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

H

Higher Tier
Biology Paper 2H

Time allowed: 1 hour 15 minutes

Materials

For this paper you must have:
- a ruler
- a scientific calculator.

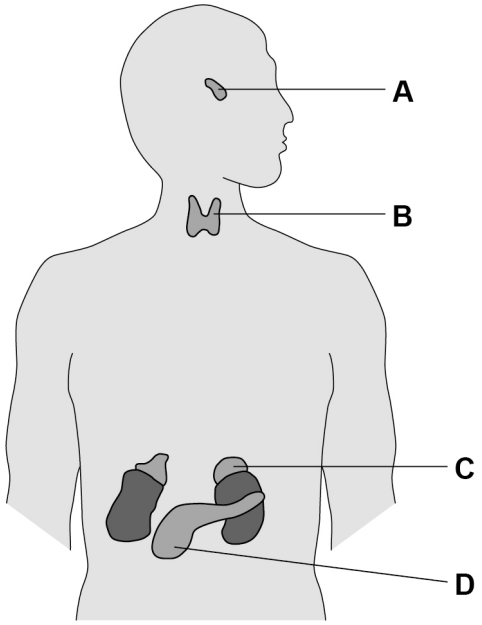
Instructions
- Use black ink or black ball-point pen.
- Pencil should only be used for drawing.
- Fill in the boxes at the top of this page.
- Answer **all** questions in the spaces provided.
- If you need extra space for your answer(s), use the lined pages at the end of this book. Write the question 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	
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.

0 1 **Figure 1** shows glands in the human body.

Figure 1



0 1 . 1 Which organ system includes the glands shown in **Figure 1**?

[1 mark]

0 1 . 2 Which gland produces insulin?

[1 mark]

Tick (✓) **one** box.

A ☐ **B** ☐ **C** ☐ **D** ☐

0 1 . 3 Which gland produces hormones that stimulate the other glands to produce hormones?

[1 mark]

Tick (✓) **one** box.

A ☐ **B** ☐ **C** ☐ **D** ☐

0 1 . 4 How do hormones travel from one gland to another gland?

[1 mark]

0 1 . 5 Name **two** glands involved in human reproduction.

Do **not** refer to glands shown on **Figure 1** in your answer.

[2 marks]

1 _____

2 _____

0 1 . 6 Ovulation test kits can help women know when they are most fertile.

Ovulation test kits detect the increase in the hormone that stimulates ovulation.

Which hormone is detected by ovulation test kits?

[1 mark]

Tick (✓) **one** box.

- Follicle stimulating hormone (FSH) ☐
- Luteinising hormone (LH) ☐
- Oestrogen ☐
- Progesterone ☐

0 1 . 7 A new contraceptive drug for men is being tested.

The drug:

- is given in one injection
- stops sperm being able to fertilise eggs
- is effective for up to 13 years.

Evaluate the use of the new drug compared with existing contraceptive methods.

[6 marks]

13

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Turn over for the next question

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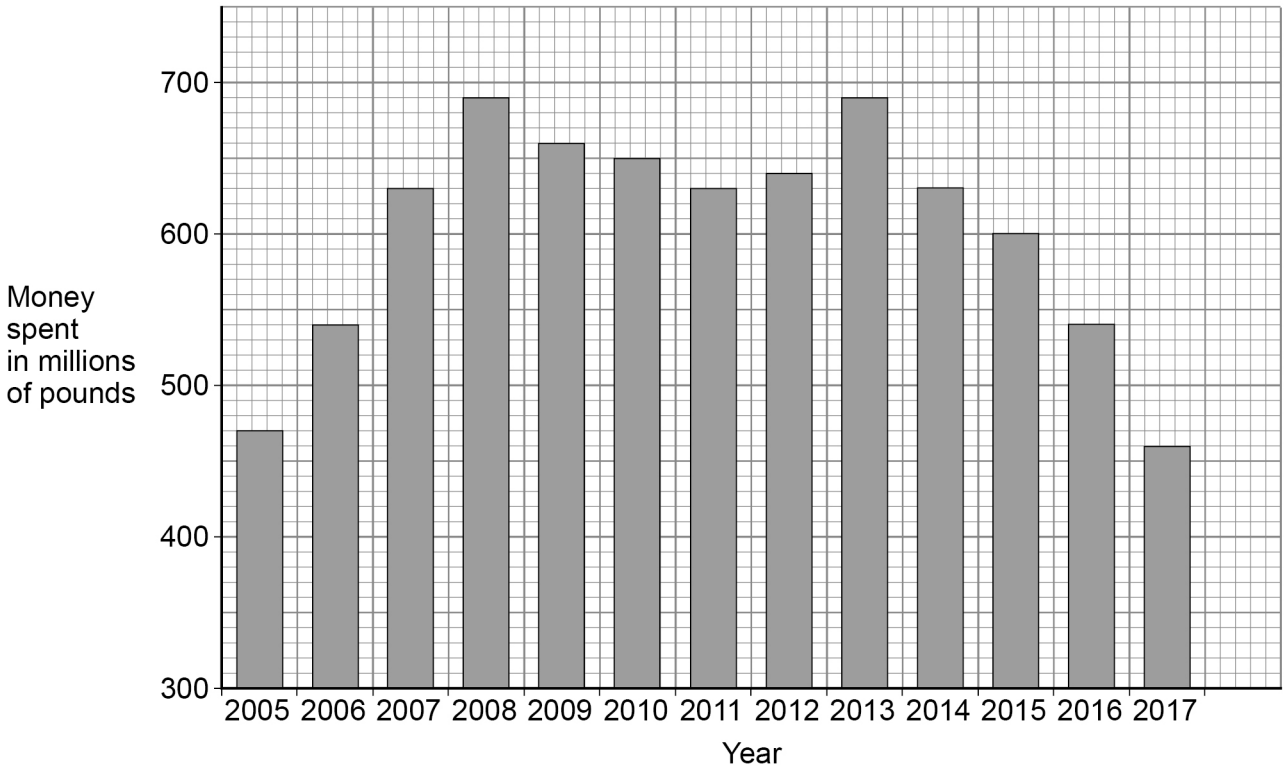
ANSWER IN THE SPACES PROVIDED

0 2 **Figure 2** shows the money spent on conserving biodiversity in the UK by the government.

Figure 2



0 2 . 1 Describe the trends in the money spent on conserving biodiversity from 2005 to 2011.

Use data from **Figure 2** in your answer.

[2 marks]

0 2 . 2 Calculate the percentage decrease in the money spent on conserving biodiversity from 2013 to 2017.

Use the equation:

$$\text{percentage decrease} = \frac{\text{change in money spent from 2013 to 2017}}{\text{money spent in 2013}} \times 100$$

Give your answer to 2 significant figures.

[3 marks]

Percentage decrease (2 significant figures) = _____ %

0 2 . 3 Conservation of peat bogs can help maintain biodiversity.

Give **two** uses of peat taken from peat bogs.

[2 marks]

1 _____

2 _____

Question 2 continues on the next page

0 2 . 4 Describe **two** ways to **increase** biodiversity in the UK.

Do **not** refer to money spent or to peat in your answer.

[2 marks]

1 _____

_____

2 _____

_____

9

0 3 A fossil was found in rocks. The rocks were formed from mud.

The fossil is of the fungus *Ourasphaira giraldae.*

0 3 . 1 What is the genus of the fungus?

[1 mark]

0 3 . 2 Why was the mud important during the formation of the fossil?

[1 mark]

Tick (✓) **one** box.

The fungus completely decayed in the mud. ☐

The mud stopped oxygen reaching the fungus. ☐

There was water in the mud around the fungus. ☐

Question 3 continues on the next page

The estimated age of the fossil is in the range from 8.9×10^8 years old to 1.1×10^9 years old.

0 3 . 3 Calculate the size of the range of the estimated age of the fossil.

[1 mark]

Size of range = _____ years

0 3 . 4 Humans did **not** exist when the fungus was alive.

Suggest **one** other reason why an accurate estimation of when this species of fungus existed is not known.

[1 mark]

Carl Woese developed the three-domain system of classification.

0 3 . 5 Fungi are **not** in the domain Archaea.

Which domain are fungi classified in?

[1 mark]

0 3 . 6 Which **two** characteristics are features of organisms in the domain Archaea?

[2 marks]

Tick (✓) **two** boxes.

Can only survive in light ☐

Can survive in extreme environments ☐

Cells contain chloroplasts ☐

Cells do not have a cell wall ☐

Cytoplasm contains DNA ☐

0 3 . 7 Carl Linnaeus lived in the 1700s.

Carl Linnaeus classified living things into groups depending on their appearance.

Give **three** types of evidence that are used **now** to classify living things.

Do **not** refer to appearance in your answer.

[3 marks]

1 _____

_____

2 _____

_____

3 _____

_____

10

Turn over for the next question

0 4 **Figure 3** shows one species of bird on a bird feeder.

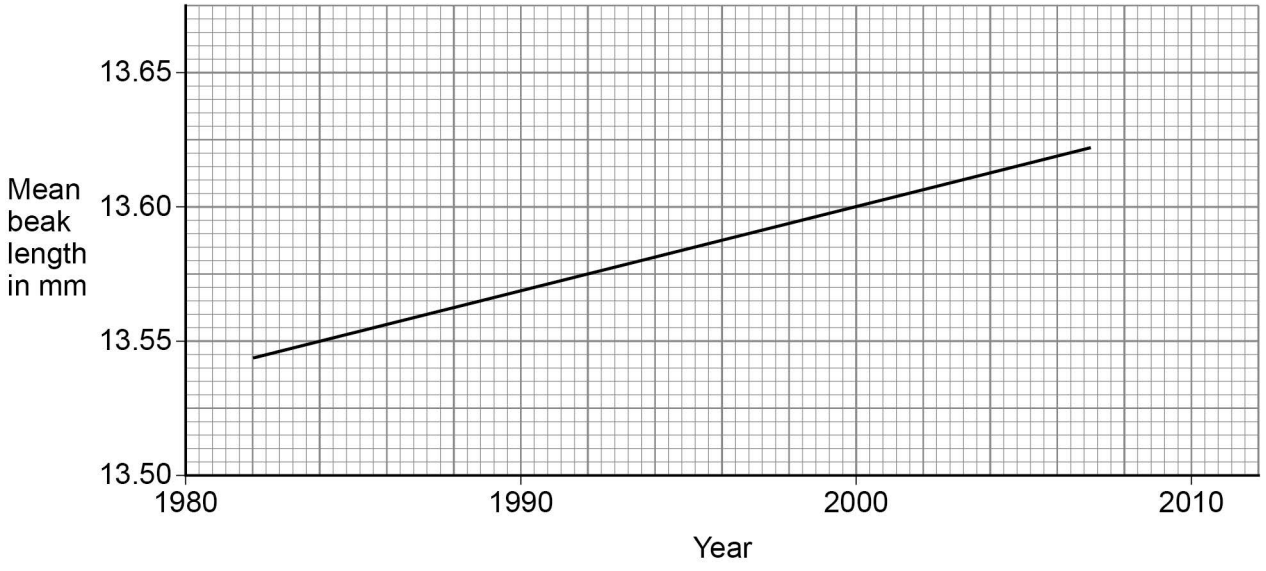
Figure 3

The birds use their beaks to reach nuts inside the bird feeder.

Figure 4 shows the mean beak length of this species of bird in the UK.

This species of bird often visits bird feeders.

Figure 4



0 4 . 1 Determine the rate of change in beak length from 1984 to 2000.

Use **Figure 4**.

[3 marks]

Rate of change = _____ mm/year

0 4 . 2 Explain the process of evolution that could cause the trend in **Figure 4**.

[6 marks]

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0 4 . 3 Birds of this species:

- live for about 3 years
- produce up to 24 eggs every year.

Explain why evolution is easier to study in this species of bird than in humans.

[3 marks]

0 4 . 4 Birds of this species are found in different parts of the world.

Describe evidence that would show two individual birds are the same species.

[3 marks]

15

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0 5 Caffeine is a drug that decreases reaction time.

A group of sixteen students investigated the effect of caffeine on reaction time.

The students were all 15-year-old girls.

The group was divided into 8 pairs of students.

This is the method used.

1. Student **A** starts two stopwatches at the same time.
2. Student **A** then gives one of the stopwatches to Student **B**.
3. Student **A** says "stop" at the same time as stopping her stopwatch. Student **B** stops her stopwatch as quickly as possible after Student **A** says "stop".
4. The difference in time shown on the two stopwatches is recorded. This is the reaction time of Student **B**.
5. Student **B** drinks a caffeinated drink.
6. The students wait 15 minutes and then repeat steps 1 to 4.

0 5 . 1 Suggest **one** control variable the students should have used in the investigation.

Do **not** refer to age or sex in your answer.

[1 mark]

0 5 . 2 Suggest **two** sources of random error when using this method to measure a person's reaction time.

[2 marks]

1 _____

_____

_____

2 _____

_____

_____

Question 5 continues on the next page

Table 1 shows the results.

Table 1

Student pair	Decrease in reaction time after drinking the caffeinated drink in seconds
1	0.039
2	0.021
3	0.027
4	0.041
5	0.022
6	0.036
7	0.024
8	0.097

0 5 . 3 Why can a mode **not** be determined for the data in **Table 1**?

[1 mark]

0 5 . 4 The students decided the result from pair **8** was anomalous.

The students calculated that the mean decrease in reaction time was 0.030 seconds.

Describe how the students calculated the mean decrease in reaction time.

[1 mark]

0 5 . 5 Caffeine causes the release of adrenaline.

Adrenaline affects heart rate.

Explain how the effect of adrenaline on heart rate might cause reaction time to decrease.

[4 marks]

Question 5 continues on the next page

Adenosine is a different chemical made by the body.

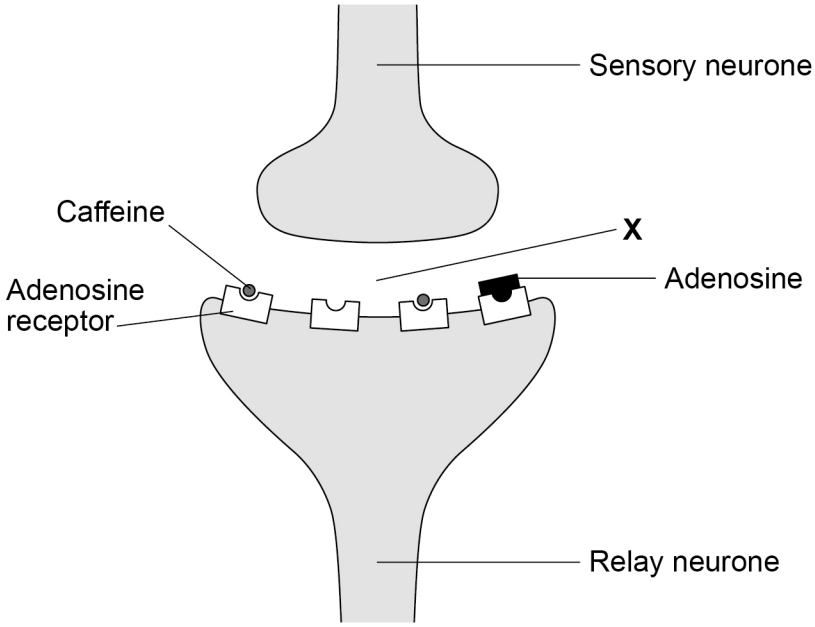
Adenosine binds to receptors on relay neurones.

Adenosine decreases the number of impulses in relay neurones.

Figure 5 shows how caffeine binds to adenosine receptors on a relay neurone.

When caffeine binds to adenosine receptors it blocks the receptor so adenosine cannot bind.

Figure 5



0 5 . 6 Label **X** shows the gap between the sensory neurone and the relay neurone.

What is the name of the gap labelled **X**?

[1 mark]

Do not write outside the box

0 5 . 7 Suggest why reaction time decreases when caffeine binds to adenosine receptors.

[2 marks]

12

Turn over for the next question

0 6 This question is about genetic disorders.

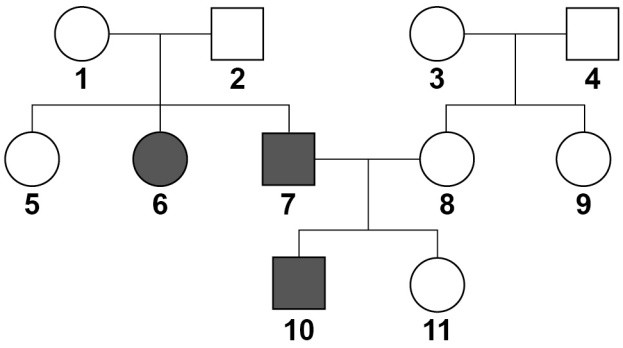
0 6 . 1 Some people are heterozygous for a genetic disorder.

Define the term 'heterozygous'.

[1 mark]

0 6 . 2 **Figure 6** shows the inheritance of a genetic disorder in a family.

Figure 6



Key

Female who does **not** have the disorder

Male who does **not** have the disorder

Female who has the disorder

Male who has the disorder

Person **7** and person **8** plan to have another child.

Determine the probability that the child will be a **male** who has the disorder.

You should:

- draw a Punnett square diagram
- identify the genotype of person **7** and the genotype of person **8**
- identify the phenotype of each offspring genotype
- use the symbols:

  H = dominant allele

  h = recessive allele

[6 marks]

Probability of having a male child with the disorder = _____

Question 6 continues on the next page

0 6 . 3 Polydactyly is a different inherited disorder.

Two parents do **not** have any alleles for polydactyly in their ordinary body cells.

These parents produced a child with polydactyly.

Explain how polydactyly suddenly occurred in this family.

[4 marks]

END OF QUESTIONS

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