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

F

Foundation Tier
Biology Paper 2F

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	
7	
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 A human body cell contains 46 chromosomes.

0 1 . 1 How many chromosomes does a human sperm cell contain?

[1 mark]

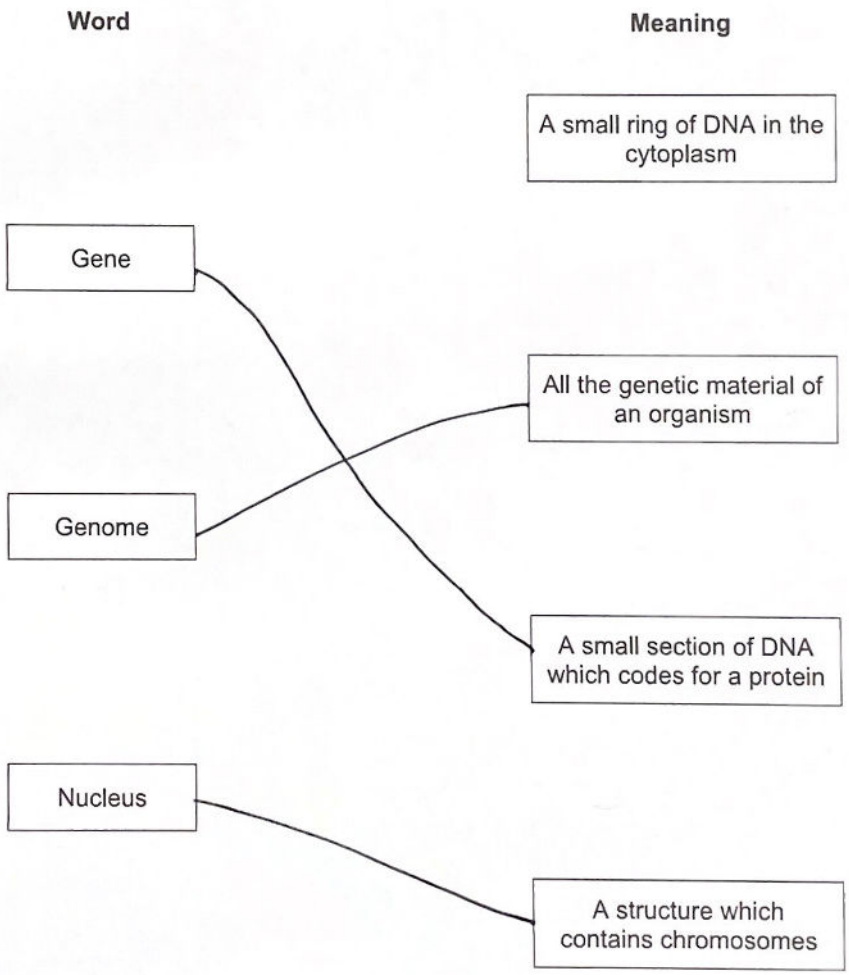
Tick (✓) **one** box.

22 ☐ 23 ☑ 46 ☐

It has half of a regular cells so $\frac{46}{2} = 23$

0 1 . 2 Draw **one** line from each word to the meaning of that word.

[3 marks]



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]

Prevents them from eating the plant that contains PTC that can be harmful to them.

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	

They have one T gene and one t gene so 2 different versions of the same gene, that is called heterozygous.

0 1 . 5 Give the genotype of a person who **cannot** taste PTC.

[1 mark]

tt

While t means recessive, so in order for the recessive gene ~~genotype~~ to be expressed they must have a homozygous recessive genotype.

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	Woman: t
Man	T	T T	T t
	t	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% ☐

10

TT + Tt + Tt

As tasting it is dominant all heterozygous offspring with a single T gene will be able to taste it.

Turn over for the next question

Do not write outside the box

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	☑

This is the variable we are measuring due to changing the condition of coffee or no coffee.

0 2 . 2 Give **two** control variables the students should have used.

[2 marks]

1 [redacted] Keep the Sex of the Students participating the same

2 exclude any student who already had some caffeine that day

OR 3 ~~what~~ Do all test roughly at the same time of the day.

0 2 . 3 Why did the students wait 15 minutes after drinking the coffee before repeating the test?

[1 mark]

To allow time for the caffeine to be absorbed and reach the brain to bring about an effect potentially.

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 ☐

We sense light through our eyes through receptors

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 ☐

This is the organ that ~~bo~~ brought the change that caused the key to be pressed.

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]

The reaction time decreases after coffee compared to before coffee for all students.

0 2 . 7 Which student had the smallest change in reaction time after drinking coffee?

[1 mark]

Tick (✓) **one** box.

Student 1	☐	130 ms
Student 2	☐	129 ms
Student 3	✓	20 ms
Student 4	☐	612 ms
Student 5	☐	216 ms

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]

leave out the anomalous result from their calculation.
only include the other 4 in the mean.

9

Turn over for the next question

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]

nuts → birds → cat

Arrows show what gets eaten by what, going from food to organism eating it.

0 3 . 2 Which organism in the food chain you gave in Question **03.1** is the primary consumer?

[1 mark]

birds, as they are the first to consume nuts which are producers.

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]

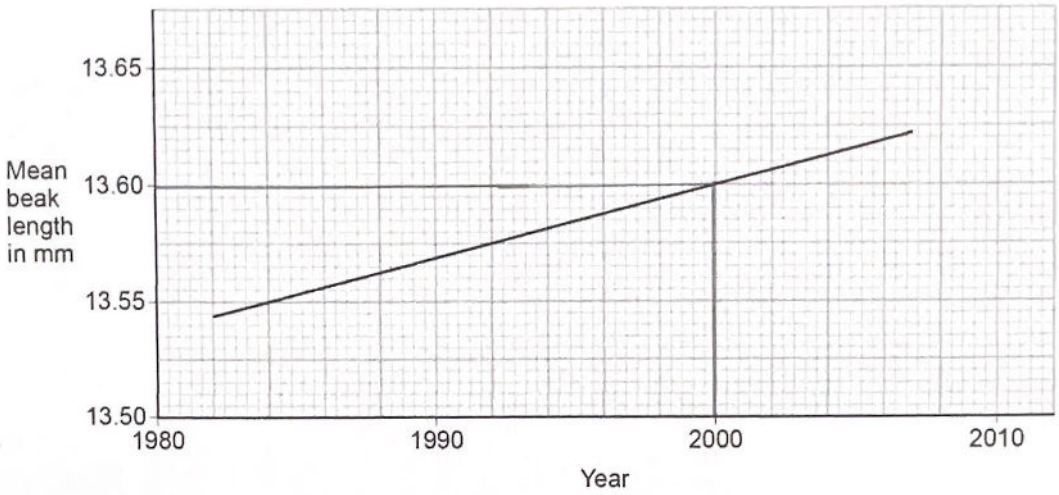
Tick (✓) **two** boxes.

Food	✓	Food is produced by plant which are living, so biotic factors
Pathogens	✓	Phatogens are bacteria, viruses, fungi, ticks which are organisms so also biotic factors.
Sunlight		
Temperature		
Water		

Question 3 continues on the next page

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 = 13.60 mm

Go along to 2000, up till hitting the line, then along horizontally to read of y axis value

0 3 . 5 What type of adaptation is beak length?

[1 mark]

Tick (✓) **one** box.

Behavioural	
Chemical	
Structural	✓

The structure of the birds body is changing

Figure 3 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 box.

[4 marks]

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

The difference in beak length in the bird population is called variation.

There is natural variation within all populations.

A change in a gene affects the beak length.

Change in a gene is called mutation.

The birds with the longest beaks get more food.

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

The longer they survive the more chances they will have to reproduce

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

Evolution takes longer than the lifetime of an individual.

Question 3 continues on the next page

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. ☐

As evolution happens over life cycles of a population with shorter life cycles we will see evolution over shorter time. Humans have much longer life cycles.

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. ☐

Resistance to antibiotics is a trait that can evolve in a population of bacteria if they are exposed to it.

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.

With latin names

Ourasphaira giraldae

first name is genus

second name is species.

- 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 ☐

With the lack of oxygen the fungus didn't break down, as organisms decaying matter require oxygen.

Question 4 continues on the next page

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 ☐

Move the decimal places by 8 units so $\times 10^8$

8 9 0 0 0 0 0 0 0 . 0

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 ☐

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 ☑ fungi are multicellular eukaryotes so belong in the Eukaryota domain

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. ☑

~~gene sequencing?~~

Many more types of organisms have become extinct. ☐

Some fossils are buried so deep that they may never be discovered. ☐

0 4 . 7 The fungus *Ourasphaira giraldae* is now extinct.

Give **two** possible causes of extinction.

[2 marks]

1 Chatostrophic event or natural disaster wiping out the species or making their habitat uninhabitable.

2 Outcompeted by other species for food / habitat.

OR

New predator wiping them out fully.

OR

New disease arising that they can't recover from and are all wiped out by.

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]

Reduced amount of photosynthesis as cut out trees can no longer fix carbon.

OR

Cut out wood is decaying or burnt which both release carbon dioxide back into the atmosphere.

0 5 . 2 Name **one** other gas that contributes to climate change.

Do **not** refer to carbon dioxide in your answer.

[1 mark]

methane / water vapour / nitrogen oxide

0 5 . 3 Meat is produced for humans to eat.

Give **two** ways the production of meat releases carbon dioxide.

[2 marks]

1 respiration of the animals as they grow released by animals

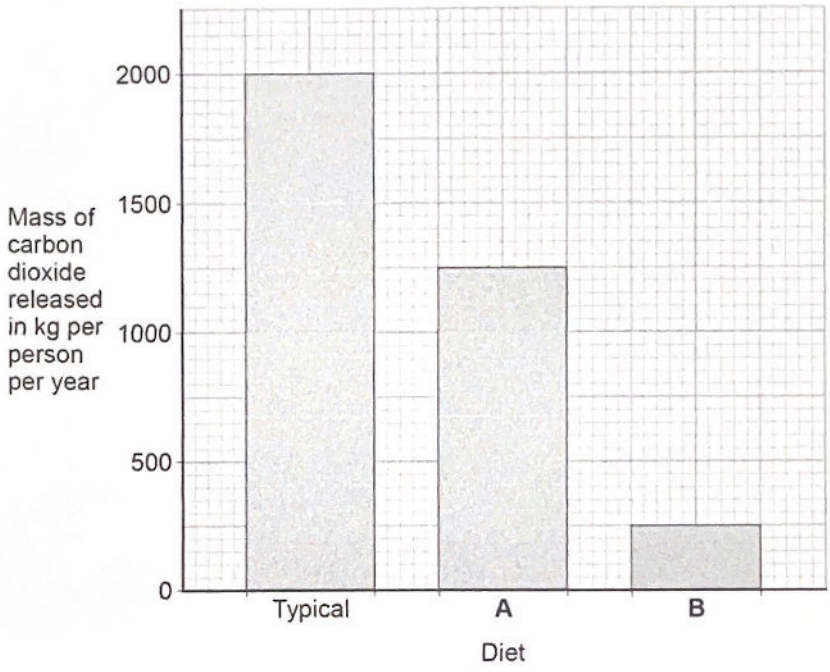
2 fuel ~~burnt~~ burnt in transportation of food, animals and heating for animals, as well as for cooking meat

Question 5 continues on the next page

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]

All diets release carbon dioxide, but they varrie by how much.

A Typical diet releases 2000 kg/p/year which is 750 kg/p/year more than Diet A and 1750 kg/p/year more than Diet B.

Diet A releases less than a typical, but still 1000 kg/p/year more than Diet B.

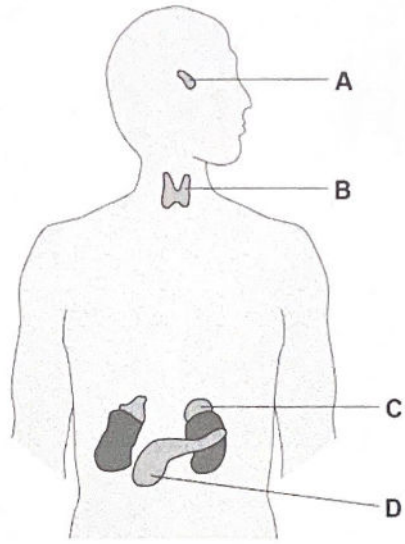
These values are calculated by calculating the difference in the height of each bar for each diet using the y axis.

8

Turn over for the next question

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]

Endocrine System

This is its proper scientific name. The 'hormone system' is too vague of a term.

0 6 . 2 Which gland produces insulin?

[1 mark]

Tick (✓) **one** box.

A ☐ B ☐ C ☑ D ☑

Pancreas

0 6 . 3 Which gland produces hormones that stimulate the other glands to produce hormones?

[1 mark]

Tick (✓) **one** box.

A ☑ B ☐ C ☐ D ☐

pituatry gland also known as a the master gland

0 6 . 4 How do hormones travel from one gland to another gland?

[1 mark]

Hormones are released into the blood stream so travel in the blood to target organs through the blood vessels.

0 6 . 5 Name **two** glands involved in human reproduction.

Do **not** refer to glands shown on **Figure 5** in your answer.

[2 marks]

1 testes (male reproductive gland)

2 ovaries (female reproductive gland)

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

LH release causes ovulation, so when its released in large quantities ovulation is about to occur

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]

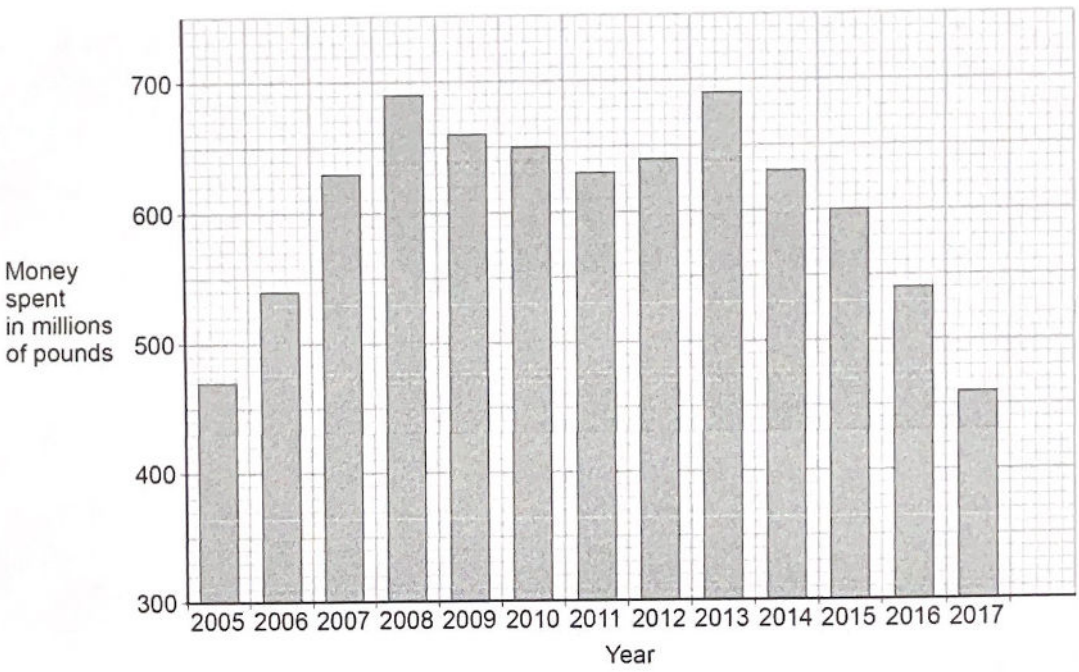
Some advantages of the new drug is that it last longer than some of the other methods, such as condoms, IUDs, diaphragms. Its a long term method of contraception for men, but unlike sterilisation its not permanant, no other similar options for men out there. Also, it is not something that could be forgotten like contraceptive pills.

On the other hand, disadvantages include: lack of protection from STDs like a condom would provide. Also, it can be effective for up to 13 years, but we don't know exactly how long will it be effective for a given individual. As its still being tested we cannot be certain about its effectiveness with humans and any side effects that may yet not be known. However a main problem is that once received patient is not permenantly unable to reproduce, but cant change their mind for 13 years, unlike with some other methods,

13

0 7 **Figure 6** shows the money spent on conserving biodiversity in the UK by the government.

Figure 6



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]

Increase every year between 2005 to 2008 from 470 to 690 millions of pounds. However, between 2008 and 2011 it decreases every year so that it decreases from 690 to 630 million pounds by 2011.

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 : $\frac{690 - 460}{690} \times 100 = 33.33\ \%$

$\Rightarrow$ 2sf : 33 %

Percentage decrease (2 significant figures) = 33 %

0 7 . 3 Conservation of peat bogs can help maintain biodiversity.

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

[2 marks]

1 Peat containing compost is used for gardening

2 burning peat has been and still is used as a fuel

Question 7 continues on the next page

Do not write outside the box

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 Planting more trees offers more habitats for wildlife giving them a better chance of survival.

2 Breeding programs for endangered species and releasing them back into the wild can boost wild populations.

9

END OF QUESTIONS