AQA

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

Monday 11 June 2018 Morning 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.
- 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.

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	
7	
TOTAL	

Do not write outside the box

0 1 Every year scientists have recorded the date when migrating birds arrived at summer breeding grounds in the UK.

The records show that for every 1 °C increase in mean global temperature, the birds arrived one day earlier.

0 1 . 1 What will the birds be competing for when they arrive at their UK breeding grounds?

[2 marks]

Tick **two** boxes.

- Eggs ☐
- Food ☐
- Light ☐
- Mates ☐
- Oxygen ☐

0 1 . 2 Birds that arrive early might survive better than birds that arrive later.

Suggest **one** reason why.

[1 mark]

0 1 . 3 Global temperatures are increasing every year.

This is because of an increase of greenhouse gases in the atmosphere.

Name **one** greenhouse gas.

[1 mark]

Do not write outside the box

0 1 . 4 Global warming affects the migration of animals.

Give **one** other effect of global warming.

[1 mark]

0 1 . 5 Which **two** human activities cause global warming?

[2 marks]

Tick **two** boxes.

- Burning fossil fuels ☐
- Eating vegetables ☐
- Farming cows ☐
- Turning off lights ☐
- Using too much water ☐

0 1 . 6 Which gas in the atmosphere causes acid rain?

[1 mark]

Tick **one** box.

- Carbon monoxide ☐
- Oxygen ☐
- Ozone ☐
- Sulfur dioxide ☐

8

Do not write outside the box

0 2 The genetic material in cells is made of DNA.

0 2 . 1 Which **two** of the following describe the structure of DNA?

[2 marks]

Tick **two** boxes.

A double helix ☐

A monomer ☐

A polymer ☐

A protein ☐

A single strand ☐

0 2 . 2 Complete the sentences.

Choose answers from the box.

[2 marks]

clone	**disorder**	**gene**
genome		**mutation**

A small section of DNA which codes for one protein is called a _____ .

All the genetic material of an organism is called its _____ .

0 2 . 3 Gametes (sex cells) contain half the amount of DNA compared to body cells.

Give the names of the **two** types of gametes in humans.

[1 mark]

_____ and _____

0 2 . 4 What is the process called when the gametes join?

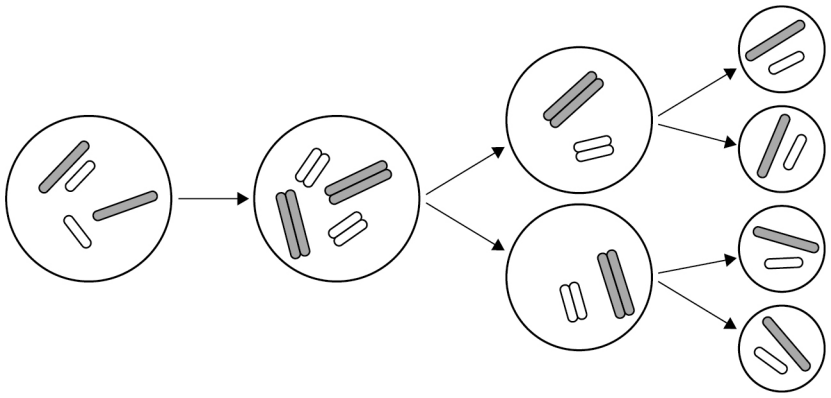
[1 mark]

_____

Do not write outside the box

0 2 . 5 **Figure 1** shows cell division by meiosis to form gametes.

Figure 1



Which **two** features in **Figure 1** show that this cell division is meiosis and **not** mitosis?

[2 marks]

Tick **two** boxes.

- The cell divides twice ☐
- The chromosomes pull apart into the new cells ☐
- The cytoplasm divides into new cells ☐
- The DNA is copied ☐
- The new cells have half the number of chromosomes ☐

8

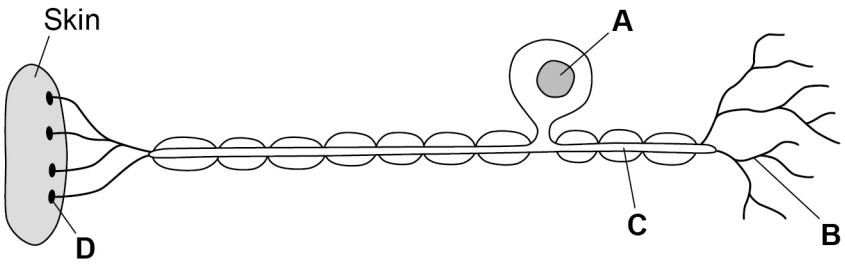
Turn over for the next question

Do not write outside the box

0 3 This question is about coordination in the human body.

Figure 2 shows a sensory neurone (nerve cell).

Figure 2



0 3 . 1 Which label is the cell nucleus?

[1 mark]

Tick **one** box.

A ☐ **B** ☐ **C** ☐ **D** ☐

0 3 . 2 Which label is the receptor?

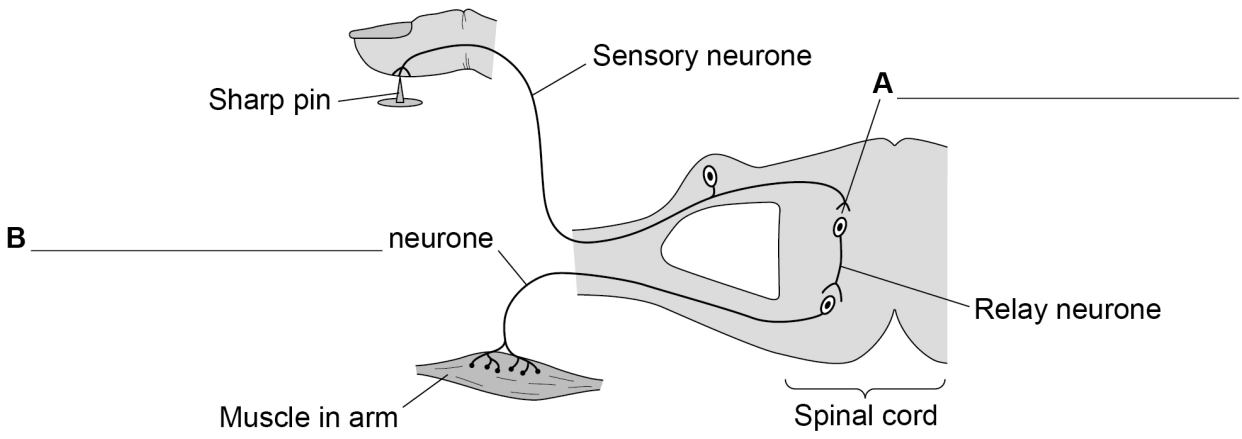
[1 mark]

Tick **one** box.

A ☐ **B** ☐ **C** ☐ **D** ☐

0 3 . 3 **Figure 3** shows the nerve pathway when a person touches a sharp pin.

Figure 3



Name structures **A** and **B** on **Figure 3**

[2 marks]

Do not write outside the box

0 3 . 4 When the finger touches the sharp pin, the muscle in the arm contracts to pull the arm away.

What type of action is this?

[1 mark]

Tick **one** box.

A conscious action ☐

A delayed action ☐

A reflex action ☐

0 3 . 5 Doctors tested people of different ages to time how long it took between touching a sharp pin and the arm muscle contracting.

At each age they tested five men and calculated a mean value for the time.

Table 1 shows the results.

Table 1

Age in years	Mean time for muscle to contract in milliseconds
20	18
40	20
60	23
80	30

How much longer does it take for the muscle to contract at 80 years of age compared to at 20 years of age?

Give your answer in seconds.

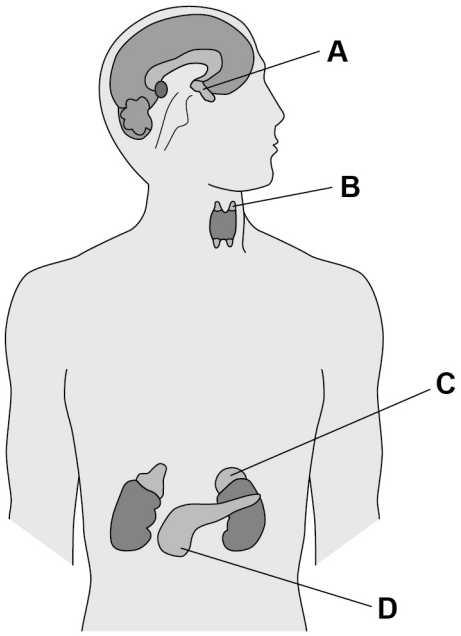
[2 marks]

Time = _____ s

Do not write outside the box

0 3 . 6 **Figure 4** shows the position of some of the glands which release hormones.

Figure 4



Which label on **Figure 4** shows the position of the pituitary gland?

[1 mark]

Tick **one** box.

A ☐ **B** ☐ **C** ☐ **D** ☐

0 3 . 7 Luteinising hormone (LH) is a hormone released by the pituitary gland.

What is the function of LH?

[1 mark]

Tick **one** box.

Controls blood glucose concentration ☐

Controls the formation of sperm ☐

Controls the growth of muscles ☐

Controls the release of an egg ☐

Do not write outside the box

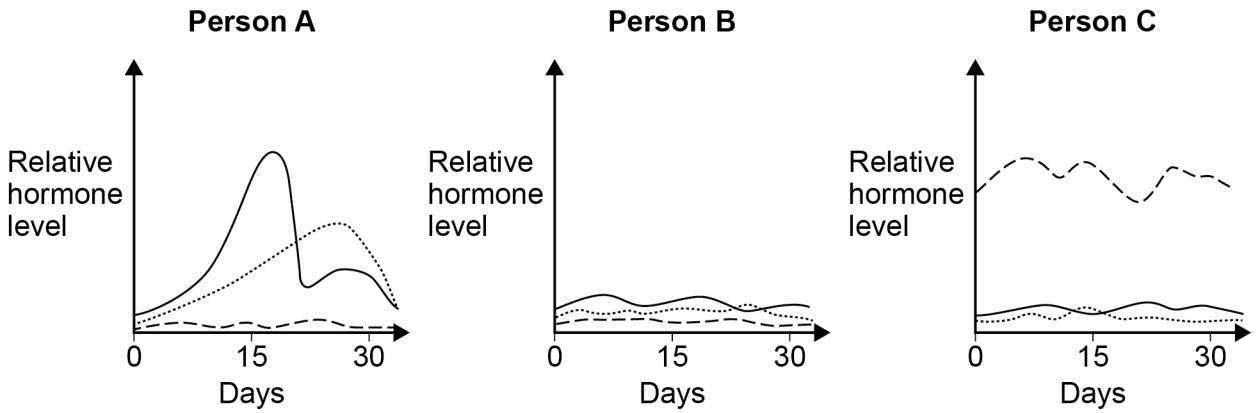
0 3 . 8 How does LH travel from the pituitary gland to its target organ?

[1 mark]

0 3 . 9 **Figure 5** shows the relative levels of sex hormones of three young people over 30 days.

One person is an 8-year-old girl, one is an 18-year-old boy and the other is an 18-year-old girl.

Figure 5



Which person is the 18-year-old boy?

Give **one** reason for your answer.

[2 marks]

Person _____

Reason _____

_____

12

Turn over for the next question

0 4 A class of eight students measured the population of water fleas living at the edge of a large pond.

This is the method each student used.

1. Put some pond water in a white tray.
2. Take a pond net and scoop at the edge of the pond a few times.
3. Empty the pond net into the water in the tray.
4. Count the number of water fleas in the tray.

Figure 6 shows a student working.

Figure 6

0 4 . 1 The students did **not** control some variables.

Give **two** variables the students should have controlled to make this a valid method.
[2 marks]

1 _____

_____

2 _____

_____

Do not write outside the box

The eight students then used a different method to obtain valid results.

Table 2 shows their results.

Table 2

Student	Number of water fleas per 1000 cm^3 pond water
A	66
B	37
C	51
D	102
E	40
F	122
G	75
H	19

0 4 . 2 Calculate the students' mean value for the population of water fleas at the edge of the pond.

[1 mark]

Mean population = _____ water fleas per 1000 cm^3 pond water

0 4 . 3 What was the range of the students' results?

[1 mark]

Range = _____

0 4 . 4 Suggest **one** reason why such a wide range of results was found.

[1 mark]

0 4 . 5 The teacher then sampled the centre of the pond eight times.

His mean value was 12 water fleas per 1000 cm^3 pond water.

What conclusion can you make about the distribution of water fleas in the pond?

Use the students' mean value from question **04.2** to compare with the teacher's mean value.

[1 mark]

Scientists counted some different invertebrates living in a pond in 2014 and in 2016

Table 3 shows the results.

Table 3

Invertebrate species	Number of invertebrates	
	2014	2016
Bloodworms	13	48
Freshwater shrimps	24	9
Mayfly nymphs	32	0
Water snails	19	24

0 4 . 6 Calculate the change in the number of bloodworms between 2014 and 2016

[1 mark]

Change = _____ bloodworms

0 4 . 7 Calculate the number of shrimps in the pond in 2016 as a percentage of the number of shrimps in the pond in 2014

[1 mark]

Percentage = _____ %

Do not write outside the box

0 4 . 8 Invertebrate species found in a pond can be used as an indicator of the pollution level.

Table 4 shows which species can survive in different levels of pollution.

Table 4

Invertebrate species	Pollution level		
	Low	Medium	High
Bloodworms	✓	✓	✓
Freshwater shrimps	✓	✓	✗
Mayfly nymphs	✓	✗	✗
Water snails	✓	✓	✓

Key
✓ = Can survive
✗ = Cannot survive

What conclusion can you make about the change in the level of pollution in the pond between 2014 and 2016?

Give **one** reason for your conclusion.

Use the data in **Table 3** and **Table 4**

[2 marks]

0 4 . 9 Water pollution and global warming are two problems that have been caused by the rapid increase of the human population.

Suggest **two** other problems caused by the rapid increase of the human population.

[2 marks]

1

2

12

Turn over ►

0 5 Variation in individual organisms can be caused by:

- genes
- the environment
- a combination of both genes and the environment.

Figure 7 shows variations in a woman.

Figure 7

0 5 . 1 What is the cause of each variation in **Table 5**?

Tick only **one** box in each row.

[3 marks]

Table 5

Variation	Cause of variation		
	Genes only	**Environment only**	**Both genes and the environment**
Brown eyes			
Light brown skin colour			
Short hair			

Do not write outside the box

0 5 . 2 The allele for blue eyes is recessive (**b**).

The allele for brown eyes is dominant (**B**).

A woman has blue eyes.

What are the woman's alleles?

[1 mark]

Tick **one** box.

BB ☐ **Bb** ☐ **bb** ☐

0 5 . 3 The woman marries a man with the alleles **Bb** for eye colour.

What colour eyes does the man have?

[1 mark]

0 5 . 4 Complete the Punnett square diagram in **Figure 8** for this man and woman.

[1 mark]

Figure 8

		Woman	
Man	**B**		
	b		

0 5 . 5 What is the probability that a child of this man and woman will have brown eyes?

[1 mark]

Question 5 continues on the next page

Do not write outside the box

0 5 . 6 What is the scientific term used for the child's eye colour?

[1 mark]

Tick **one** box.

- Chromosome ☐
- Condition ☐
- Genotype ☐
- Phenotype ☐

0 5 . 7 What effect will a mutation have?

[1 mark]

Tick **one** box.

- Almost certainly have no effect ☐
- Definitely change appearance ☐
- Definitely be passed on to all children ☐
- Probably cause a disease ☐

9

Turn over for the next question

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0 6 Many biotic and abiotic factors can affect the growth of plants.

0 6 . 1 Are the factors in **Table 6** biotic or abiotic?

[2 marks]

Tick **one** box for each factor.

Table 6

Factor	Biotic	Abiotic
Diseases		
Herbivores		
Temperature		
Water		

Two students investigated the effect of light intensity on the distribution of small plants.

The plants are growing under a tree in a park.

The students made the following hypothesis:

'As you move outwards from a tree there will be more plant growth.'

0 6 . 2 Explain why the students thought their hypothesis would be correct.

[3 marks]

Do not write outside the box

0 6 . 3 The students used two pieces of equipment.

Give the scientific name of each piece of equipment.

[2 marks]

A square frame measuring 0.5 m × 0.5 m _____

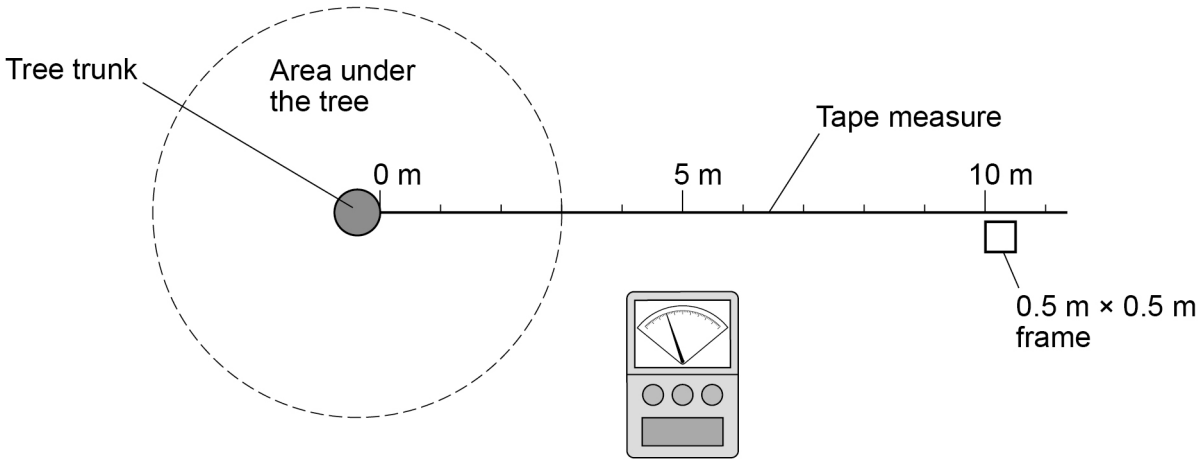
An electronic device to measure light intensity _____

This is the method used.

1. Fix one end of a tape measure at the base of the tree.
2. Fix the other end of the tape measure 11 metres from the tree.
3. At 0 metres put the square frame on the ground.
4. Identify all the plant species growing inside the frame.
5. Estimate and record the percentage cover of each plant species.
6. Measure the light intensity inside the frame.
7. Put the square frame on the ground every 2 metres along the tape to 10 metres.
8. Repeat steps 4 – 6 in every frame.

Figure 9 shows the equipment in this investigation.

Figure 9



0 6 . 4 Calculate the total area sampled.

[1 mark]

_____

_____

Total area sampled = _____ m^2

Turn over ►

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0 6 . 5 The whole investigation was done as quickly as possible on the same day.

Suggest **one** reason why.

[1 mark]

0 6 . 6 Give **one** way the investigation could be improved.

[1 mark]

Table 7 shows the results.

Table 7

	Distance from tree in metres					
	0	**2**	**4**	**6**	**8**	**10**
Percentage cover of grass	15	50	35	16	15	15
Percentage cover of plantain	0	5	10	40	25	30
Percentage cover of daisy	0	0	0	4	20	10
Percentage cover of clover	1	10	25	40	40	45
Total percentage cover of plants	16	65	70	100	100	100
Light intensity in arbitrary units	37	59	150	175	>200	>200

0 6 . 7 Which plant species in **Table 7** will only grow at high light intensity?

[1 mark]

Do not write outside the box

0 6 . 8 What conclusion can be made about the relationship between light intensity and the total percentage cover of plants?

Use data from **Table 7** in your answer.

[2 marks]

0 6 . 9 Light intensity might **not** be the cause of this pattern of plant distribution.

Suggest **one** different factor that may cause these results.

Give **one** reason for your answer.

[2 marks]

Factor _____

Reason _____

15

Turn over for the next question

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0 7 *Pseudomonas* bacteria cause infections in hospital patients.

A new strain of *Pseudomonas* bacteria has evolved. This new strain can only be killed by one antibiotic called fluroquinolone.

Scientists want to prevent the new strain of *Pseudomonas* from spreading in the human population.

Explain the advice doctors should be given to prevent the spread of the new strain.

[6 marks]

END OF QUESTIONS

6

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