AQA

GCSE
COMBINED SCIENCE: TRILOGY

F

Foundation Tier   Biology Paper 2F

Specimen 2018 (set 2)   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	

0 1   **Figure 1** shows a photograph of a fossil of a trilobite.

Figure 1
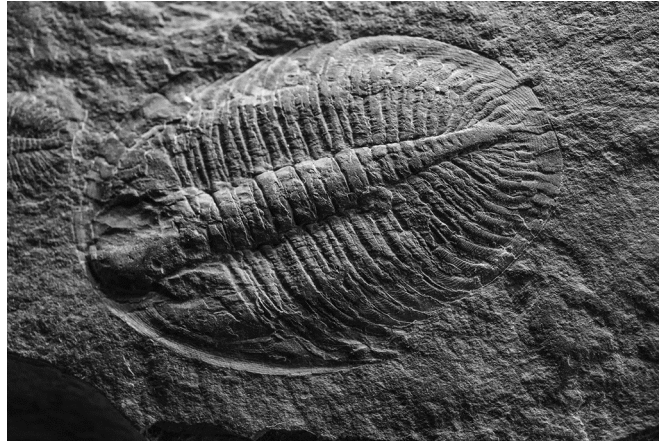
0 1 . 1   When were trilobites alive?

[1 mark]

Tick **one** box.

Between 20 and 50 years ago. ☐

Between 20 and 50 thousand years ago. ☐

Between 200 and 500 thousand years ago. ☐

Between 200 and 500 million years ago. ☐

| 0 | 1 | . | 2 | Suggest how the fossil in **Figure 1** was formed.

[1 mark]

Tick **one** box

The organism left a footprint behind. ☐

The organism was buried by rocks. ☐

The organism was frozen in ice. ☐

The organism was replaced by minerals. ☐

| 0 | 1 | . | 3 | Trilobites are extinct.

What does extinct mean?

[1 mark]

Tick **one** box.

The species evolved into another species. ☐

The species does not have any soft tissue parts. ☐

There are no organisms of that species alive today. ☐

There are not enough of the species alive to reproduce. ☐

Question 1 continues on the next page

Turn over ▶

0 1 . 4 Hyoliths are another type of fossil. Hyoliths were discovered in the 1800s and thought to be a type of snail.

In 2017 scientists used modern techniques to place hyoliths into a different group.

Suggest a modern technique that the scientists may have used.

[1 mark]

Tick **one** box.

DNA analysis ☐

Genetic modification ☐

Light microscopy ☐

Selective breeding ☐

0 1 . 5 Which scientist developed the traditional classification system for all living organisms?
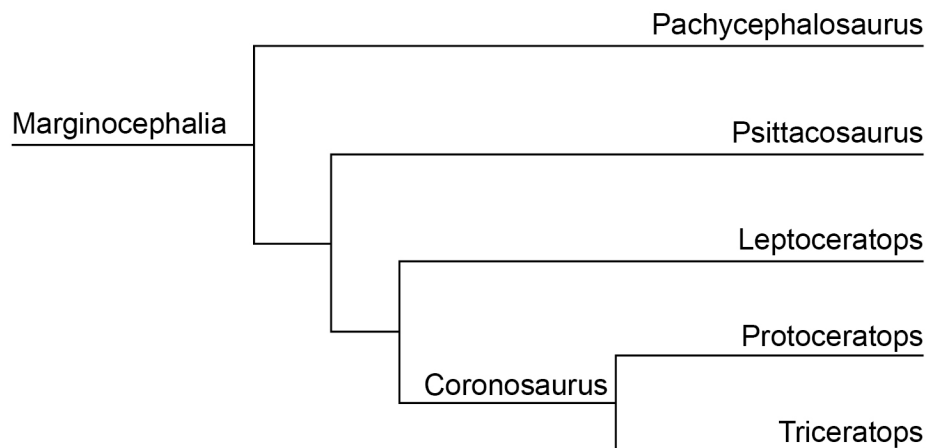
[1 mark]

_____

The fossil record is used to draw evolutionary trees.

Figure 2 shows an evolutionary tree for a group of dinosaurs.

Figure 2

| 0 | 1 | . | 6 | Suggest which **two** of these dinosaurs are most closely related.

[1 mark]

_____ and _____

| 0 | 1 | . | 7 | Name a common ancestor of Triceratops and Leptoceratops.

[1 mark]

_____

| 0 | 1 | . | 8 | How does the fossil record provide evidence for Darwin's theory of evolution?

[1 mark]

Tick **one** box.

Dinosaurs became extinct 65 million years ago. ☐

Fossils have been found in most countries of the world. ☐

Older fossils have a simpler structure. ☐

Trilobites belong to the arthropod group of animals. ☐

8

Turn over for the next question

Turn over ▶

There are no questions printed on this page

**DO NOT WRITE ON THIS PAGE
ANSWER IN THE SPACES PROVIDED**

0 2 This question is about reproduction.

0 2 . 1 Complete the sentences.

Choose answers from the box.

[5 marks]

asexual	**clones**	**eggs**	**gametes**
meiosis	**mitosis**	**sexual**	**variation**

Identical offspring are produced by _____ reproduction.

These offspring are called _____ .

In another form of reproduction male and female _____
join at fertilisation.

This leads to _____ in the offspring.

The embryo grows by a type of cell division called _____ .

0 2 . 2 The body cells of a kangaroo have 16 chromosomes.

How many chromosomes will an egg cell of a kangaroo have?

[1 mark]

Tick **one** box.

4 ☐   8 ☐   16 ☐   32 ☐

0 2 . 3 Which sex chromosomes will be in the body cells of a male kangaroo?

[1 mark]

Tick **one** box.

XX ☐   XZ ☐   XY ☐   YZ ☐

Question 2 continues on the next page

Turn over ▶

Different species of animal have different numbers of chromosomes in their body cells.

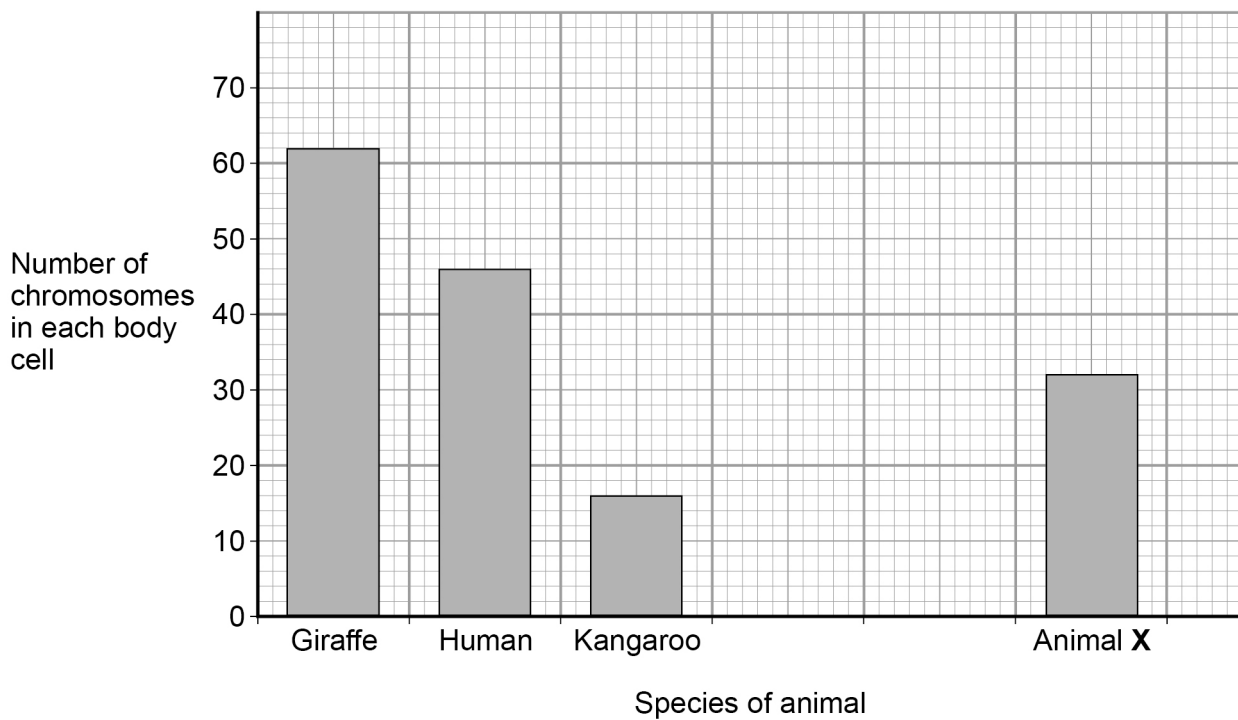**Table 1** shows the chromosome number of some species.

Table 1

Species of animal	Number of chromosomes in each body cell
Giraffe	62
Human	46
Kangaroo	16
Snail	24
Zebra fish	50

| 0 | 2 |. | 4 | Plot the data from **Table 1** for the snail and for the zebra fish on **Figure 3**.

[2 marks]

Figure 3

Number of chromosomes in each body cell

Species of animal

0 2 . 5 Look at **Figure 3**.

How many more chromosomes are there in the body cells of giraffes than in the body cells of animal **X**?

[1 mark]

Number of chromosomes = _____

0 2 . 6 A student concluded:

'the bigger an animal, the more chromosomes it has in each body cell.'

This is **not** a valid conclusion.

Give **one** reason why.

[1 mark]

_____

_____

___
11

Turn over for the next question

Turn over ▶

0 3 In 2017, the city of Manchester began a 'City of Trees' project.

The city council intend to plant 3 million trees over the next 25 years.

The trees will be planted:

- to make woodlands larger
- to make new woodlands
- in parks, streets and in people's gardens.

0 3 . 1 How will the trees benefit **the people** living in Manchester?

[2 marks]

Tick **two** boxes.

By dropping leaves on the streets in autumn. ☐

By hiding the road signs. ☐

By helping people relax in outdoor spaces ☐

By putting soot in the air. ☐

By reducing the noise pollution. ☐

| 0 | 3 |.| 2 | How will the trees benefit **the environment** in Manchester?

[2 marks]

Tick **two** boxes.

By giving more space for car parks. ☐

By hiding old buildings. ☐

By making new habitats for plants and animals. ☐

By providing a resting place for migrating birds. ☐

By taking more oxygen out of the air. ☐

It was suggested that 360 000 trees should be planted in the first year.

| 0 | 3 |.| 3 | How many trees would still need to be planted in the remaining 24 years?

[1 mark]

Number of trees = _____

| 0 | 3 |.| 4 | If the council planted an equal number of trees in each remaining year how many would they plant each year?

[2 marks]

Number of trees per year = _____

Question 3 continues on the next page

Turn over ▶

The council says that planting new trees will increase biodiversity in the area.

0 3 . 5 What is the definition of biodiversity?

[1 mark]

Tick **one** box.

The arrival of new predators in an ecosystem. ☐

The evolution of new species by natural selection. ☐

The recycling of carbon in the environment. ☐

The variety of different species of organisms in an ecosystem. ☐

0 3 . 6 Suggest **one other** way the council could increase biodiversity in Manchester.
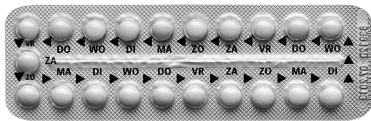
[1 mark]

_____

_____

9

0 4   Contraceptives are used to prevent pregnancy.

0 4 . 1   Draw **one** line from each contraceptive to the method of preventing pregnancy.

[3 marks]

Contraceptive device   **Method of preventing pregnancy**

Contains hormones to stop eggs maturing

Prevents the sperm reaching the egg

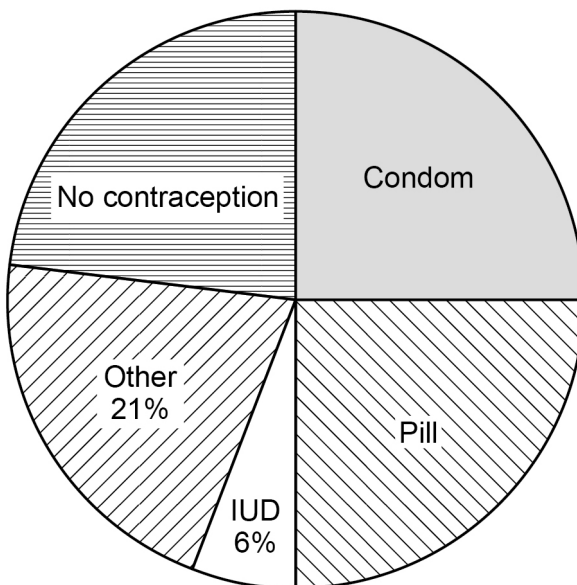Kills sperm

Slows down sperm production

Stops an embryo implanting in the uterus

Question 4 continues on the next page

Turn over ▶

Figure 4 shows the percentages of people who used different types of contraception in the UK in 2016.

The people are aged 16–49 years.

Figure 4

0 4 . 2 Determine the percentage of people who used no contraception.

[2 marks]

Percentage of people = _____ %

0 4 . 3 Suggest **two** reasons why a person aged 16–49 years might **not** be using contraception.

[2 marks]

1 _____

2 _____

Table 2 shows some information about three methods of contraception.

Table 2

Method	Effectiveness	Other information
Combined pill	99.5%	• Must be taken every day • Free from your GP or sexual health clinic • May cause headaches
Male condom	98.0%	• May split or leak • Only used when you have sexual intercourse • Inexpensive in supermarkets or free from a sexual health clinic
Sterilisation	100.0%	• Needs an operation in hospital • Usually cannot be reversed

| 0 | 4 |.| 4 | A man and a woman plan to start a family in 5 years' time.

Compare the risks and benefits for this couple of the three methods of contraception.

[4 marks]

Turn over for the next question

11

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ANSWER IN THE SPACES PROVIDED

0 5 This question is about ecology.

0 5 . 1 Give **two** abiotic (non-living) factors which will affect the growth of plants on a school playing field.

Give a reason why each factor will affect the growth of the plants.

[4 marks]

Abiotic factor 1 _____

Reason _____

_____

Abiotic factor 2 _____

Reason _____

_____

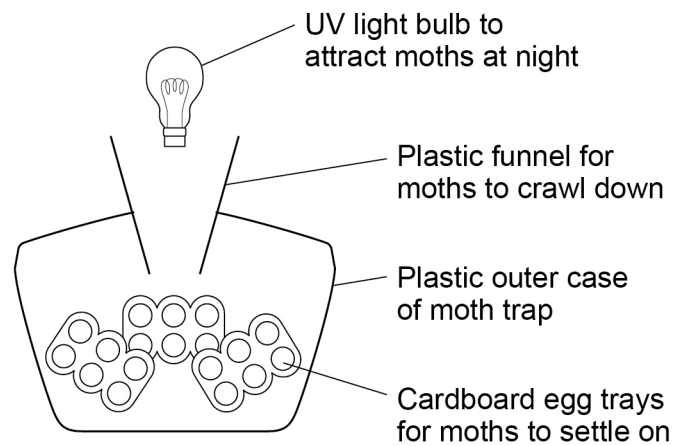**Question 5 continues on the next page**

Turn over ▶

Students were studying the ecology of their playing field.

They wanted to count the population of ruby tiger moths.

Figure 5 shows the moth trap they used.

Figure 5

This is the method used.

1. Set up the moth trap on the playing field.

2. Leave the trap for several days with the light on.

3. Take the trap to the laboratory and carefully remove the egg trays.

4. Count the number of ruby tiger moths.

5. Release the moths on the playing field.

0 5 . 2 The students needed other equipment to identify the ruby tiger moths.

What **two** other pieces of equipment did the students need?

[2 marks]

Tick **two** boxes.

Electron microscope ☐

Hand lens ☐

Moth guide ☐

Quadrat ☐

Tape measure ☐

0 5 . 3 Suggest **one** reason why the moths were counted in the laboratory.

[1 mark]

_____

0 5 . 4 Suggest **one** hazard in using the moth trap.

[1 mark]

_____

0 5 . 5 What precaution should the students take to minimise the hazard you suggested in Question **05.4**?

[1 mark]

_____

Question 5 continues on the next page

Turn over ▶

Figure 6 shows a caterpillar of the ruby tiger moth.

The head is sometimes bright orange in colour or there is a red stripe on the back.

Figure 6

| 0 | 5 |.| 6 | Give **one** reason why caterpillars of the ruby tiger moth have very few predators.

[1 mark]

_____

_____

10

0 6 This question is about the human nervous system.

0 6 . 1 A ball is thrown towards a boy.

As the ball is thrown, information passes along a pathway to allow the boy to catch the ball.

Draw **one** line from each action to the correct part of the pathway.

[3 marks]

Action	**Part of the pathway**
	Coordinator
Retina cells in the eye detect the light from the ball	Effector
The impulse reaches the brain which 'sees' the ball and sends an impulse to the arm muscle	Response
The muscle in the arm contracts	Receptor
The arm stretches to catch the ball	Stimulus

Question 6 continues on the next page

Turn over ▶

Students in a college made this hypothesis:

'reaction time will increase as the time you have been awake increases.'

The students set up an investigation to test their hypothesis.

This is the method used.

1. Find 5 volunteers willing to stay awake for 24 hours.

2. Keep the volunteers in a room where they can study, use an exercise bike or watch TV as they wish.

3. Provide food, water, coffee and tea as requested.

4. Measure the volunteers' reaction time every 4 hours using a computer program.

0 6 . 2 What was the independent variable in this investigation?

[1 mark]

_____

The students used a computer program to test reaction time.

0 6 . 3 Describe one **other** method that can be used to measure reaction time.

[3 marks]

_____

_____

_____

_____

_____

0 6 . 4 Which method would you choose to use at your school?

Tick **one b**ox.

Computer program ☐

Method described in Question **06.3** ☐

Give **one** reason for your choice.

[1 mark]

_____

_____

Question 6 continues on the next page

Turn over ▶

Table 3 shows the students' results.

Table 3

Time awake in hours	Reaction time in seconds					
	Volunteer					Mean
	A	**B**	**C**	**D**	**E**	
0	0.25	0.33	0.35	0.21	0.27	0.28
4	0.20	0.30	0.31	0.19	0.26	0.25
8	0.21	0.28	0.33	0.20	0.27	0.26
12	0.26	0.40	0.58	0.22	0.30	0.35
16	0.44	0.49	0.83	0.27	0.75	**X**
20	0.64	0.55	1.11	0.39	1.40	0.82
24	0.92	0.61	1.15	0.45	1.35	0.90

`0` `6` . `5` Calculate value **X** in **Table 3**.

Give your answer to 2 significant figures.

[2 marks]

_____

_____

X = _____ seconds

`0` `6` . `6` Describe the pattern of results for mean reaction time as the time awake increases.

[2 marks]

_____

_____

_____

_____

0 6 . 7 Do these results support the students' hypothesis: 'reaction time will increase as the time you have been awake increases'?

Give **one** reason for your answer.

[1 mark]

_____

_____

0 6 . 8 Give **two** ways the students could improve their investigation to make it more valid.

[2 marks]

1 _____

_____

2 _____

_____

15

Turn over for the next question

Turn over ▶

0 7 Some animals are adapted to survive in very cold conditions such as the Arctic.

Explain how the adaptations of Arctic animals help them to survive in cold conditions.

[6 marks]

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6

END OF QUESTIONS