

AQA

GCSE

Biology

SET B – Paper 2 Higher Tier

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Materials

Time allowed: 1 hour 45 minutes

For this paper you must have:

- a ruler
- a calculator.

Instructions

- 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.

Information

- There are 100 marks available on this paper.
- 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.
- When answering questions 03.3, 04.6 and 06.3 you need to make sure that your answer:
 - is clear, logical, sensibly structured
 - fully meets the requirements of the question
 - shows that each separate point or step supports the overall answer.

Advice

- In all calculations, show clearly how you work out your answer.

Name:

01 An ecosystem is the interaction of a community of living organisms with the non-living parts of their environment.

01.1 How is the **non-living** part of the environment described?

Tick **one** box.

Abiotic ☐

Biotic ☐

Dead ☐

Habitat ☐

[1 mark]

01.2 Name **two** resources that **plants** compete for.

1.

2. [2 marks]

01.3 Name **two** resources that **animals** compete for.

1.

2. [2 marks]

01.4 Within a community each species depends on other species to help it survive.

If one species is removed it can affect the whole community.

How is this described?

..... [1 mark]

01.5 Explain the term 'a **stable community**'.

[2 marks]

01.6 Biological material eventually dies and decays.

What does **anaerobic** decay produce?

Tick **one** box.

Carbon dioxide ☐

Ethane ☐

Lactic acid ☐

Methane ☐

[1 mark]

01.7 Microorganisms return carbon dioxide to the atmosphere.

Which material do they return to the soil?

[1 mark]

Turn over >

02 The human body reacts to changes by coordinating a **nervous** response or a **hormonal** response.

02.1 Compare the body’s nervous response with a hormonal response.

[4 marks]

02.2 In **Scientific Study A**, reaction times were investigated after four volunteers had drunk alcohol.

A small can of beer contains about one unit of alcohol.

The results are shown in **Table 2.1**

Table 2.1

Volunteer	Reaction time in milliseconds (ms)					
	Units of alcohol	0.5	1.5	3.0	4.5	6.0
A		34	45	59	71	85
B		35	47	62	75	87
C		32	46	64	72	83
D		30	42	59	70	
Mean		33	45	61	72	84

Calculate the reaction time of volunteer D after 6.0 units of alcohol

Reaction time of volunteer D after 6.0 units of alcohol = [3 marks]

02.3 Use the results to describe how alcohol affects reaction time.

.....

.....

.....

[2 marks]

02.4 In **Scientific Study B**, a test was carried out on 2000 people of all ages.

Comment on the repeatability of **Scientific Studies A and B**.

.....

.....

[2 marks]

03 Type 2 diabetes is a serious condition.

In Type 2 diabetes the body’s cells no longer respond as effectively to control glucose concentration in the blood.

Look at **Table 3.1**

Table 3.1

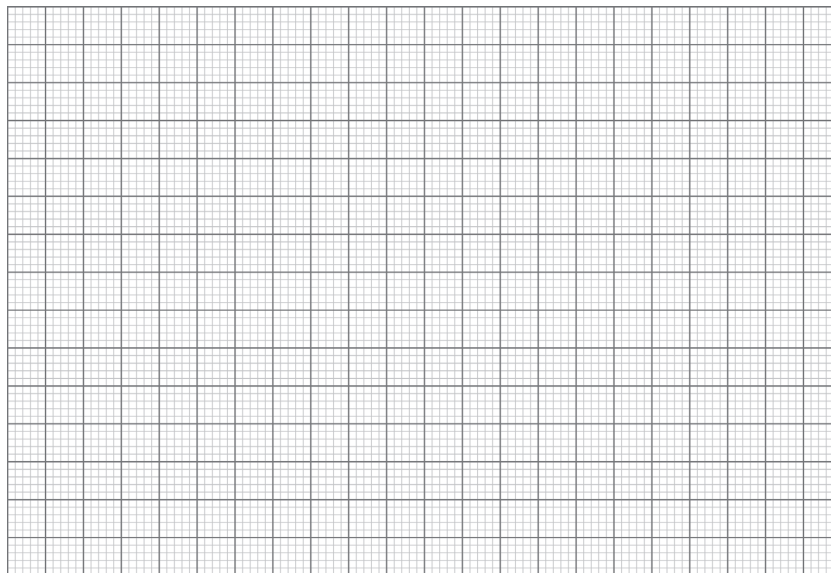
Year	Percentage (%) of the population who have Type 2 diabetes	Mean body mass in kg
1990	4.9	72.5
1991	5.0	73.0
1992	5.4	73.7
1993	4.7	74.0
1994	5.3	74.6
1995	5.5	75.0
1996	5.4	74.8
1997	6.2	75.3
1998	6.5	76.0
1999	6.9	76.6
2000	7.3	77.2

03.1 Use the data in **Table 3.1** to plot a graph to show the effect of body mass on percentage of the population who have Type 2 diabetes.

You do not need to use the Year column in **Table 3.1**.

Make sure to:

- choose an appropriate scale
- label both axes
- plot all points to show the pattern of results.



[4 marks]

03.2 Describe the relationship between the mean body mass of the population and the percentage of people who have **Type 2 diabetes**.

.....

.....

[1 mark]

Question 3 continues on the next page

03.3 If one person has Type 2 diabetes, and another person does not:

- explain how the negative feedback system in their bodies controls high levels of blood glucose concentration
- describe the differences in the blood glucose concentration of the two people after they have both eaten a full breakfast.

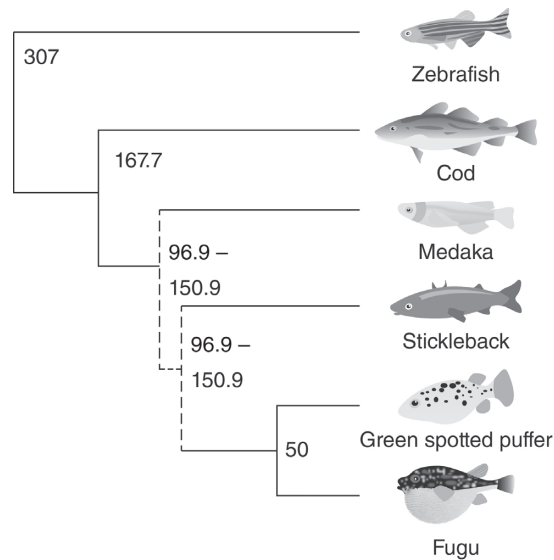
[6 marks]

04 Evolutionary trees are used by scientists to show how organisms are related.

Figure 4.1 shows an evolutionary tree.

The numbers on the branches of the evolutionary tree are the number of 'million years ago'.

Figure 4.1



04.1 Which fish is the most **distantly** related to the others?

Tick **one** box

- | | |
|----------------------|--------------------------|
| Cod | <input type="checkbox"/> |
| Fugu | <input type="checkbox"/> |
| Green spotted puffer | <input type="checkbox"/> |
| Medaka | <input type="checkbox"/> |
| Stickleback | <input type="checkbox"/> |
| Zebrafish | <input type="checkbox"/> |

[1 mark]

Question 4 continues on the next page

04.2 Which **two** fishes are most **closely** related?

Tick **two** boxes

Cod

☐

Fugu

☐

Green spotted puffer

☐

Medaka

☐

Stickleback

☐

Zebrafish

☐

[1 mark]

04.3 How long ago did the cod split from medaka and stickleback?

.....

[1 mark]

04.4 Suggest why there is only a **dotted** line between medaka and stickleback.

.....

.....

[1 mark]

04.5 Name **one** type of evidence that helps scientists construct evolutionary trees.

.....

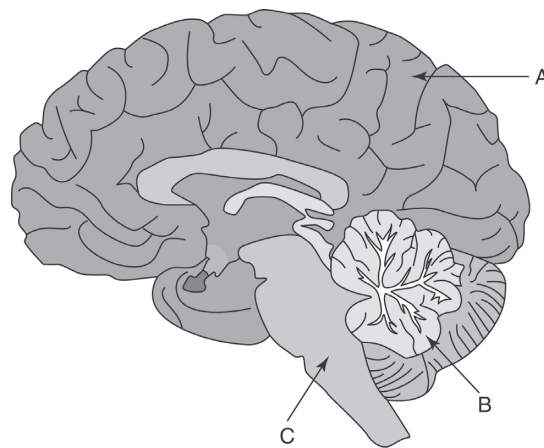
[1 mark]

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Turn over >

05 Figure 5.1 shows a section through a human brain.

Figure 5.1



05.1 What is the area labelled **A** on Figure 5.1?

Tick **one** box

- | | |
|-----------------|--------------------------|
| Cerebellum | <input type="checkbox"/> |
| Cerebral cortex | <input type="checkbox"/> |
| Medusa | <input type="checkbox"/> |
| Pituitary | <input type="checkbox"/> |

[1 mark]

05.2 What is the area labelled **B** on Figure 5.1?

Tick **one** box

- | | |
|-----------------|--------------------------|
| Cerebellum | <input type="checkbox"/> |
| Cerebral cortex | <input type="checkbox"/> |
| Hypothalamus | <input type="checkbox"/> |
| Medulla | <input type="checkbox"/> |

[1 mark]

05.3 What is the area labelled **C** on **Figure 5.1**?Tick **one** box

Medulla

☐

Medusa

☐

Optic nerve

☐

Spinal column

☐**[1 mark]****05.4** What is the function of area **A**, area **B** and area **C**?Give **one** example for each.**Area A**

Function:

Example:

Area B

Function:

Example:

Area C

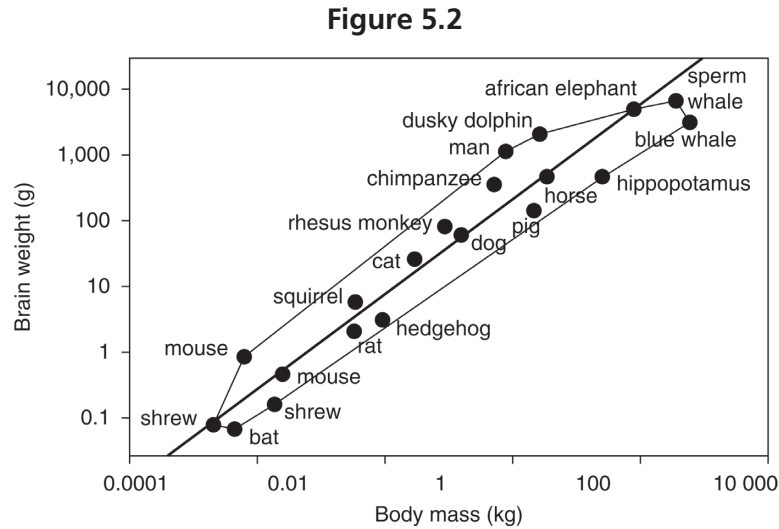
Function:

Example:

[6 marks]

Question 5 continues on the next page

05.5 Figure 5.2 shows the brain weight and body mass of animals.



Describe the relationship between the size of an animal and the size of its brain.

.....

.....

.....

.....

[2 marks]

05.6 Suggest **one** reason for this relationship.

.....

.....

[1 mark]

05.7 Suggest **one** reason why this relationship is not seen **within** a species.

.....

.....

[1 mark]

06 DNA contains four bases.

06.1 Which base does A (adenine) always pair with?

[1 mark]

06.2 How many bases code for a single amino acid?

[1 mark]

06.3 A disease called Leigh syndrome occurs when the process of protein synthesis is disrupted, causing the wrong protein to be made.

Explain how the process of protein synthesis might be disrupted in Leigh syndrome.

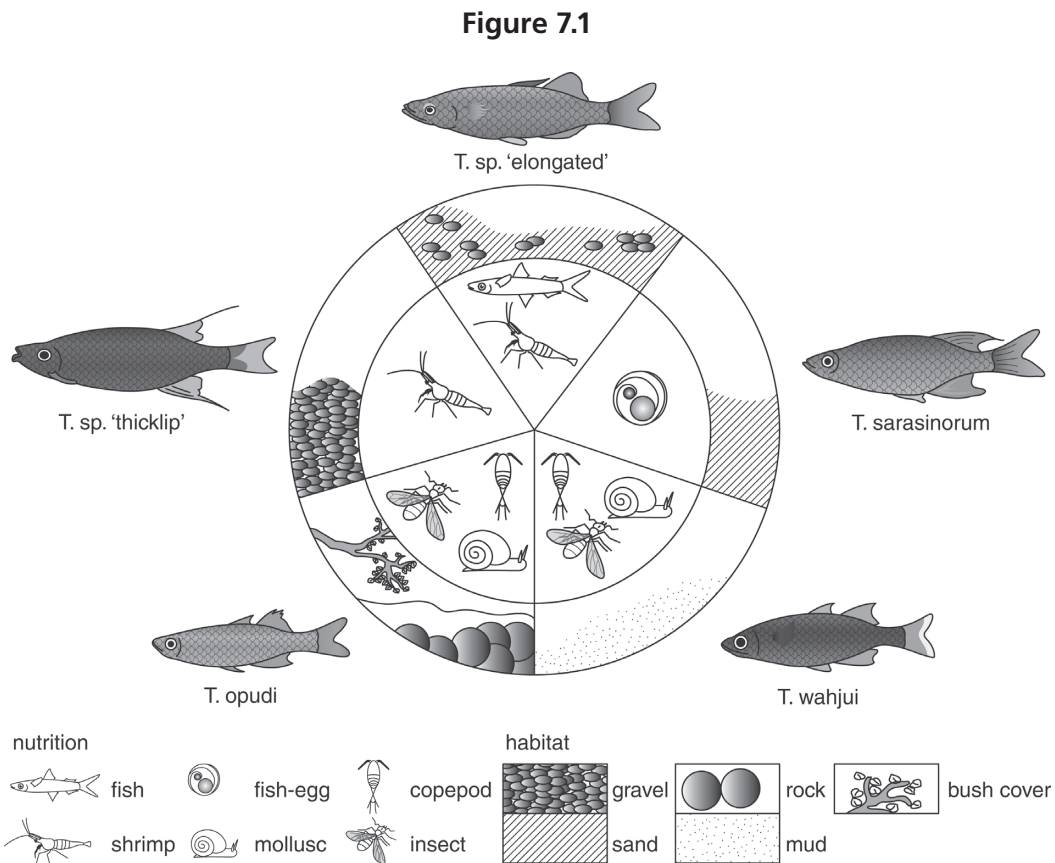
[6 marks]

Question 6 continues on the next page

06.4 Give **two** applications for our understanding of the human genome.

[2 marks]

07 Figure 7.1 shows five closely related species of fish, with their diets and habitats.



07.1 The copepods in this community are primary consumers.

Suggest what their diet may consist of.

[1 mark]

Question 7 continues on the next page

07.2 In one year, there was a huge increase in numbers of *T. sarasinorum*.

How would this affect the numbers of 'thicklip'?

Explain your answer.

[3 marks]

07.3 Explain why *T. opudi* and *T. wahjui* are **not** competitors, even though they have similar diets.

[2 marks]

07.4 Name a source of pollution that could affect the fish.

[1 mark]

07.5 Explain why pyramids of biomass are rarely higher than four organisms.

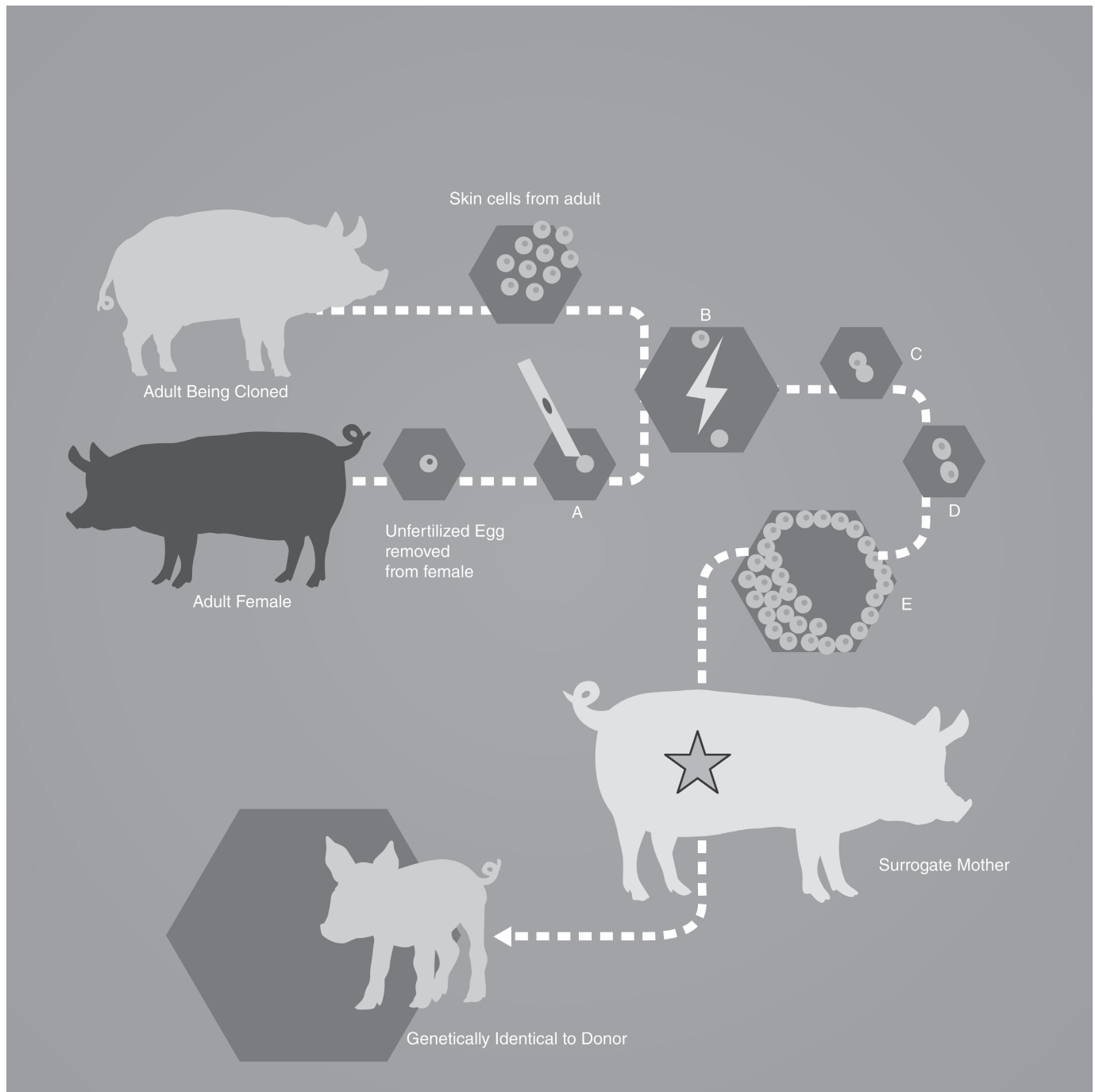
[3 marks]

08 In the year 2000, a litter of piglets was produced by cloning.

One of the piglets born was called Millie.

Figure 8.1 shows the cloning of Millie the piglet.

Figure 8.1



Question 8 continues on the next page

08.1 Look at **Figure 8.1**

Suggest labels to describe the cloning process at points **A**, **B**, **C**, **D** and **E**.

A

B

C

D

E

[5 marks]

08.2 In the year 2001, a kitten called Copy Cat was produced by cloning.

Copy Cat was genetically identical to the cloned cat, but the patterns on her fur were different.

Suggest a reason for this.

.....

[1 mark]

08.3 Name **two** different types of organism that naturally produce clones.

.....

.....

[2 marks]

08.4 Give **two** advantages of this method of reproduction.

.....

.....

[2 marks]

08.5 A gardener has been breeding roses in her garden.

She selects the roses with the biggest blossoms and most fragrant flowers to breed together, and pollinates them herself.

A farmer's cabbages suffer from white fly.

The farmer asks a local plant laboratory to create him a resistant breed of cabbage.

Describe the differences between the gardener's and the farmer's approaches to improving their plants.

[4 marks]

09.1 Explain the difference between **population size** and **population density**.

[2 marks]

09.2 Mr Green needs to assess the population of plantain on a 10 m wide path in a national park.

Figure 9.1 shows broadleaf plantain, which is a tough plant often found on footpaths.

Figure 9.1



Mr Green has a 25 cm² wire quadrat and a measuring tape.

He places the tape across the path, including the dense verges either side of the path.

What is the name of this line?

[1 mark]

09.3 Mr Green places the quadrat at the end of the line, in the verge.

He counts the number of whole plants in the quadrat and records the number.

How should Mr Green decide where to place the **next** quadrat along the line?

.....

.....

.....

[2 marks]

09.4 Mr Green samples along the line, until he reaches the other end.

The whole path is 500 m long.

Describe the steps Mr Green should follow so that he has statistical evidence for the distribution of plantain **along the length of the path**.

.....

.....

.....

.....

[3 marks]

09.5 Explain why there are likely to be more plantains in the **middle** of the path than at the edges.

.....

.....

[2 marks]

END OF QUESTIONS

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