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

Monday 1 June 2020 Afternoon 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	
7	
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.

Do not write outside the box

0 1 This question is about reproduction.

0 1 . 1 Which **two** statements are true for sexual reproduction in humans?

[2 marks]

Tick (✓) **two** boxes.

- Gametes are formed. ✓
- Offspring are clones.
- Offspring are genetically identical to parents.
- Only one parent is involved.
- Sperm and egg fuse. ✓

0 1 . 2 Humans reproduce by sexual reproduction.

Complete **Figure 1** to show the inheritance of sex.

[3 marks]

Figure 1

		Mother	
		X	**X**
Father	**X**	XX	XX
	Y	XY	XY

Do not write outside the box

0 1 . 3 Draw a ring around the genotype of all male children in **Figure 1**.

[1 mark]

0 1 . 4 When children reach puberty, reproductive hormones cause changes in their bodies.

Draw **one** line from each hormone to the change the hormone causes at puberty.

[2 marks]

Hormone	Change the hormone causes at puberty
Oestrogen	Breasts develop
	Skin turns lighter
Testosterone	Voice becomes deeper
	Wisdom teeth appear

Question 1 continues on the next page

Do not write outside the box

A woman does **not** want to become pregnant.

She considers two methods of contraception.

0 1 . 5 Draw **one** line from each method of contraception to how the method prevents pregnancy.

[2 marks]

Method of contraception	How the method prevents pregnancy
Condom	Sperm do not reach the egg
Oral contraceptive (the pill)	Hormones stop eggs maturing
	Embryos do not implant in the uterus
	Sperm are killed

Do not write outside the box

0 1 . 6 Give **one** advantage and **one** disadvantage of taking oral contraceptives to prevent pregnancy.

[2 marks]

Advantage very reliable

Disadvantage may cause side effects

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Turn over for the next question

Do not write outside the box

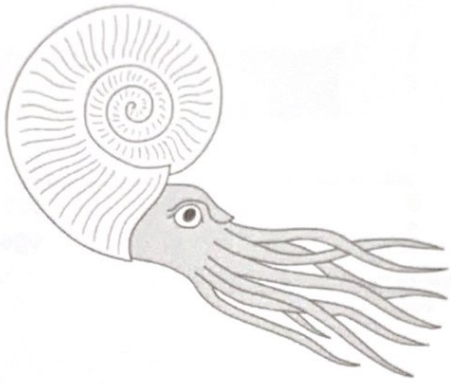
0 2 Ammonites became extinct millions of years ago.

Figure 2 is a photograph of a fossil ammonite.

Figure 3 is a drawing of what scientists think a living ammonite looked like.

Figure 2

Figure 3



0 2 . 1 How was the fossil in **Figure 2** formed?

[1 mark]

Tick (✓) **one** box.

- The ammonite left traces where it moved. ☐
- The ammonite shell was replaced by minerals. ☑
- The ammonite was frozen in ice. ☐

0 2 . 2 Suggest why scientists are **not** certain what living ammonites looked like.

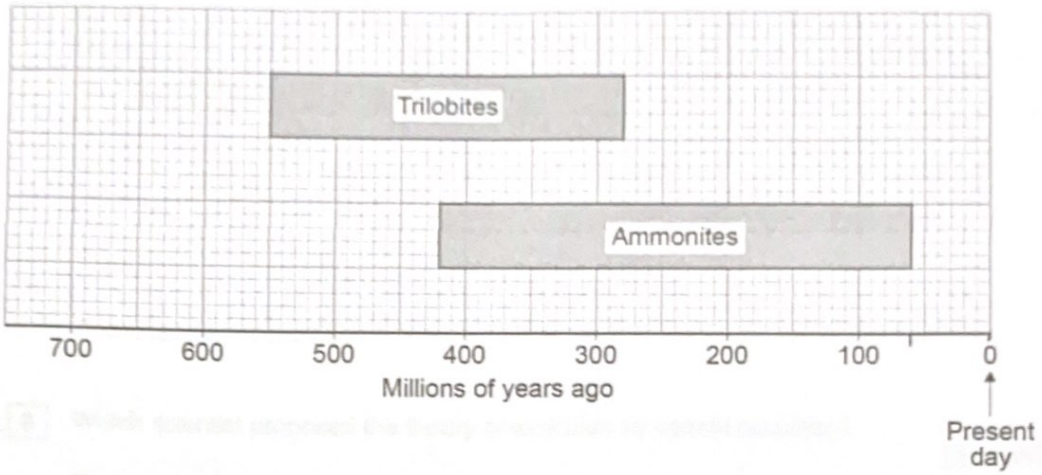
[1 mark]

There are no living ones found today and all the soft parts have decayed.

Do not write outside the box

Figure 4 shows when two different types of organism were alive on Earth.

Figure 4



0 2 . 3 How many millions of years ago did ammonites become extinct?

Use **Figure 4**.

[1 mark]

60 million years

0 2 . 4 Trilobites lived on Earth for 270 million years.

Calculate how much longer ammonites lived on Earth than trilobites.

Use **Figure 4**.

[2 marks]

Ammonites : 420 - 60 = 360

360 - 270 = 90

90 million years

Do not write outside the box

0 2 . 5 Suggest **two** factors which may have caused ammonites to become extinct.

[2 marks]

1 Drought

2 Volcanic activity

The fossil record provides evidence for the theory of evolution by natural selection.

0 2 . 6 Which scientist proposed the theory of evolution by natural selection?

[1 mark]

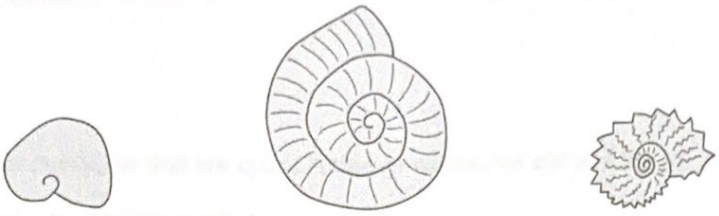
Tick (✓) **one** box.

- Carl Linnaeus ☐
- Carl Woese ☐
- Charles Darwin ☑

Do not write outside the box

0 2 . 7 **Figure 5** shows ammonite fossils from three different time periods.

Figure 5



400 million years ago | 300 million years ago | 200 million years ago

How do the fossils in **Figure 5** give evidence for the theory of evolution by natural selection?

[1 mark]

Tick (✓) **one** box.

All fossils have coiled shells. ☐

More recent fossils are bigger. ☐

Older fossils are more simple. ☑

9

Turn over for the next question

box

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]

roots

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 carbon

2 water

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]

Microorganisms decay the dead plant. While respiring using carbon compounds such as glucose and releasing CO_2 into the atmosphere. New plants take in the CO_2 for photosynthesis which produces glucose for plant growth. When the plants are decayed nitrates and other mineral ions are released into the soil which can be ~~used~~ taken up by new growing plants ~~in the~~ and used for cell growth. Water evaporates from plants when they die and is recycled as rain which is again taken up and used by more growing plants.

9

Turn over for the next question

Do not write outside the box

0 4 Homeostasis regulates the internal conditions of the human body.

0 4 . 1 Which **two** processes are regulated by homeostasis?

[2 marks]

Tick (✓) **two** boxes.

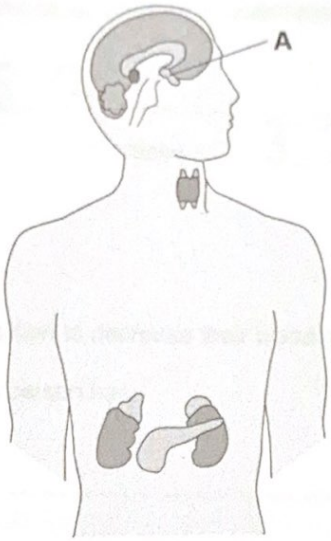
- Controlling water output in urine ☑
- Defending the body against pathogens ☐
- How quickly you walk ☐
- Keeping cool on a hot day ☑
- Waking up in the morning ☐

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 4 . 2 What is the name of gland **A**?

[1 mark]

Tick (✓) **one** box.

- Pancreas ☐
- Pituitary ☑
- Thyroid ☐

Question 4 continues on the next page

Do not write outside the box

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 4 . 3 Calculate the increase in the blood glucose concentration.

[1 mark]

8.4 - 5.2

Increase = 3.2 mmol/dm^3

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

Suggest what disorder the person has.

[1 mark]

Diabetes

0 4 . 5 There is a problem with the hormone control of the person.

What is the problem?

Tick (✓) **one** box.

[1 mark]

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 4 . 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 Do more exercise such as walk / bike to work

2 Change diet such as reducing amount of sugary foods + drinks.

8

Turn over for the next question

Do not write outside the box

0 5 This question is about biodiversity.

A farmer:

- grows only wheat crops
- has used all his small fields to make a few large fields
- cuts down trees in his woodlands to burn as fuel.

0 5 . 1 What are **two** ways the farmer could increase biodiversity on his farm?

[2 marks]

Tick (✓) **two** boxes.

- Cut down trees to grow wheat ☐
- Plant hedgerows around his fields ☑
- Plant many different crops in his fields ☑
- Put fences around his fields ☐
- Put fertiliser on his wheat crop ☐

Do not write outside the box

Students investigated the effect of cutting down trees in the woodland.

This is the method used.

1. Mark out a 10 m by 10 m area where trees have been removed.
2. Place a 1 m × 1 m quadrat at six random positions in the area.
3. Record the number of plant species present.
4. Record the number of invertebrate species seen among dead leaves on the ground.
5. Repeat steps 1 to 4 in an area where there are trees.

0 5 . 2 Suggest **one** improvement the students could make to their method.

[1 mark]

Repeat the experiment in each area

0 5 . 3 The students made this prediction:

'There will be more invertebrate species living in the area where there are trees.'

Explain why the students' prediction may be correct.

[2 marks]

The trees provide habitats for the invertebrates so there will be more food, camouflage and shade available

Question 5 continues on the next page

Table 1 shows the students' results.

Table 1

Quadrat	Number of plant species		Number of invertebrate species	
	Area with no trees	Area with trees	Area with no trees	Area with trees
1	8	2	4	10
2	6	2	3	6
3	7	0	4	8
4	6	3	5	14
5	20	4	2	9
6	8	1	6	13
Mean	7	2	4	10

0 5 . 4 The students decided that one result was anomalous.

Draw a ring around the anomalous result in **Table 1**.

[1 mark]

0 5 . 5 How does removing trees affect the number of invertebrate species living among the dead leaves on the ground?

Use **Table 1**.

[1 mark]

Decreases the number of invertebrate species

Do not write outside the box

0 5 . 6 There were more plant species growing in the area where there were no trees.

Explain why.

[3 marks]

Where there is fewer trees, there is less shade and so more light reaches the plants. The plants can therefore photosynthesise more and produce more glucose that can be used for growth.

10

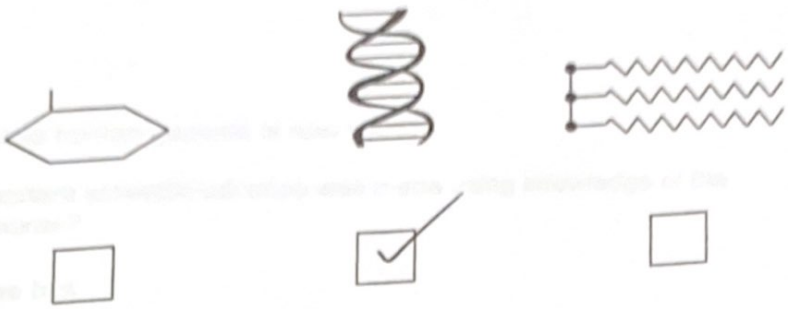
Turn over for the next question

Do not write outside the box

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]**

2 strands that are coiled into a double helix structure

0 6 . 3 A gene is a small section of DNA on a chromosome. **[2 marks]**

Complete the sentences.

A gene codes for a particular sequence of amino acids.

This sequence makes a specific protein.

Do not write outside the box

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

[1 mark]

all the genetic material of an organism

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 ☐

Question 6 continues on the next page

Do not write outside the box

A student found six different snails of one species in his garden.

Figure 7 shows the snails.

Figure 7

0 6 . 6 All the snails are different.

What scientific term describes differences in characteristics between individuals of a species?

[1 mark]

Variation

DO NOT WRITE ON THIS PAGE
ANSWER IN THE SPACES PROVIDED

0 6 . 7 A change in DNA has caused snail **P** to be very different from the other five snails.

Suggest why there might be an increasing number of snails similar to snail **P** in each future generation.

[2 marks]

P has a larger and potentially stronger shell which may give it a survival advantage so P would be more likely to survive and pass on it's genes for big shells.

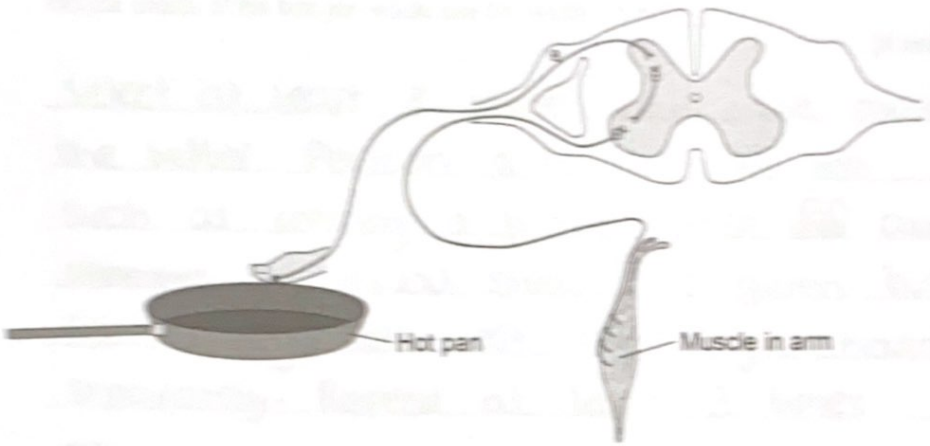
9

0 7 Human reactions are a response to an external change.

0 7 . 1 Reflex actions help to protect the body against damage.

Figure 8 shows the nervous pathway for a reflex action.

Figure 8



A stimulus from the hot pan will cause the muscle in the arm to contract and move the finger away.

Describe how the stimulus from the hot pan reaches the muscle in the arm.

[4 marks]

The stimulus is detected by receptors in the hand that initiates and electrical impulse through the sensory neurone, reflex neurone then motor neurone. This then ~~the~~ causes the muscles in the arm to contract in order to move the hand away from the hot pan. Between the neurones it crosses the synapse as a chemical.

Do not write outside the box

0 7 . 2 A student investigated whether using the right hand or the left hand had an effect on reaction time.

The student only tested right-handed people.

Describe a method for the student's investigation.

Include details of the test you would use for reaction time.

[4 marks]

select at least 3 ~~people~~ people, the more the better. Perform a reaction time test such as pressing a buzzer when an ~~one~~ audio ~~stimulus~~ or visual stimulus is given but test using both left and right hands separately. Repeat at least 3 times per person and per hand and calculate a mean for each persons reaction time using each hand. Select people of the same age and gender and do investigations at same time of day.

Question 7 continues on the next page

Do not write outside the box

A different student carried out an investigation to see if playing tennis improved reaction time.

The student used two groups of six people.

Table 2 shows the results.

Table 2

Person	Reaction time in seconds	
	People who play tennis	People who do not play tennis
1	0.2	0.3
2	0.4	0.4
3	0.3	0.6
4	0.4	0.5
5	0.2	0.3
6	0.3	0.2
Mean	**X**	0.4

0 7 . 3 Calculate mean value **X** in **Table 2**.

[2 marks]

$$\frac{0.2 + 0.4 + 0.3 + 0.4 + 0.2 + 0.3}{6}$$

X = 0.3 seconds

0 7 . 4 What is the dependent variable in the student's investigation?

[1 mark]

reaction time

Do not write outside the box

The student concluded:

'Playing tennis improves reaction time.'

0 7 . 5 Give **one** piece of evidence which supports the conclusion.

[1 mark]

Students who play tennis had shorter reaction times (0.3 secs) than those who don't (0.4 secs)

0 7 . 6 Give **one** piece of evidence which does **not** support the conclusion.

[1 mark]

There is a lot of overlap between the groups.

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END OF QUESTIONS