Please write clearly in block capitals.

Centre number | | | | | | Candidate number | | | | |

Surname _____

Forename(s) _____

Candidate signature _____

GCSE
COMBINED SCIENCE: TRILOGY

F

Foundation Tier
Biology Paper 2F

Materials
For this paper you must have:
- a ruler
- a scientific calculator.

Instructions
- Use black ink or black ball-point pen.
- Fill in the boxes at the top of this page.
- Answer **all** questions in the spaces provided.
- 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
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 A human body cell contains 46 chromosomes.

0 1 . 1 How many chromosomes does a human sperm cell contain?

[1 mark]

Tick (✓) **one** box.

22 ☐ 23 ☐ 46 ☐

0 1 . 2 Draw **one** line from each word to the meaning of that word.

[3 marks]

Word	**Meaning**
	A small ring of DNA in the cytoplasm
Gene	
	All the genetic material of an organism
Genome	
	A small section of DNA which codes for a protein
Nucleus	
	A structure which contains chromosomes

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Some plants contain a harmful chemical called PTC.

Some people can taste PTC.

0 1 . 3 Suggest **one** advantage of being able to taste PTC.

[1 mark]

Only people with a dominant allele **T** can taste PTC.

People with **only** the allele **t** cannot taste PTC.

0 1 . 4 A person has the genotype **Tt**.

What word describes the person's genotype?

[1 mark]

Tick (✓) **one** box.

- Heterozygous ☐
- Phenotype ☐
- Recessive ☐

0 1 . 5 Give the genotype of a person who **cannot** taste PTC.

[1 mark]

Do not write outside the box

0 1 . 6 A woman and a man plan to have a child.

The woman and the man both have the genotype **Tt**.

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

[2 marks]

Figure 1

		Woman	
		T	**t**
Man	**T**	**T T**	
	t		

0 1 . 7 What is the chance of the child being able to taste PTC?

Use **Figure 1**.

[1 mark]

Tick (✓) **one** box.

25% ☐ 50% ☐ 75% ☐ 100% ☐

10

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Turn over for the next question

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ANSWER IN THE SPACES PROVIDED

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0 2 Some students estimated the population of daisy plants in a field.

This is the method used.

1. Place a quadrat randomly on the field.
2. Count and record the number of daisy plants in the quadrat.
3. Repeat steps 1 and 2 another four times.

0 2 . 1 How could the students have made sure the quadrats were placed randomly?

[1 mark]

0 2 . 2 Describe the piece of equipment called a quadrat.

[1 mark]

Table 1 shows the results.

Table 1

Quadrat number	Number of daisy plants
1	8
2	11
3	4
4	6
5	16
Mean	**X**

0 2 . 3 Calculate mean value **X**.

[1 mark]

X = _____ daisy plants

Do not write outside the box

0 2 . 4 The field is a rectangle 100 m wide and 150 m long.

Calculate the area of the field.

[1 mark]

Area = _____ m^2

0 2 . 5 The quadrat used by the students had an area of 1.0 m^2

Estimate the population of daisy plants in the field.

Use your answers to Question **02.3** and Question **02.4**

[2 marks]

Estimated population = _____ daisy plants

0 2 . 6 More daisy plants grew in some parts of the field compared to other areas of the field.

Give **two** biotic factors that may affect where daisy plants grow in the field.

[2 marks]

1 _____

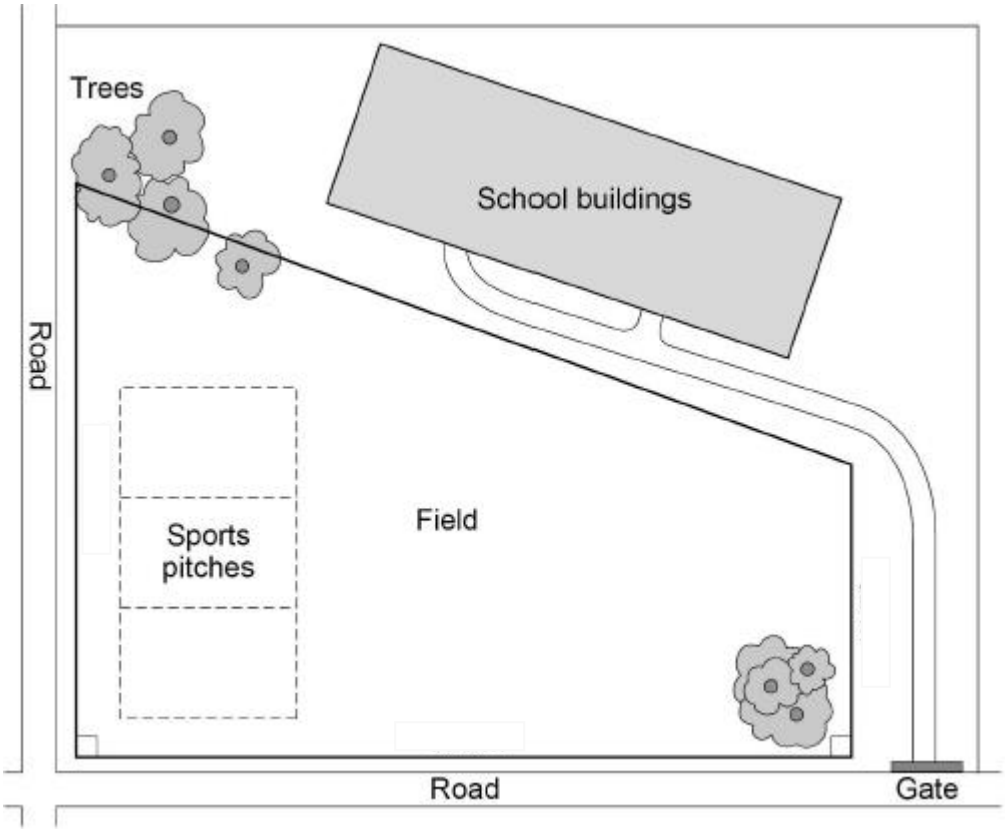
2 _____

0 2 . 7 The students noticed that the daisy plants growing near a building were smaller.

Explain why smaller daisy plants grew near the building.

[2 marks]

2.8



The students noticed a very uneven distribution of daisy plants in the field.

Explain how different biotic factors **and** abiotic factors could have caused an uneven distribution of daisy plants.

Use the diagram above.

(6)

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16

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0 3 Mineral ions are important chemicals in an ecosystem.

0 3 . 1 Plants take in nitrate ions dissolved in water.

Which part of a plant takes in nitrate ions?

[1 mark]

_____

0 3 . 2 Name **two** chemicals that are cycled between plants, the soil and the air.

Do **not** refer to nitrogen or nitrates in your answer.

[2 marks]

1 _____

2 _____

Do not write outside the box

0 3 . 3 All the chemicals in a plant are recycled when the plant dies.

Describe how:

- microorganisms recycle chemicals
- the chemicals are used again by new plants.

[6 marks]

9

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0 4 A fossil was found in rocks. The rocks were formed from mud.

The fossil is of the fungus *Ourasphaira giraldae*.

0 4 . 1 What is the genus of the fungus?

[1 mark]

Tick (✓) **one** box.

Giraldae ☐

Ourasphaira ☐

Ourasphaira giraldae ☐

0 4 . 2 The mud around the fungus did **not** contain oxygen.

Which process did the mud around the fungus prevent?

[1 mark]

Tick (✓) **one** box.

Decay ☐

Geological activity ☐

Photosynthesis ☐

Do not write outside the box

0 4 . 3 The fossilised fungus is estimated to be 890 000 000 years old.

What is 890 000 000 in standard form?

[1 mark]

Tick (✓) **one** box.

8.9×10^6 ☐

8.9×10^7 ☐

8.9×10^8 ☐

8.9×10^9 ☐

0 4 . 4 Traditional classification divided organisms into kingdoms.

Who developed the traditional system of classification?

[1 mark]

Tick (✓) **one** box.

Carl Linnaeus ☐

Carl Woese ☐

Charles Darwin ☐

Do not write outside the box

0 4 . 5 More recent classification methods use a three-domain system.

What is the name of the domain the fungus *Ourasphaira giraldae* is classified in?

[1 mark]

Tick (✓) **one** box.

Bacteria ☐

Eukaryota ☐

Plants ☐

0 4 . 6 Why has classification changed over time?

[1 mark]

Tick (✓) **one** box.

Electron microscopes allow more detail to be seen inside cells. ☐

Many more types of organisms have become extinct. ☐

Some fossils are buried so deep that they may never be discovered. ☐

6

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0 5 Homeostasis regulates the internal conditions of the human body.

0 5 . 1 Which **two** processes are regulated by homeostasis?

[2 marks]

Tick (✓) **two** boxes.

Controlling water output in urine ☐

Defending the body against pathogens ☐

How quickly you walk ☐

Keeping cool on a hot day ☐

Waking up in the morning ☐

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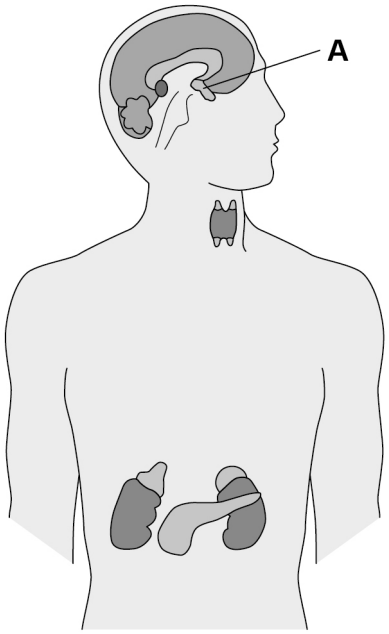
Hormones are produced by glands in the endocrine system.

Each hormone has an effect on a target organ.

Figure 6 shows glands of the endocrine system.

Figure 6



0 5 . 2 What is the name of gland **A**?

[1 mark]

Tick (✓) **one** box.

Pancreas ☐

Pituitary ☐

Thyroid ☐

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Before eating a sugar-coated cereal a person had a blood glucose concentration of 5.2 mmol/dm^3

Soon after eating the cereal the person had a blood glucose concentration of 8.4 mmol/dm^3

0 5 . 3 Calculate the increase in the blood glucose concentration.

[1 mark]

Increase = _____ mmol/dm^3

0 5 . 4 The person needed medication to decrease their blood glucose concentration.

Suggest what disorder the person has.

[1 mark]

0 5 . 5 There is a problem with the hormone control of the person.

What is the problem?

[1 mark]

Tick (✓) **one** box.

The blood is not taking hormones to target organs. ☐

The pancreas is not releasing insulin. ☐

The pituitary gland is not being stimulated. ☐

Do not write outside the box

0 5 . 6 The person:

- works in an office
- drives to work
- is overweight
- watches the television and reads every night
- drinks a hot chocolate every night.

Suggest **two** lifestyle changes the person could make to help treat their disorder.

[2 marks]

1 _____

_____

2 _____

_____

8

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Turn over for the next question

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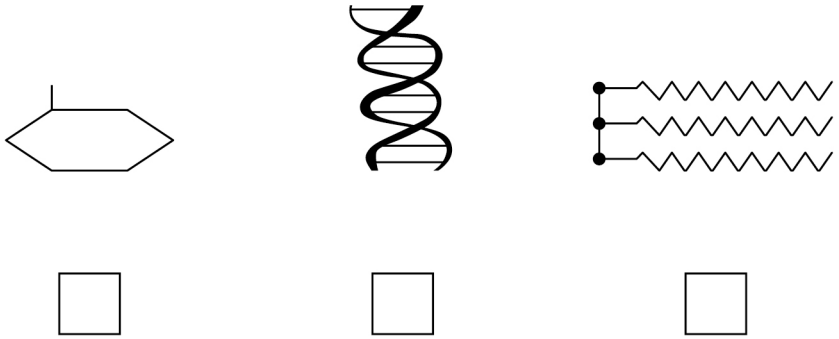
0 6 This question is about DNA and genes.

0 6 . 1 Which diagram represents a DNA molecule?

[1 mark]

Tick (✓) **one** box.



☐ ☐ ☐

0 6 . 2 Describe the structure of a DNA molecule.

[1 mark]

_____

_____

0 6 . 3 A gene is a small section of DNA on a chromosome.

Complete the sentences.

[2 marks]

A gene codes for a particular sequence of _____ .

This sequence makes a specific _____ .

Do not write outside the box

0 6 . 4 What is meant by the term genome?

[1 mark]

0 6 . 5 The complete human genome is now known.

Which important scientific advance was made using knowledge of the human genome?

[1 mark]

Tick (✓) **one** box.

Discovering antibiotic resistant bacteria ☐

Finding more foods to eat from tropical forests ☐

Tracing how aboriginal people spread across Australia ☐

Working out when the last ice age ended ☐

6

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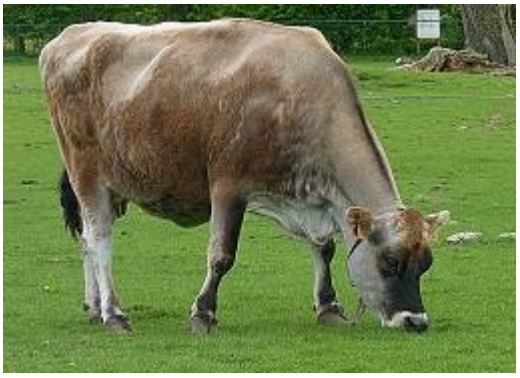
Q7 . The photographs show two breeds of cow.

Friesian cow

By Keith Weller/USDA (www.ars.usda.gov: Image Number K5176-3) [Public domain], via Wikimedia Commons

Jersey cow



By Jamain (Own work) [CC-BY-SA-3.0-2.5-2.0-1.0], via Wikimedia Commons

(a) Friesian and Jersey cows can both be used for meat or to produce milk.

The information shows features of Friesian and Jersey cows.

Friesian cows	Jersey cows
Body mass up to 600 kg	Body mass up to 400 kg
Milk contains 3.4% protein	Milk contains 3.8% protein
Can be milked for 325 days after giving birth	Can be milked for 250 days after giving birth
Produce no milk for 55 days before having a calf	Produce no milk for 45 days before having a calf
Produce > 30 litres of milk per day	Produce < 30 litres of milk per day

Use **only** the information above to answer these questions.

In your answers you must make comparisons between the two breeds of cow.

(i) Give **two** advantages of a farmer keeping Friesian cows and **not** Jersey cows.

1. _____

_____

2. _____

_____

(2)

(ii) Give **two** advantages of a farmer keeping Jersey cows and **not** Friesian cows.

Do not write outside the box

1. _____

_____

2. _____

_____

(2)

(b) Cow's milk is different from human milk. Cow's milk should **not** be given to young human babies.

Scientists in China have *genetically engineered* cows to produce human milk. Milk from these cows can be fed to young human babies.

(i) What is *genetic engineering* ?

Tick (✓) **one** box.

Genes from one organism are transferred to a different organism	☐
Cells are separated from an embryo and are transferred to host mothers	☐
The nucleus from a body cell is transferred to an egg cell	☐

(1)

(ii) Some people are worried about using milk from genetically engineered cows, to feed human babies.

Give **one** reason why.

_____

_____

(1)

6

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0 8 **Figure 4** shows a food chain in a garden.

Figure 4

bean plant → blackfly → spider → blackbird

0 8 . 1 Which term describes the spider in this food chain?

[1 mark]

Tick (✓) **one** box.

Primary consumer ☐

Producer ☐

Secondary consumer ☐

Tertiary consumer ☐

0 8 . 2 Many of the spiders in the garden died.

What is likely to happen to the number of blackflies in the garden?

[1 mark]

Tick (✓) **one** box.

Decrease ☐

Increase ☐

Stay the same ☐

0 8 . 3 Give a reason for your answer to Question **05.2**

[1 mark]

_____

_____

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Table 2 shows the estimated biomass of organisms in the garden.

Table 2

Organism	Biomass in g
Bean plants	225
Blackflies	115
Spiders	65
Blackbirds	10

0 8 . 4 What conclusion can be made about biomass in food chains?

[1 mark]

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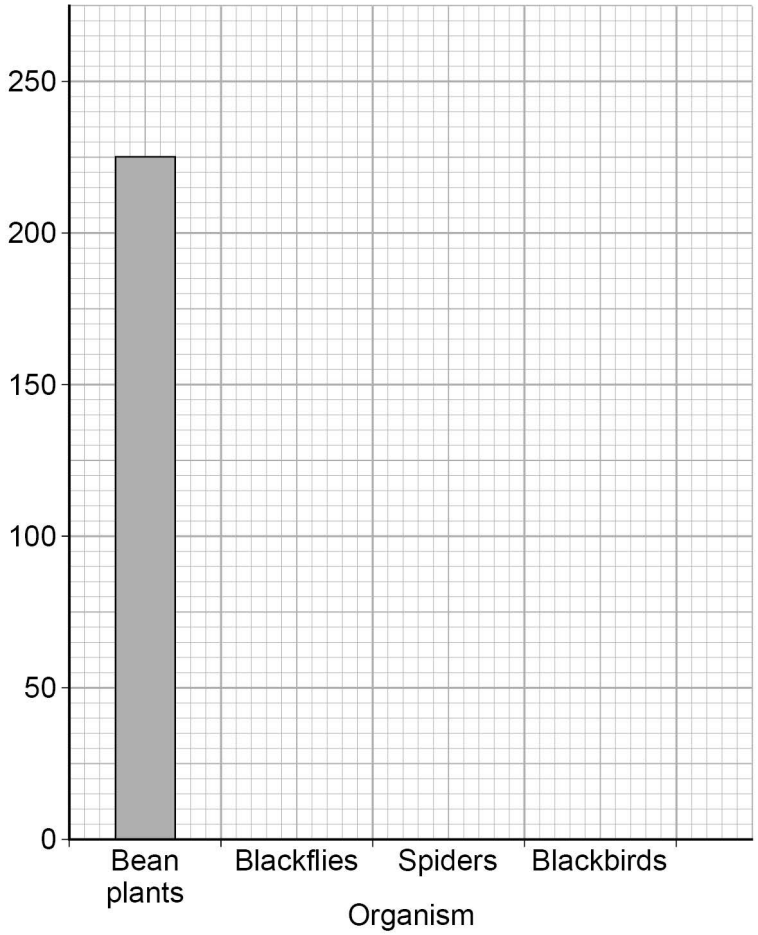
0 8 . 5 Complete **Figure 5**.

You should:

- label the y-axis
- plot the data from **Table 2**.

[3 marks]

Figure 5



0 8 . 6 Explain why a garden is **not** a stable community.

[2 marks]

9

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