A

AQA

Surname _____

Other Names _____

Centre Number _____

Candidate Number _____

Candidate Signature _____

I declare this is my own work.

GCSE

COMBINED SCIENCE: TRILOGY

F

Foundation Tier

Biology Paper 2F

8464/B/2F

Time allowed: 1 hour 15 minutes

At the top of the page, write your surname and other names, your centre number, your candidate number and add your signature.

[Turn over]

JUN218464B2F01

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.**
- **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.**

DO NOT TURN OVER UNTIL TOLD TO DO SO

0 1

A human body cell contains 46 chromosomes.

0 1 . 1

How many chromosomes does a human sperm cell contain? [1 mark]

Tick (✓) ONE box.

- ☐ **22**
- ☐ **23**
- ☐ **46**

0 1 . 2

Draw ONE line from each word to the meaning of that word. [3 marks]

WORD	MEANING
	A small ring of DNA in the cytoplasm
Gene	All the genetic material of an organism
Genome	A small section of DNA which codes for a protein
Nucleus	A structure which contains chromosomes

Some plants contain a harmful chemical called PTC.

Some people can taste PTC.

0 1 . 3

Suggest ONE advantage of being able to taste PTC.
[1 mark]

Only people with a dominant allele T can taste PTC.

People with ONLY the allele t cannot taste PTC.

0 1 . 4

A person has the genotype Tt.

What word describes the person's genotype? [1 mark]

Tick (✓) ONE box.

- ☐ **Heterozygous**
- ☐ **Phenotype**
- ☐ **Recessive**

0 1 . 5

Give the genotype of a person who CANNOT taste PTC. [1 mark]

_____

_____

0 1 . 6

A woman and a man plan to have a child.

The woman and the man both have the genotype Tt.

Complete FIGURE 1 to show the possible genotypes of the child. [2 marks]

FIGURE 1

		WOMAN	
		T	**t**
MAN	**T**	**T T**	
	t		

0 1 . 7

What is the chance of the child being able to taste PTC?

Use FIGURE 1. [1 mark]

Tick (✓) ONE box.

- ☐ **25%**
- ☐ **50%**
- ☐ **75%**
- ☐ **100%**

[Turn over]

10

0 2

Caffeine is a drug that affects reaction time.

Coffee is a drink that contains caffeine.

Five students investigated the effect of drinking coffee on their reaction time.

Each student sat in front of a computer screen showing a reaction timer.

This is the method used.

1. **Press any key on the keyboard when the colour of the screen changes to green.**
2. **Record the reaction time shown on the computer screen.**
3. **Drink coffee containing caffeine.**
4. **Wait 15 minutes then repeat steps 1 and 2.**

0 2 . 1

What is the dependent variable in the investigation?
[1 mark]

Tick (✓) ONE box.

☐ **The coffee containing caffeine**

☐ **The number of students**

☐ **The reaction time**

[Turn over]

0 2 . 2

Give TWO control variables the students should have used. [2 marks]

1 _____

_____

_____

2 _____

_____

_____

0 2 . 3

Why did the students wait 15 minutes after drinking the coffee before repeating the test? [1 mark]

_____

_____

_____

0 2 . 4

Responding to the colour change of the screen involves a receptor in the student.

Where is the receptor in the student? [1 mark]

Tick (✓) ONE box.

☐ **Ear**

☐ **Eye**

☐ **Skin**

[Turn over]

0 2 . 5

Responding to the colour change of the screen involves an effector in the student.

What is the effector in the student? [1 mark]

Tick (✓) ONE box.

- ☐ **Brain**
- ☐ **Gland**
- ☐ **Muscle**
- ☐ **Spinal cord**

TABLE 1 shows the results.

TABLE 1

Student	Reaction time in milliseconds	
	Before drinking coffee	After drinking coffee
1	385	255
2	420	291
3	285	265
4	871	259
5	463	247

0 2 . 6

What is the effect of drinking coffee on reaction time?

Use TABLE 1. [1 mark]

0 2 . 7

Which student had the smallest change in reaction time after drinking coffee? [1 mark]

Tick (✓) ONE box.

- ☐ **Student 1**
- ☐ **Student 2**
- ☐ **Student 3**
- ☐ **Student 4**
- ☐ **Student 5**

0 2 . 8

The students decided that one of the results was anomalous.

What should the students do with the anomalous result when calculating the mean change in reaction time?
[1 mark]

_____

_____

_____

[Turn over]

9

0 3

FIGURE 2 shows one species of bird on a bird feeder.

FIGURE 2

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

Cats sometimes eat the birds.

0 3 . 1

Give the food chain for the birds, cats and nuts.
[2 marks]

0 3 . 2

Which organism in the food chain you gave in Question 03.1 is the primary consumer? [1 mark]

[Turn over]

0 3 . 3

Cats are one biotic factor that affects the size of the bird population.

Which TWO of the following are BIOTIC factors?
[2 marks]

Tick (✓) TWO boxes.

- ☐ **Food**
- ☐ **Pathogens**
- ☐ **Sunlight**
- ☐ **Temperature**
- ☐ **Water**

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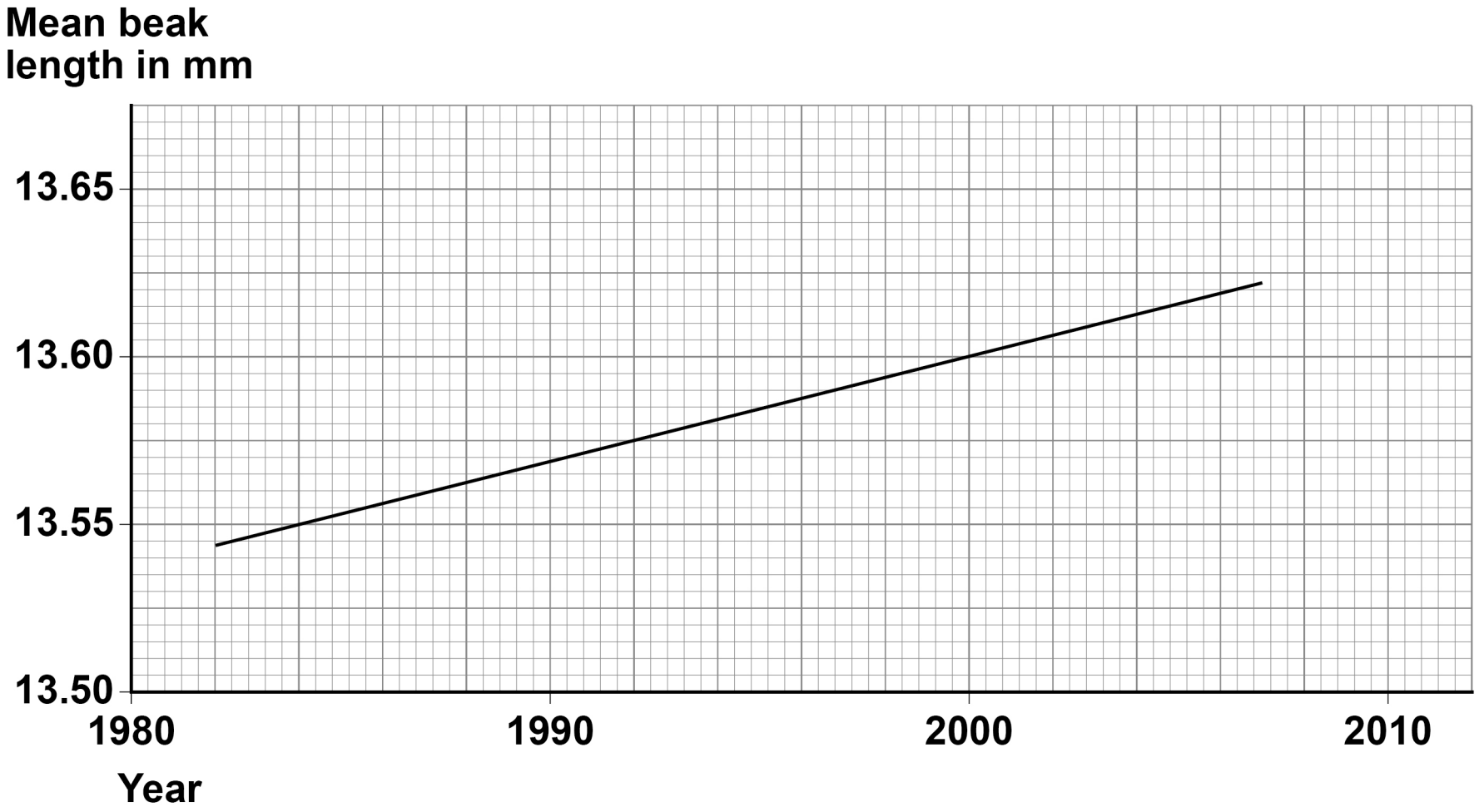
[Turn over]

FIGURE 3 shows the mean beak length of this species of bird from 1982 to 2007.

FIGURE 3



0 3 . 4

What was the mean beak length in 2000? [1 mark]

Mean beak length = _____ mm

0 3 . 5

What type of adaptation is beak length? [1 mark]

Tick (✓) ONE box.

- ☐ **Behavioural**
- ☐ **Chemical**
- ☐ **Structural**

[Turn over]

FIGURE 3, on page 22, shows evidence of evolution in this species of bird.

0 3 . 6

Scientists have concluded that beak length in this species of bird is increasing.

Complete the sentences about the evolution of this species of bird.

Choose answers from the list. [4 marks]

- **excretion**
- **generation**
- **mutation**
- **reproduction**
- **respiration**
- **variation**

The difference in beak length in the bird population

is called _____ .

A change in a gene affects the beak length.

Change in a gene is called _____ .

The birds with the longest beaks get more food.

Getting more food improves a bird's chances of survival and _____ .

This process of evolution takes place over more than one _____ .

[Turn over]

0 3 . 7

Birds of this species:

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

Why is evolution easier to study in birds than in humans? [1 mark]

Tick (✓) ONE box.

☐ **Birds breed less frequently than humans.**

☐ **Birds have a shorter life cycle than humans.**

☐ **Birds have fewer offspring than humans.**

0 3 . 8

Bacteria also provide evidence for evolution.

Which statement describes evidence for evolution?
[1 mark]

Tick (✓) ONE box.

☐ **Bacteria can become resistant to antibiotics.**

☐ **Decomposition can be caused by bacteria.**

☐ **Some bacteria are pathogens.**

[Turn over]

13

0 4

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

The fossil is of the fungus 'Ourasphaira giraldae'.

0 4 . 1

What is the genus of the fungus? [1 mark]

Tick (✓) ONE box.

- ☐ **Giraldae**
- ☐ **Ourasphaira**
- ☐ **Ourasphaira giraldae**

0 4 . 2

The mud around the fungus did NOT contain oxygen.

Which process did the mud around the fungus prevent? [1 mark]

Tick (✓) ONE box.

- ☐ **Decay**
- ☐ **Geological activity**
- ☐ **Photosynthesis**

[Turn over]

0 4 . 3

The fossilised fungus is estimated to be 890 000 000 years old.

What is 890 000 000 in standard form? [1 mark]

Tick (✓) ONE box.

- ☐ 8.9×10^6
- ☐ 8.9×10^7
- ☐ 8.9×10^8
- ☐ 8.9×10^9

0 4 . 4

Traditional classification divided organisms into kingdoms.

Who developed the traditional system of classification? [1 mark]

Tick (✓) ONE box.

- ☐ **Carl Linnaeus**
- ☐ **Carl Woese**
- ☐ **Charles Darwin**

[Turn over]

0 4 . 5

More recent classification methods use a three-domain system.

What is the name of the domain the fungus 'Ourasphaira giraldae' is classified in? [1 mark]

Tick (✓) ONE box.

- ☐ **Bacteria**
- ☐ **Eukaryota**
- ☐ **Plants**

0 4 . 6

Why has classification changed over time? [1 mark]

Tick (✓) ONE box.

- ☐ **Electron microscopes allow more detail to be seen inside cells.**
- ☐ **Many more types of organisms have become extinct.**
- ☐ **Some fossils are buried so deep that they may never be discovered.**

[Turn over]

0 4 . 7

The fungus ‘Ourasphaira giraldae’ is now extinct.

Give TWO possible causes of extinction. [2 marks]

1 _____

_____

_____

2 _____

_____

_____

8

0 5

Increased carbon dioxide levels in the atmosphere contribute to climate change.

0 5 . 1

Give ONE way deforestation can increase carbon dioxide levels in the atmosphere. [1 mark]

0 5 . 2

Name ONE other gas that contributes to climate change.

Do NOT refer to carbon dioxide in your answer. [1 mark]

[Turn over]

0 5 . 3

Meat is produced for humans to eat.

Give TWO ways the production of meat releases carbon dioxide. [2 marks]

1 _____

_____

_____

2 _____

_____

_____

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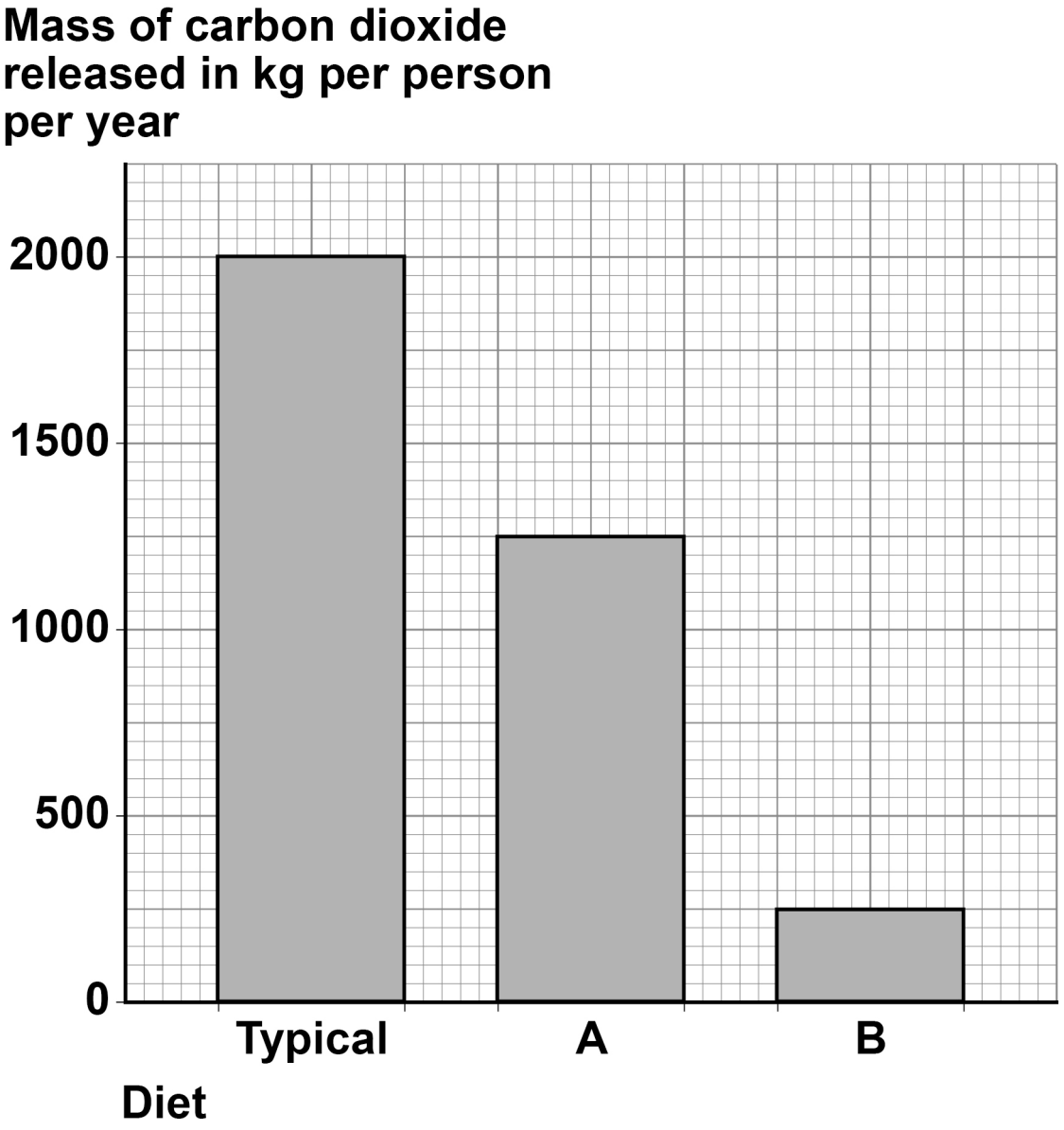
[Turn over]

0 5 . 4

The mass of carbon dioxide released during the production of food varies depending on the type of food.

FIGURE 4 shows the mass of carbon dioxide released as a result of three different diets.

FIGURE 4



Compare the mass of carbon dioxide released as a result of the three diets shown in FIGURE 4.

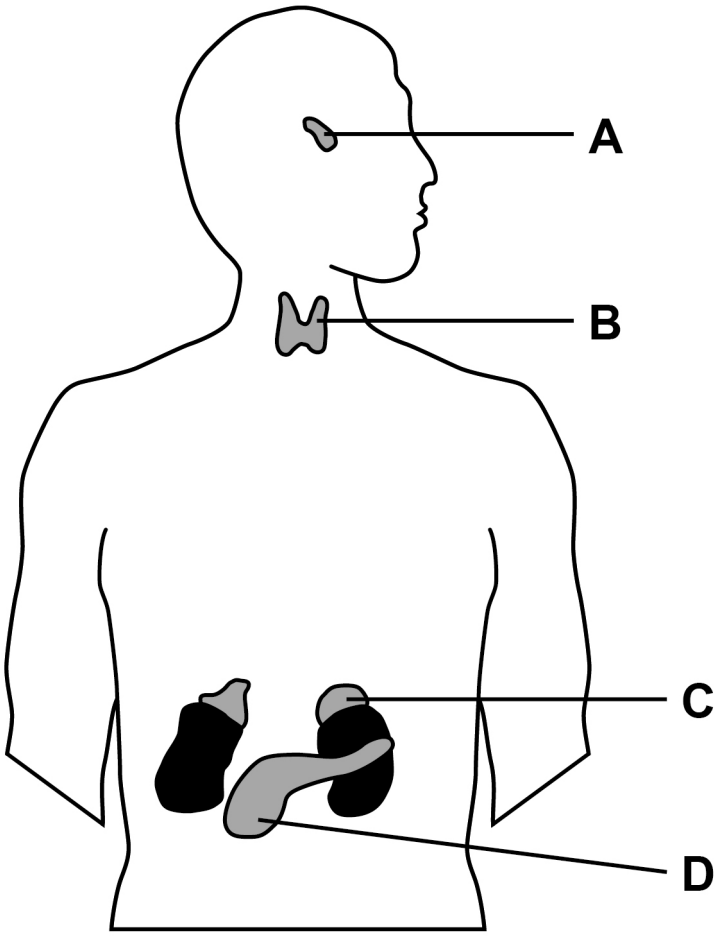
Use data from FIGURE 4 in your answer. [4 marks]

8

0 6

FIGURE 5 shows glands in the human body.

FIGURE 5



0 6 . 1

Which organ system includes the glands shown in FIGURE 5? [1 mark]

0 6 . 2

Which gland produces insulin? [1 mark]

Tick (✓) ONE box.

☐ **A**

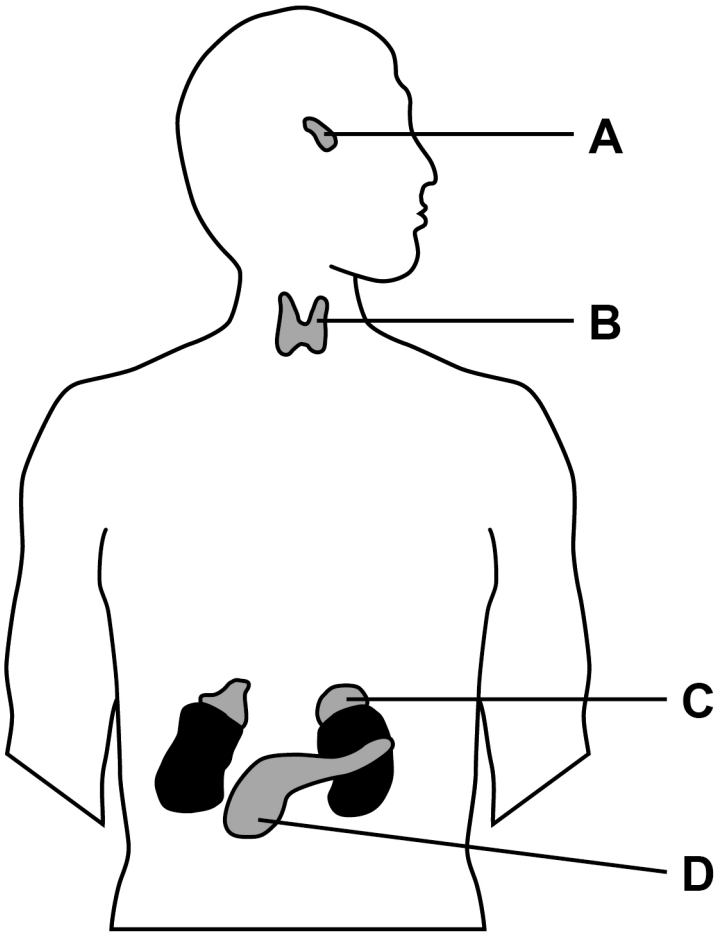
☐ **B**

☐ **C**

☐ **D**

[Turn over]

REPEAT OF FIGURE 5



0 6 . 3

Which gland produces hormones that stimulate the other glands to produce hormones? [1 mark]

Tick (✓) ONE box.

☐ **A**

☐ **B**

☐ **C**

☐ **D**

[Turn over]

0 6 . 4

How do hormones travel from one gland to another gland? [1 mark]

0 6 . 5

Name TWO glands involved in human reproduction.

Do NOT refer to glands shown on FIGURE 5, on page 42, in your answer. [2 marks]

1

2

0 6 . 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**

[Turn over]

0 6 . 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

0 7

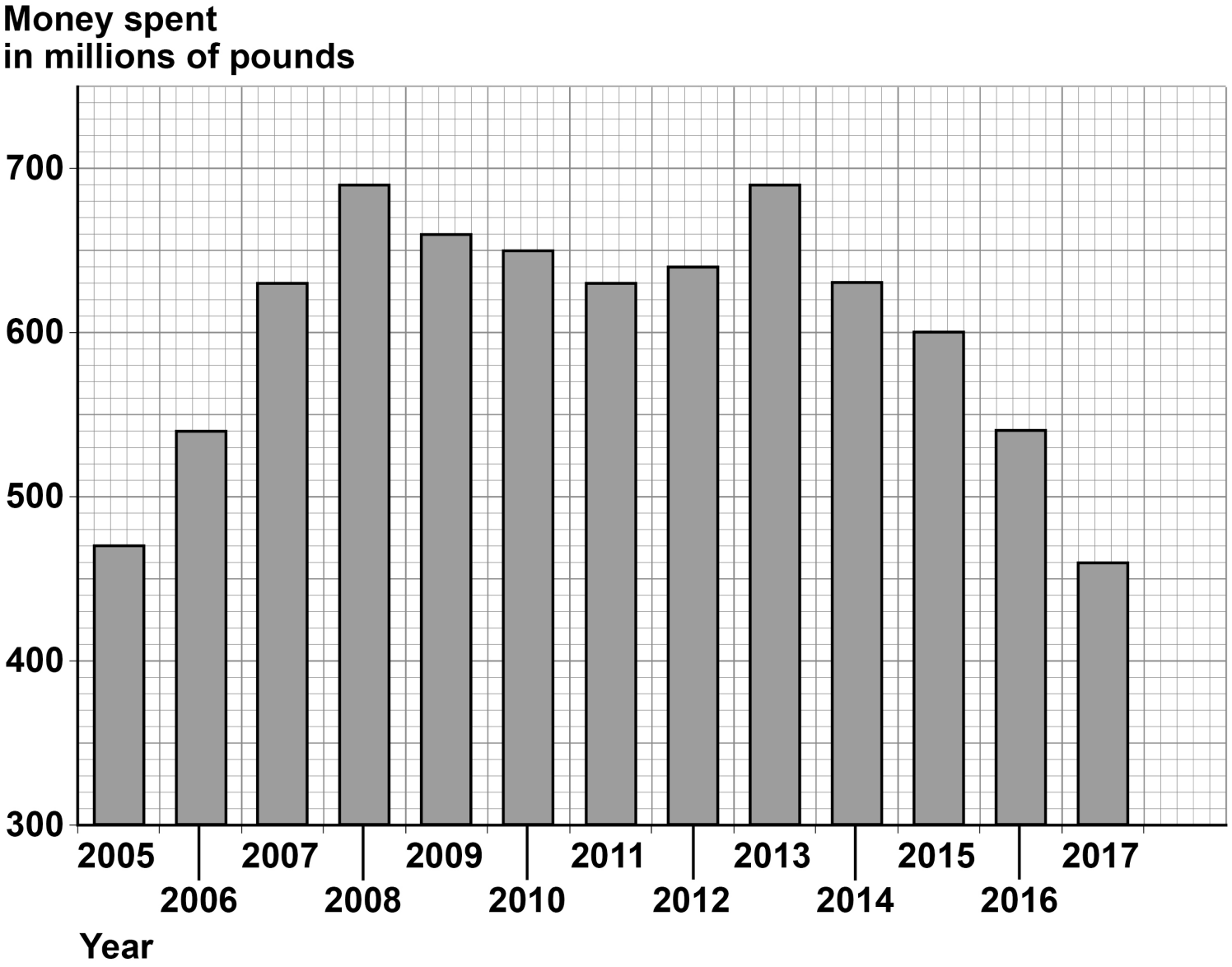
FIGURE 6, on the opposite page, shows the money spent on conserving biodiversity in the UK by the government.

0 7 . 1

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

Use data from FIGURE 6 in your answer. [2 marks]

FIGURE 6



[Turn over]

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0 7 . 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 7 . 3

Conservation of peat bogs can help maintain biodiversity.

Give TWO uses of peat taken from peat bogs. [2 marks]

1 _____

_____

_____

2 _____

_____

_____

0 7 . 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 _____

_____

_____

END OF QUESTIONS

9

Additional page, if required.
Write the question numbers in the left-hand margin.

Additional page, if required.
Write the question numbers in the left-hand margin.

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For Examiner's Use	
Question	Mark
1	
2	
3	
4	
5	
6	
7	
TOTAL	