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

**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.

| 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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**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]**

_____

*Do not write outside the box*

**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**

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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 |

*Do not write outside the box*

**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**

*Do not write outside the box*

**0 2** On a school field:

- one area of the soil was usually wet
- another area of the soil was usually dry.

Students investigated the effect of water in the soil on the number of buttercup plants growing in each area.

On the field the students marked out:

- an area of 10 m by 10 m on the wet soil
- an area of 10 m by 10 m on the dry soil.

**0 2 . 1** Describe how a quadrat can be used to measure the size of the buttercup population on the wet soil area.

**[4 marks]**

*Do not write outside the box*

**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**

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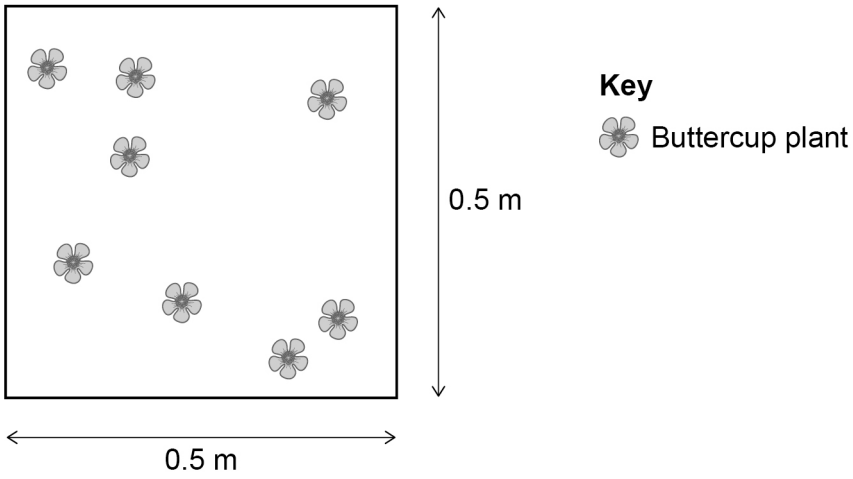
**Figure 2** shows a quadrat on an area of the school field.

**Figure 2**




**0 2 . 5** Calculate the area of the quadrat.

**[1 mark]**

Area of the quadrat = _____ $m^2$

**0 2 . 6** The mean number of buttercups in one quadrat was 8

Calculate the number of buttercups per $m^2$

Use your answer from Question **02.5**

**[2 marks]**

Number of buttercups = _____ per $m^2$

*Do not write outside the box*

**Question 2 continues on the next page**

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**ANSWER IN THE SPACES PROVIDED**

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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 _____

_____

*Do not write outside the box*

The students then carried out a valid investigation.

**Table 1** shows the students' results.

**Table 1**

| | Height of bean plants in cm | |
|---|---|---|
| **Bean plant** | **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**

*Do not write outside the box*

**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 ☐

*Do not write outside the box*

**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. ☐

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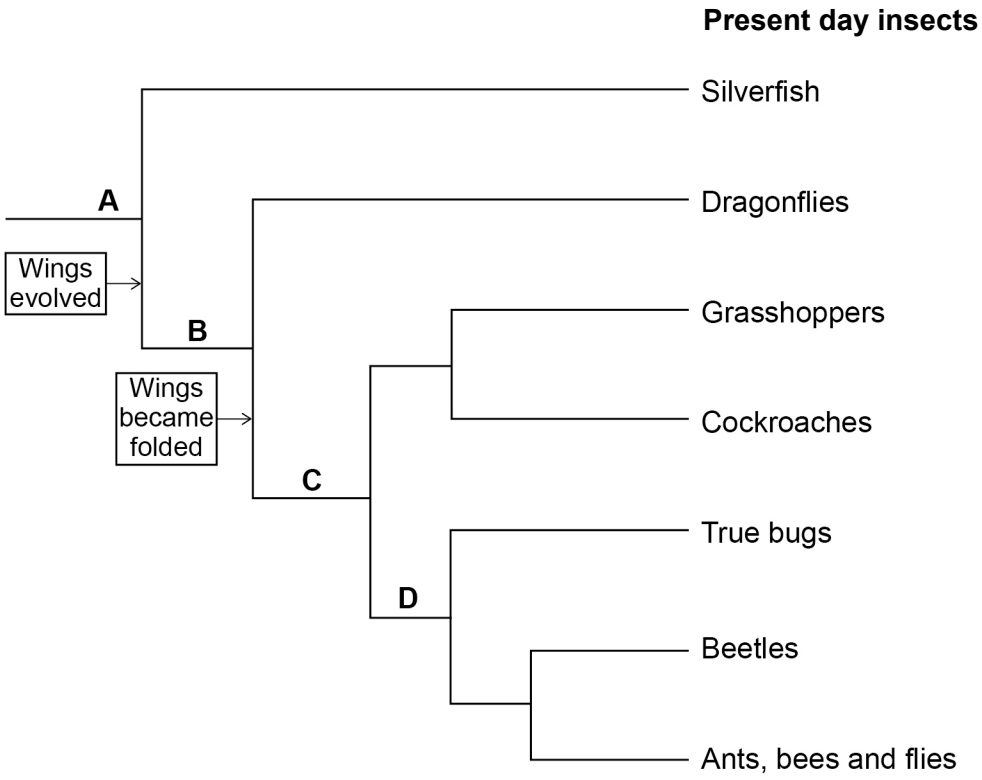
**Figure 4** shows a simplified evolutionary tree for the insect group of animals.

**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**

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**0 3 . 7** Carl Woese proposed the 'three-domain system' of classification.

Which domain are insects in?

**[1 mark]**

Tick (✓) **one** box.

Archaea ☐

Eukaryota ☐

Prokaryota ☐

9

*Do not write outside the box*

**Turn over for the next question**

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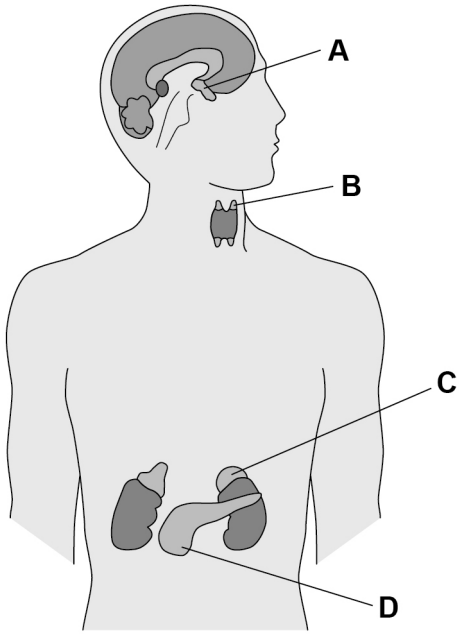
**0 4** The endocrine system is made up of glands which secrete hormones.

**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** ☐

*Do not write outside the box*

**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]**

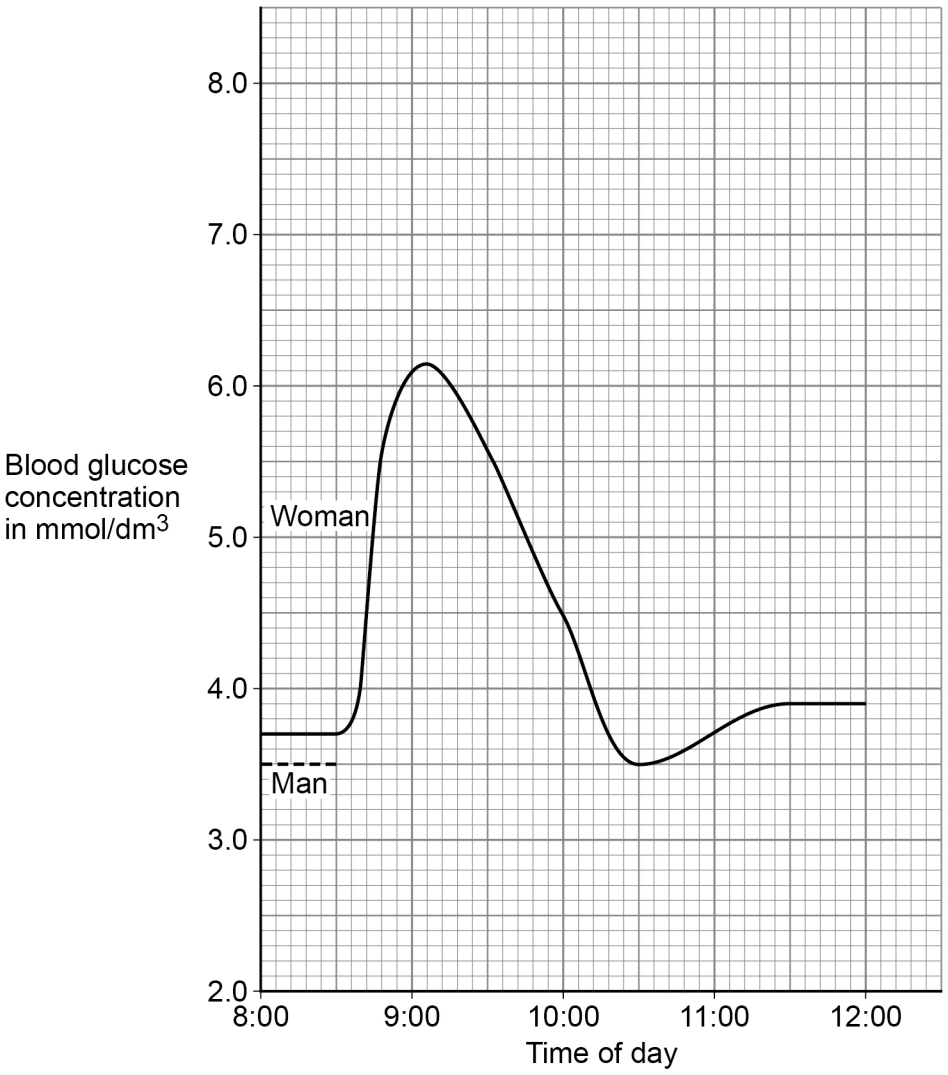
Tick (✓) **two** boxes.

- 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. ☐

*Do not write outside the box*

**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 = _____

*Do not write outside the box*

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/dm$^3$

**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]**

_____

_____

_____

_____

**12**

*Do not write outside the box*

**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 ☐

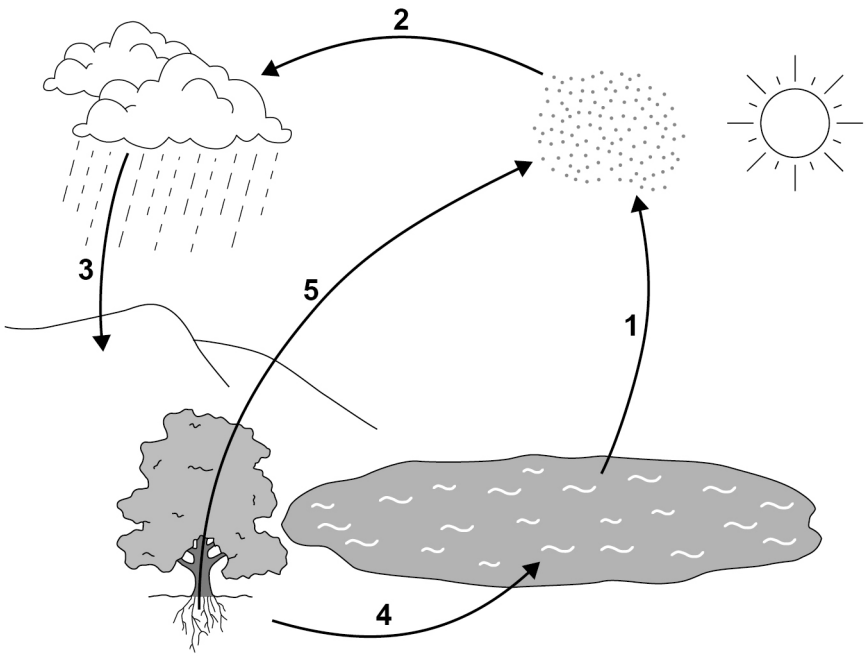
Anaerobic respiration ☐

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**



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**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**

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**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]**

*Do not write outside the box*

**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

**Turn over for the next question**

*Do not write outside the box*

**0 6** Water pollution is a problem for humans and wildlife.

Explain how human activities are polluting rivers, lakes and seas.

**[6 marks]**

6

**END OF QUESTIONS**

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