxes.

Glucose is broken down.

☐

Glucose is converted to glycogen.

☐

Glucose is excreted by the kidneys.

☐

Glucose moves from the blood into the cells.

☐

Glucose moves into the small intestine.

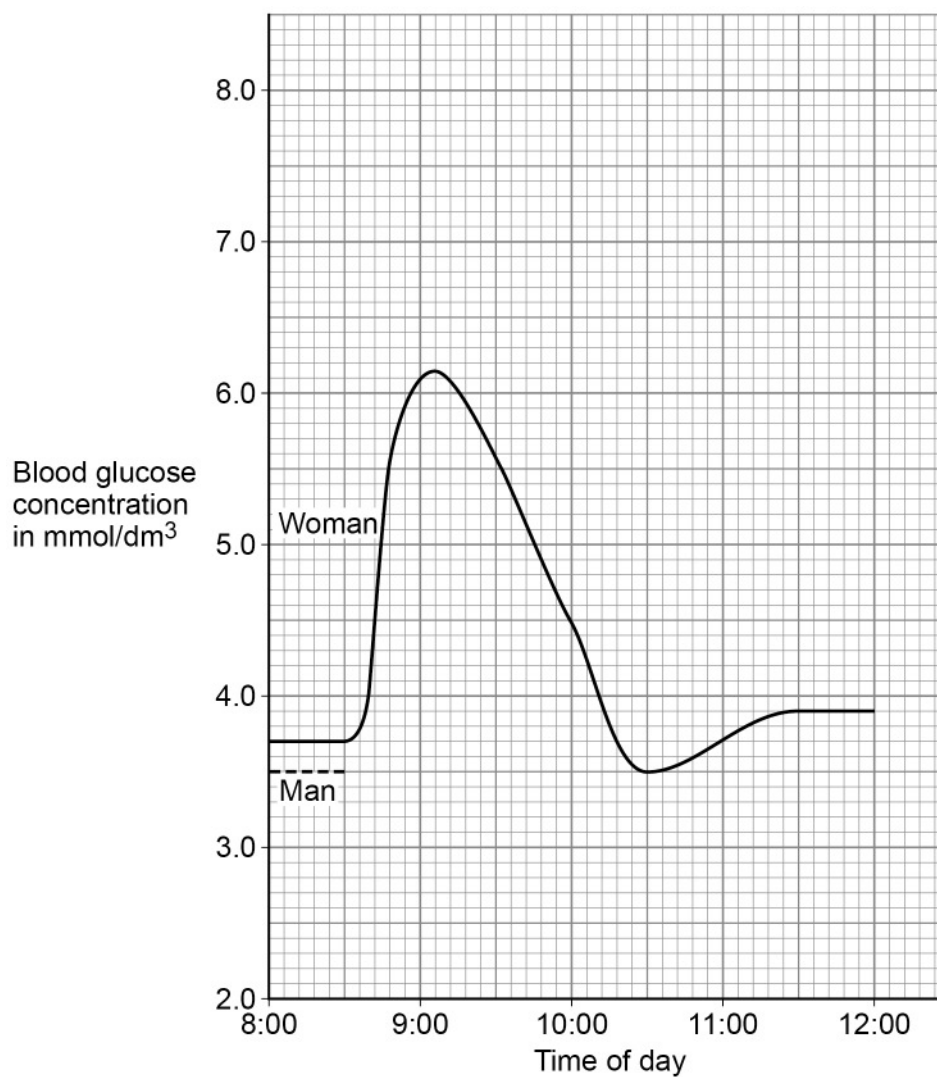
☐

Turn over ►



Figure 6 shows the blood glucose concentration in a woman.

Figure 6



0 4 . 6 Suggest what time of day the woman ate her breakfast of sugar-coated cereal.

[1 mark]

Time of day = _____



The man in **Figure 6** has Type 2 diabetes but he has **not** been treated.

0 4 . 7

The man ate:

- the same type and amount of breakfast cereal as the woman
- at the same time as the woman.

Suggest what his blood glucose concentration would be at 9:00

[1 mark]

Blood glucose concentration = _____ mmol/dm³

0 4 . 8

The man:

- is an obese office worker
- does not exercise
- eats sugary snacks at his desk.

Give **two** lifestyle changes a doctor might recommend to the man to help him control his diabetes.

[2 marks]

1 _____

2 _____

0 4 . 9

Describe how a **low** blood glucose concentration would lead to a person feeling weak.

[2 marks]



0 5

This question is about the cycling of water and carbon in ecosystems.

0 5 . 1

Which reaction produces water?

[1 mark]

Tick (✓) **one** box.

Aerobic respiration

☐

Anaerobic respiration

☐

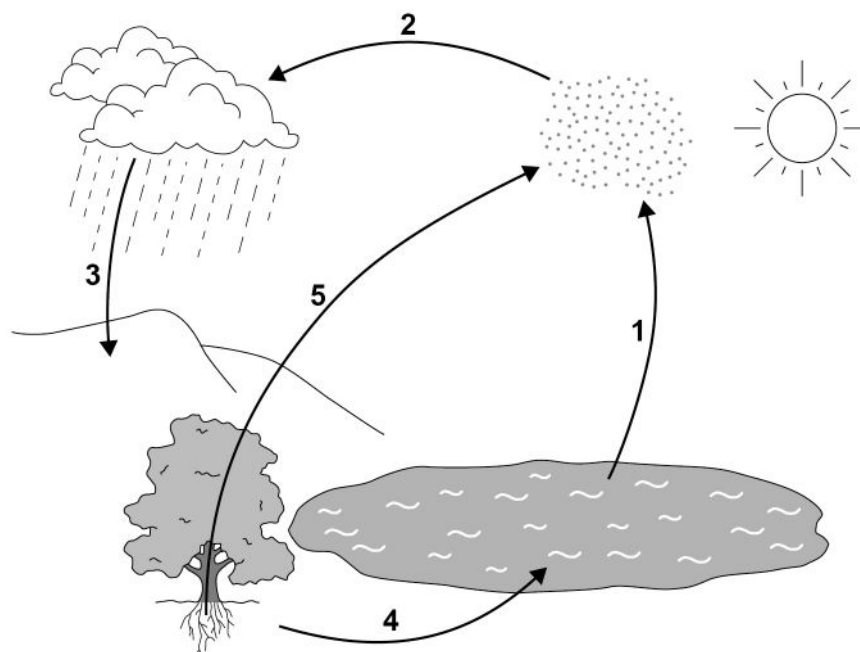
Photosynthesis

☐

The water cycle provides water for plants and animals on land before the water goes into lakes and seas.

Figure 7 represents the water cycle.

Figure 7



0 5 . 2 Name the processes **1** to **5** shown on **Figure 7**.

[5 marks]

- 1** _____
- 2** _____
- 3** _____
- 4** _____
- 5** _____

0 5 . 3 In 2007 the population of the world was 6 000 000 000

A study found that 4.5% of the population had severe water shortage.

Calculate how many people had severe water shortage.

Give your answer in standard form.

[3 marks]

Number of people (in standard form) = _____

Question 5 continues on the next page

Turn over ►



0 5 . 4

Why do more people have severe water shortage now than in 2007?

[2 marks]Tick (✓) **two** boxes.

Climate change has increased the area of deserts.

☐

Each person drinks less water.

☐

More water is used to grow crops.

☐

Sea levels have risen because the ice caps are melting.

☐

Some countries have built de-salting factories for seawater.

☐

Leaves on a tree contain carbon compounds.

In autumn the leaves fall to the ground.

0 5 . 5

Microorganisms in the soil recycle carbon from the leaves so that the carbon is used for new plant growth.

Explain how.

[4 marks]



0 5 . 6

What is **one** benefit of fallen leaves for living plants?**[1 mark]**Tick (✓) **one** box.

Energy is released for living plants.

☐

Insect pests in the soil are killed.

☐

Nitrates are released into the soil.

☐

Oxygen is supplied to root cells.

☐

16

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[6 marks]

[illegible]

6

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3 2



2 2 6 G 8 4 6 4 / B / 2 F

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