

Please write clearly in block capitals.

Centre number

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Candidate number

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Surname

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Forename(s)

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Candidate signature

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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.

## 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	
<b>TOTAL</b>	



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**

		<b>Mother</b>	
		X	X
<b>Father</b>	X	XX	



**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**

**Turn over ►**



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

Embryos do not  
implant in the uterus

Hormones stop  
eggs maturing

Oral contraceptive  
(the pill)

Sperm are killed

Sperm do not reach  
the egg



0 1 . 6

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

**[2 marks]**

Advantage \_\_\_\_\_

\_\_\_\_\_

Disadvantage \_\_\_\_\_

\_\_\_\_\_

12

**Turn over for the next question**

**Turn over ►**



0 2

Ammonites became extinct millions of years ago.

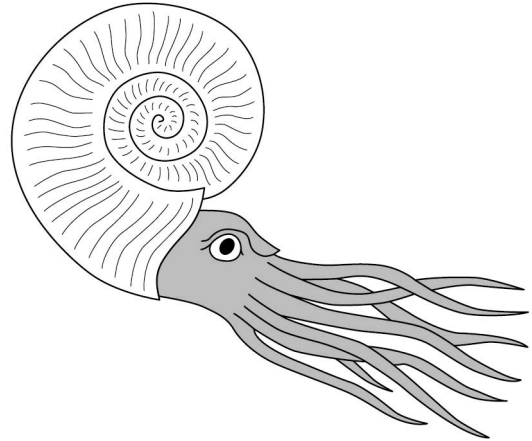
**Figure 2** is a photograph of a fossil ammonite.

**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]

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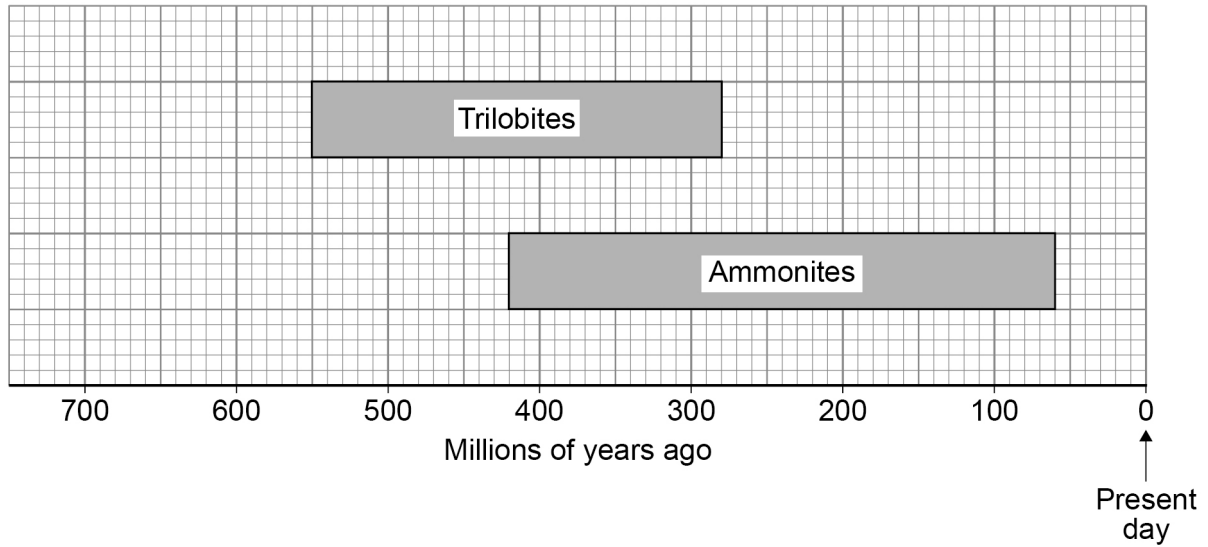


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Figure 4 shows when two different types of organism were alive on Earth.

Figure 4



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

Use Figure 4.

[1 mark]

\_\_\_\_\_ 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]

\_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_ million years

Turn over ►



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

**[2 marks]**

1 \_\_\_\_\_

2 \_\_\_\_\_

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

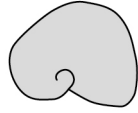
Charles Darwin



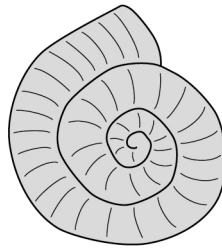


0 2 . 7 **Figure 5** shows ammonite fossils from three different time periods.

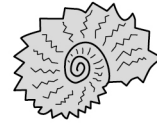
**Figure 5**



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**

**Turn over ►**



**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]**

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**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 

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2 

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**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

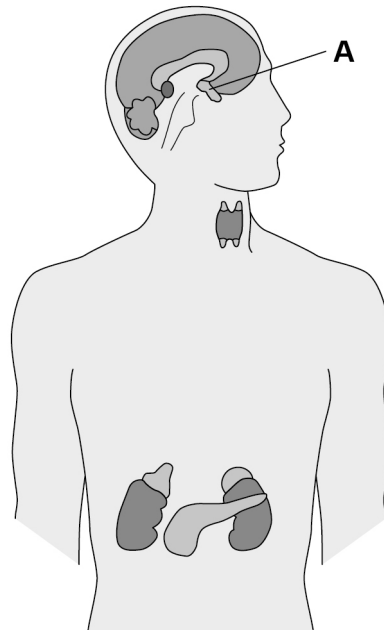


Hormones are produced by glands in the endocrine system.

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**

**Turn over ►**



Before eating a sugar-coated cereal a person had a blood glucose concentration of  $5.2 \text{ mmol/dm}^3$

Soon after eating the cereal the person had a blood glucose concentration of  $8.4 \text{ mmol/dm}^3$

**0 4 . 3** Calculate the increase in the blood glucose concentration.

**[1 mark]**

Increase = \_\_\_\_\_  $\text{mmol/dm}^3$

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

Suggest what disorder the person has.

**[1 mark]**

**0 4 . 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.



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 \_\_\_\_\_

\_\_\_\_\_

2 \_\_\_\_\_

\_\_\_\_\_

8

**Turn over for the next question****Turn over ►**

**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





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]

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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]

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**Question 5 continues on the next page**

**Turn over ►**



**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
<b>Mean</b>	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]**

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0 5 . 6

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

Explain why.

[3 marks]

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10

Turn over for the next question

Turn over ►



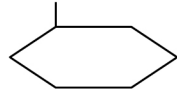
0 6

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]

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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 \_\_\_\_\_.



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

[1 mark]

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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**

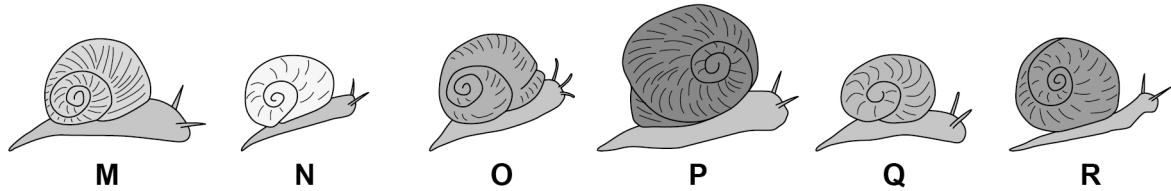
**Turn over ►**



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]**

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**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]**

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**9**



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0 7

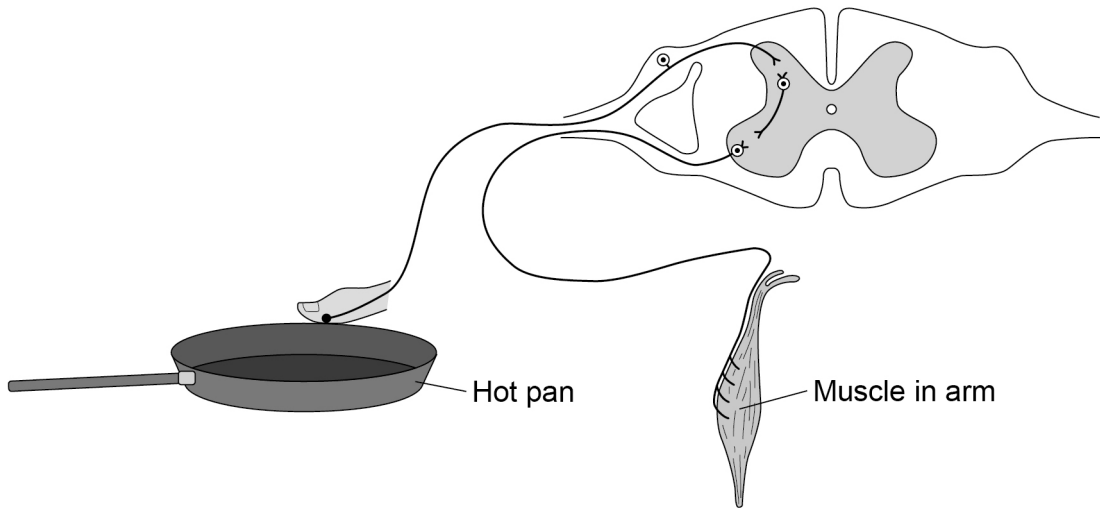
Human reactions are a response to an external change.

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]**

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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
<b>Mean</b>	<b>X</b>	0.4

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

**[2 marks]**

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**X** = \_\_\_\_\_ seconds

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

**[1 mark]**

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The student concluded:

'Playing tennis improves reaction time.'

0 7 . 5

Give **one** piece of evidence which supports the conclusion.

[1 mark]

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0 7 . 6

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

[1 mark]

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13

**END OF QUESTIONS**



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3 2



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